



## UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

General Certificate of Education Ordinary Level · May/June 2006

| SUBJECT                                                      | CLASS   | TIME ALLOWED | MAXIMUM MARKS |
|--------------------------------------------------------------|---------|--------------|---------------|
| <b>Combined Science</b><br>5129/01 · Paper 1 Multiple Choice | O Level | 1 hour       | <b>40</b>     |

Name: \_\_\_\_\_ Date: \_\_\_\_\_

### Additional Materials:

- Multiple Choice Answer Sheet
- Soft clean eraser
- Soft pencil (type B or HB is recommended)

### READ THESE INSTRUCTIONS FIRST

Write in soft pencil.

Do not use staples, paper clips, highlighters, glue or correction fluid.

Write your name, Centre number and candidate number on the Answer Sheet in the spaces provided unless this has been done for you.

There are **forty** questions on this paper. Answer **all** questions. For each question there are four possible answers **A, B, C** and **D**.

Choose the **one** you consider correct and record your choice in **soft pencil** on the separate Answer Sheet.

**Read the instructions on the Answer Sheet very carefully.**

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

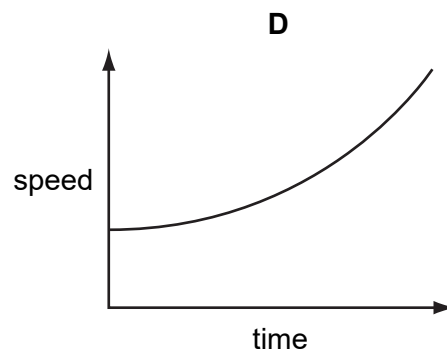
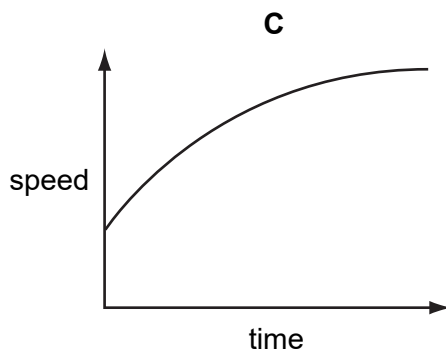
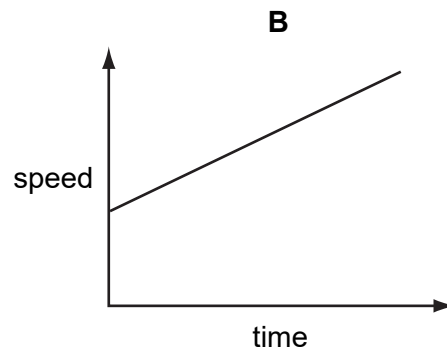
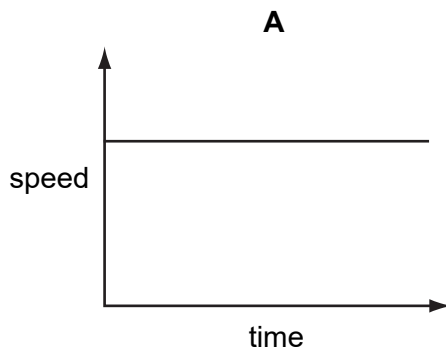
Any rough working should be done in this booklet.

A copy of the Periodic Table is printed on page 16.

- 1 A constant force causes a car to accelerate.

Which graph shows how the speed of the car varies with time?

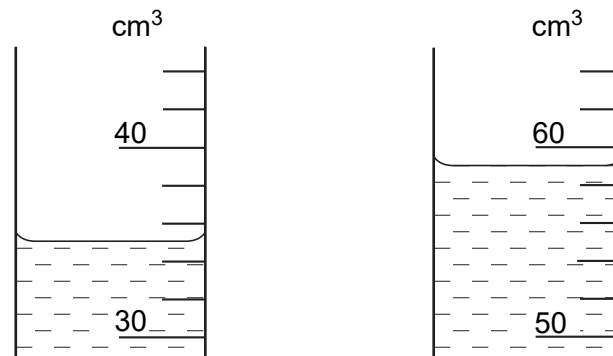
[1]





- 2 A quantity of water is poured into a measuring cylinder. A small piece of rock is then added carefully.

The two diagrams show the water levels and the measuring cylinder scales.

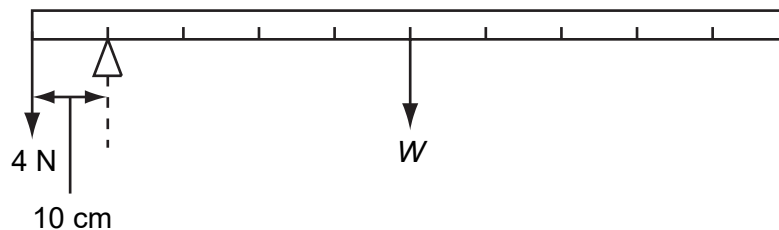


What are the correct values for the volumes of water and rock?

[1]

|   | volume of water / $\text{cm}^3$ | volume of rock / $\text{cm}^3$ |
|---|---------------------------------|--------------------------------|
| A | 32.5                            | 22.0                           |
| B | 32.5                            | 54.5                           |
| C | 35.0                            | 24.0                           |
| D | 35.0                            | 59.0                           |

- 3 A uniform metre rule is balanced by a 4 N weight as shown in the diagram.



What is the weight W of the metre rule?

[1]

- A 1 N      B 4 N      C 16 N      D 40 N

- 4 Which property of a body **cannot** be changed if a force is applied to it?

[1]

- A its mass  
B its shape  
C its size  
D its velocity

- 5 What are the energy changes in hydroelectric power production?

[1]

- A kinetic → electrical → potential  
B kinetic → potential → electrical  
C potential → electrical → kinetic  
D potential → kinetic → electrical



- 6 The earliest Ford cars were always painted black. This was because black paint dried more quickly than lighter colours when the cars were left in the sun to dry.

Which property of black paint makes it dry more quickly?

[1]

- A It is the best absorber of heat.
- B It is the best conductor of heat.
- C It is the best insulator of heat.
- D It is the best reflector of heat.

- 7 Water waves are produced in a ripple tank using a vibrator of frequency 3 Hz.

Which values of speed and wavelength could the waves have?

[1]

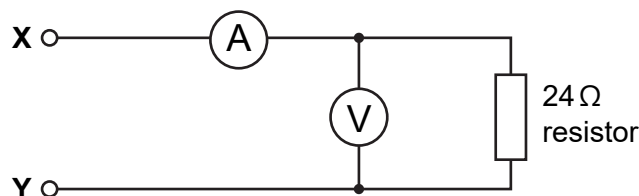
|   | speed / cm per s | wavelength / cm |
|---|------------------|-----------------|
| A | 1                | 3               |
| B | 5                | 15              |
| C | 6                | 2               |
| D | 12               | 6               |

- 8 When a converging lens is used as a magnifying glass, what is the nature of the image?

[1]

- A real and inverted
- B real and upright
- C virtual and inverted
- D virtual and upright

- 9 The diagram shows an electric circuit.

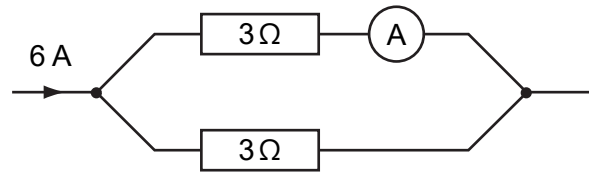


Which pair of readings is obtained when a suitable power supply is connected to X and Y?

[1]

|   | voltmeter | ammeter |
|---|-----------|---------|
| A | 2 V       | 6 A     |
| B | 2 V       | 0.5 A   |
| C | 12 V      | 0.5 A   |
| D | 12 V      | 2 A     |

- 10 A current of 6 A flows in the circuit shown. The current splits up when it enters parallel branches of resistors.



What is the reading on the ammeter?

[1]

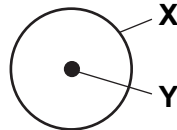
- A 2 A      B 3 A      C 6 A      D 12 A

- 11 Which properties make materials suitable for use as a core in an electromagnet?

[1]

- A difficult to magnetise and easy to demagnetise  
 B difficult to magnetise and retains magnetic strength  
 C easy to magnetise and demagnetise  
 D easy to magnetise and retains magnetic strength

- 12 In the simple model of an atom, **X** orbits around **Y**.



What are **X** and **Y**?

[1]

|          | <b>X</b> | <b>Y</b> |
|----------|----------|----------|
| <b>A</b> | electron | nucleus  |
| <b>B</b> | neutron  | electron |
| <b>C</b> | nucleus  | proton   |
| <b>D</b> | proton   | neutron  |

- 13 **X**, **Y** and **Z** are three types of radiation.

**X** is almost completely absorbed by 5 cm lead but not by 5 mm aluminium.

**Y** is almost completely absorbed by 5 mm aluminium but not by thin card.

**Z** is absorbed by thin card.

What are **X**, **Y** and **Z**?

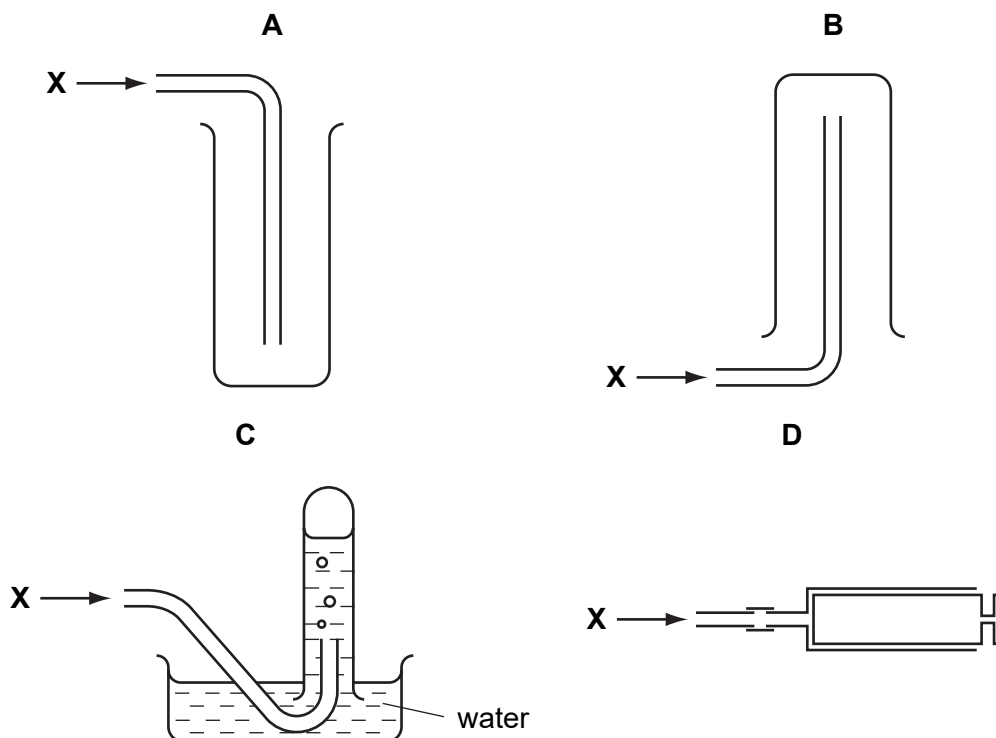
[1]

|          | <b>X</b> | <b>Y</b> | <b>Z</b> |
|----------|----------|----------|----------|
| <b>A</b> | alpha    | beta     | gamma    |
| <b>B</b> | beta     | alpha    | gamma    |
| <b>C</b> | gamma    | alpha    | beta     |
| <b>D</b> | gamma    | beta     | alpha    |

- 14 A gas, X, is less dense than air and insoluble in water.

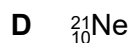
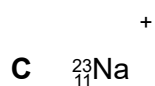
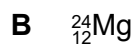
Which method **cannot** be used to collect the gas?

[1]



- 15 Which particle contains 10 electrons and 12 neutrons?

[1]

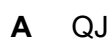


- 16 Each atom of element Q contains 2 electrons in its outermost shell.

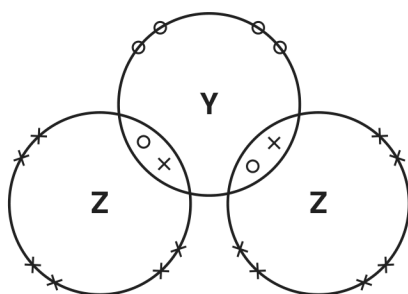
Each atom of element J contains 7 electrons in its outermost shell.

What is the formula of the compound formed when Q and J combine?

[1]



17 The diagram shows the outer shell electrons in the compound  $\text{YZ}_2$ .



key

○ electrons of Y atom

× electrons of Z atom

Which pair of elements could be Y and Z?

[1]

|   | Y       | Z        |
|---|---------|----------|
| A | calcium | fluorine |
| B | carbon  | sulphur  |
| C | oxygen  | hydrogen |
| D | sulphur | chlorine |

18 Copper(II) sulphate crystals lose water when heated.

|       |                                           |               |                 |   |                       |
|-------|-------------------------------------------|---------------|-----------------|---|-----------------------|
|       | $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ | $\rightarrow$ | $\text{CuSO}_4$ | + | $5\text{H}_2\text{O}$ |
| $M_r$ | 250                                       |               | 160             |   |                       |

What is the mass of water lost on heating 5 g of  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ ?

[1]

A 4.5 g      B 1.8 g      C 0.9 g      D 0.18 g

19 Strontium hydroxide is an alkali.

Which statement about aqueous strontium hydroxide is correct?

[1]

- A The solution contains fewer hydrogen ions than hydroxide ions.
- B The solution has a pH less than 7.
- C The solution reacts with metal carbonates to form carbon dioxide.
- D The solution turns blue litmus red.

20 The names and electronic structures of the noble gases are shown.

|         |                 |
|---------|-----------------|
| helium  | 2               |
| neon    | 2, 8            |
| argon   | 2, 8, 8         |
| krypton | 2, 8, 18, 8     |
| xenon   | 2, 8, 18, 18, 8 |

Why are the noble gases unreactive?

[1]

- A They all have an even number of electrons.
- B They all have a stable arrangement of electrons.
- C They all have eight electrons in the outer shell.
- D They all have two electrons in the first shell.

- 21 An excess of zinc powder is added to a solution containing a mixture of the ions  $\text{Ca}^{2+}$ ,  $\text{Cu}^{2+}$ ,  $\text{Fe}^{2+}$  and  $\text{Mg}^{2+}$ .

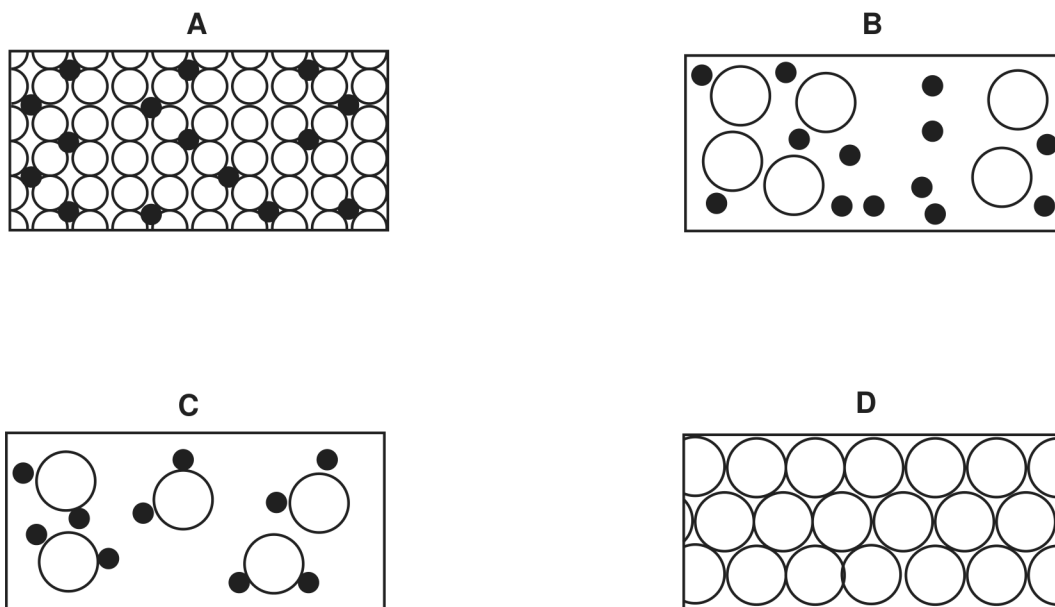
Which two metals are displaced from this solution?

[1]

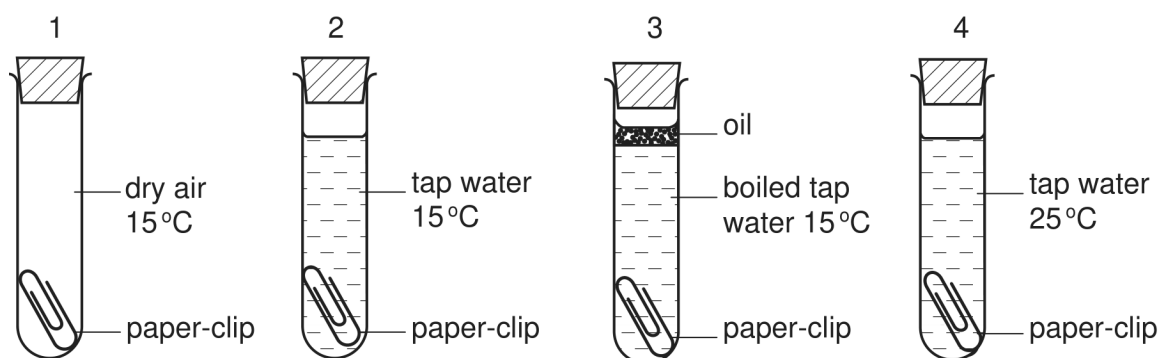
- A calcium and copper
- B calcium and magnesium
- C copper and iron
- D magnesium and iron

- 22 Which drawing shows the arrangement of particles in a solid alloy?

[1]



- 23 Four experiments on rusting are shown.



not rusty  
after 1 week

rusts after  
1 week

not rusty  
after 1 week

rusts after  
1 week

Which two experiments show that air is needed for iron to rust?

[1]

- A 1 and 3
- B 1 and 4
- C 2 and 3
- D 2 and 4



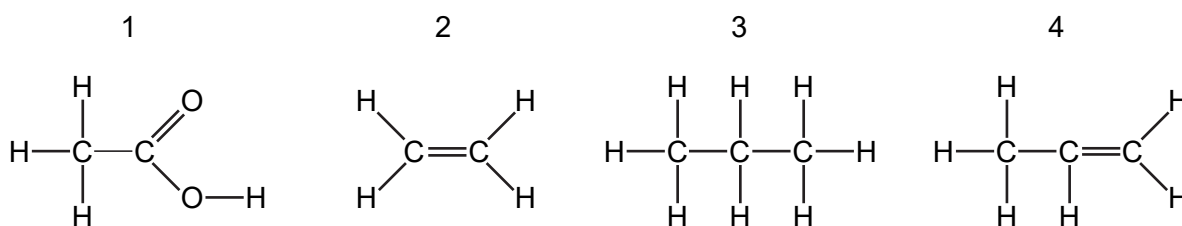
- 24 Which conditions are used for the manufacture of ammonia by the Haber process? [1]

|   | catalyst used | pressure / atm | temperature / °C |
|---|---------------|----------------|------------------|
| A | iron          | 200            | 450              |
| B | iron          | 450            | 200              |
| C | nickel        | 200            | 450              |
| D | nickel        | 450            | 200              |

- 25 Which compound is an alkene? [1]

A  $\text{CH}_4$       B  $\text{C}_2\text{H}_6$       C  $\text{C}_3\text{H}_8$       D  $\text{C}_4\text{H}_8$

- 26 The structures of four organic compounds are shown.



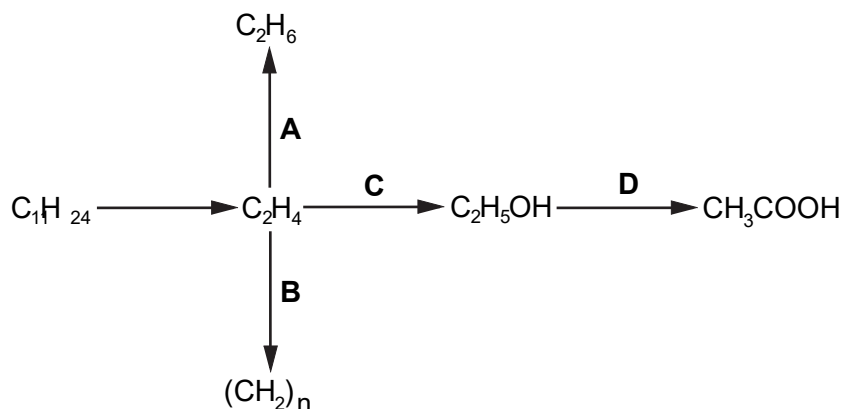
Which compounds decolourise aqueous bromine? [1]

A 1 and 2 only      B 2 and 4 only      C 3 only      D 3 and 4 only

- 27 The hydrocarbon  $\text{C}_{11}\text{H}_{24}$  is present in crude oil.

The diagram shows reactions by which various products can be obtained from  $\text{C}_{11}\text{H}_{24}$ .

In which step does oxidation take place? [1]

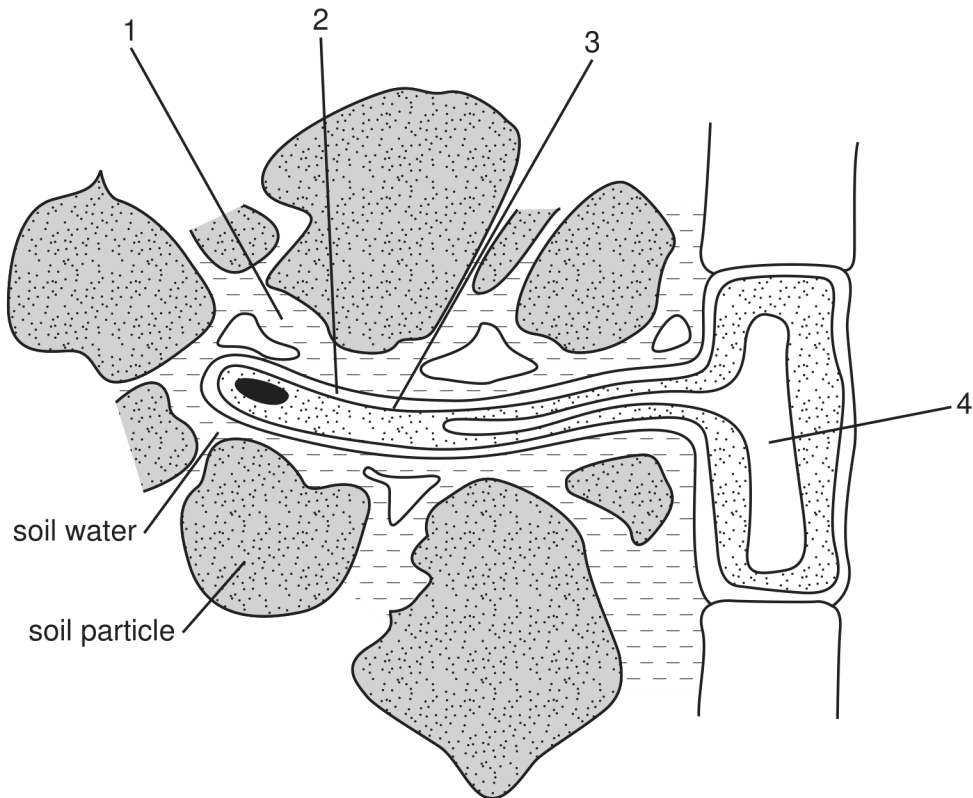


- 28 A cell is being examined.

Which feature would enable you to identify it as a plant cell or an animal cell? [1]

- A The cell contains a single large sap vacuole space.  
B The cell contains glucose and amino acids.  
C The cell contains stored fat.  
D The cell surface membrane is partially permeable.

- 29 The diagram shows a root hair cell and surrounding soil particles.



Osmosis occurs when regions of higher and lower concentration of water molecules are separated by a partially permeable membrane.

On the diagram, what are these regions?

[1]

|          | higher concentration<br>of water molecules | partially permeable<br>membrane | lower concentration<br>of water molecules |
|----------|--------------------------------------------|---------------------------------|-------------------------------------------|
| <b>A</b> | 1                                          | 2                               | 4                                         |
| <b>B</b> | 1                                          | 3                               | 4                                         |
| <b>C</b> | 4                                          | 2                               | 1                                         |
| <b>D</b> | 4                                          | 3                               | 1                                         |

30 What are enzymes?

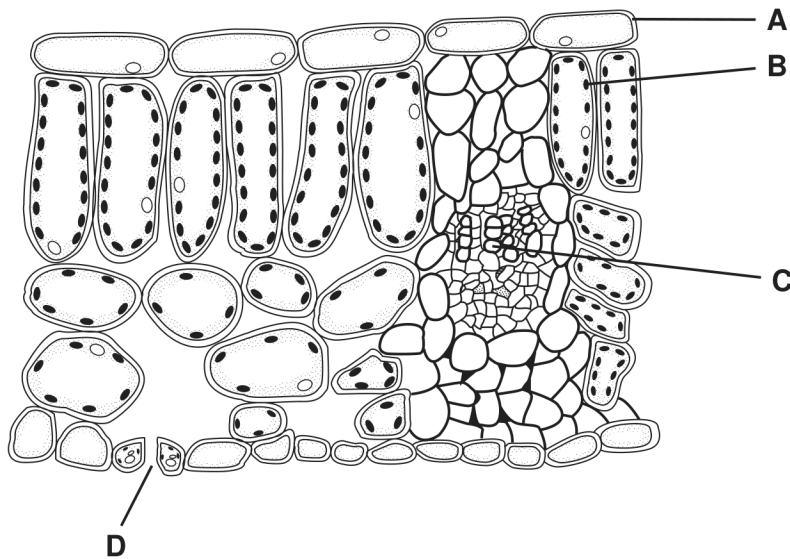
[1]

- A** fats which are secreted by glands in the digestive system
- B** proteins which are unaffected by temperature
- C** fats which have a characteristic molecular shape
- D** proteins which act as biological catalysts

31 The diagram shows a cross section of a leaf under the microscope.

Where is light energy converted into chemical energy?

[1]



32 After eating, the pH in the mouth decreases.

Which statement explains this decrease?

[1]

- A Bacteria release acids.
- B Enzymes in saliva release acids.
- C Salivary glands release acids.
- D Taste receptors release acids.

33 What causes wilting to occur in a plant?

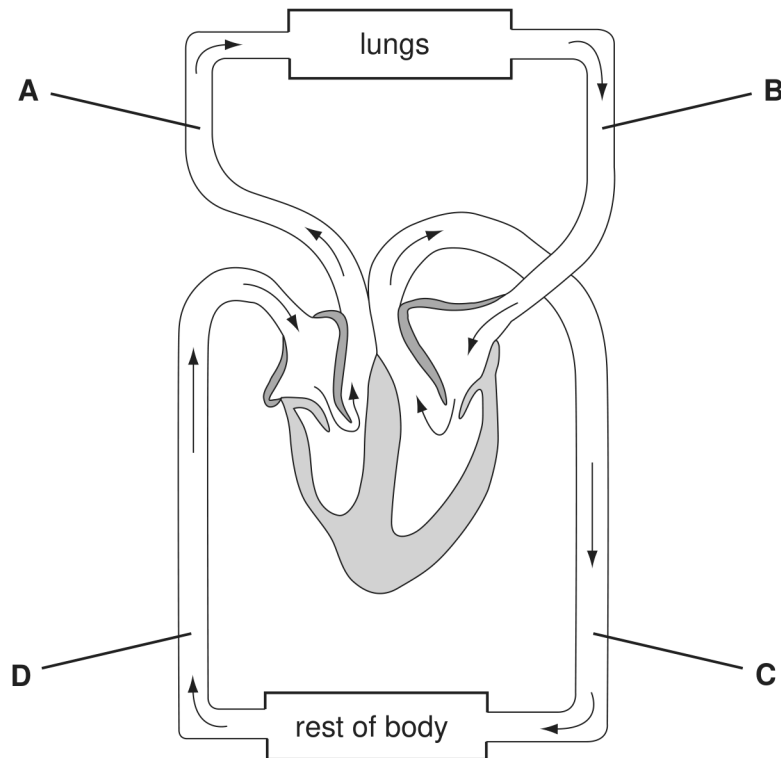
[1]

|   | water loss | water uptake |
|---|------------|--------------|
| A | high       | high         |
| B | high       | low          |
| C | low        | high         |
| D | low        | low          |

**34** The diagram shows the circulatory system.

In which vessel is the blood pressure highest?

[1]



**35** What are the products of anaerobic respiration in yeast?

[1]

- A** alcohol and carbon dioxide
- B** carbon dioxide and glucose
- C** glucose and oxygen
- D** oxygen and alcohol

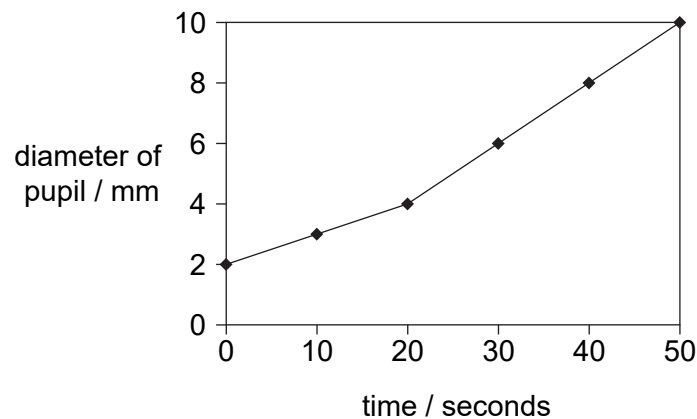
**36** Which **cannot** be an example of excretion?

[1]

- A** Carbon dioxide is breathed out from the lungs.
- B** Undigested food leaves the body through the anus.
- C** Urea leaves the body in urine.
- D** Water is removed through the kidneys.



- 37 A light of varying intensity was shone into a person's eye for 50 seconds.  
The graph shows changes in pupil size as the light intensity was changed.



Which statement explains the change in pupil size?

[1]

- A The light slowly became brighter.
- B The light suddenly became brighter.
- C The light slowly became dimmer.
- D The light suddenly became dimmer.

- 38 What are the effects of the excessive consumption of alcohol?

[1]

|   | depressant | liver damage | quicker reaction time |
|---|------------|--------------|-----------------------|
| A | ✓          | X            | ✓                     |
| B | ✓          | ✓            | X                     |
| C | X          | X            | ✓                     |
| D | X          | ✓            | X                     |

key

✓= effect occurs

X= effect does not occur

- 39 The diagram shows part of a food web.



**DIAGRAM PLACEHOLDER**

Q39 — The diagram shows part of a food web.  
Add diagrams/Sci\_5129\_s06\_1\_Q39.png and rebuild

How many herbivores are shown?

[1]

- A** 3                      **B** 4                      **C** 5                      **D** 6

**40** Which structures protect the flower when it is a bud?

[1]

- A** anthers  
**B** carpels  
**C** petals  
**D** sepals



**DATA SHEET**  
**The Periodic Table of the Elements**

| Group                           |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
|---------------------------------|-----------------------------|------------------------------|-----------------------------|-----------------------------|------------------------------|------------------------------|------------------------------|----------------------------|------------------------------|---------------------------|----------------------------|-----------------------------|-----------------------------|-----------------------------|------------------------------|-----------------------------|---------------------------|-----------------------------|--------------------------|-----------------------------|-------------------------|--|
| I                               | II                          |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            | III                         | IV                          | V                           | VI                           | VII                         | 0                         |                             |                          |                             |                         |  |
|                                 |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              | 1<br>H<br>Hydrogen<br>1     |                           |                             |                          |                             |                         |  |
| 7<br>Li<br>Lithium<br>3         | 9<br>Be<br>Beryllium<br>4   |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              | 11<br>B<br>Boron<br>5       | 12<br>C<br>Carbon<br>6    | 14<br>N<br>Nitrogen<br>7    | 16<br>O<br>Oxygen<br>8   | 19<br>F<br>Fluorine<br>9    | 20<br>Ne<br>Neon<br>10  |  |
| 23<br>Na<br>Sodium<br>11        | 24<br>Mg<br>Magnesium<br>12 |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              | 27<br>A<br>Aluminium<br>13  | 28<br>Si<br>Silicon<br>14 | 31<br>P<br>Phosphorus<br>15 | 32<br>S<br>Sulphur<br>16 | 35.5<br>C<br>Chlorine<br>17 | 40<br>Ar<br>Argon<br>18 |  |
| 39<br>K<br>Potassium<br>19      | 40<br>Ca<br>Calcium<br>20   | 45<br>Sc<br>Scandium<br>21   | 48<br>Ti<br>Titanium<br>22  | 51<br>V<br>Vanadium<br>23   | 52<br>Cr<br>Chromium<br>24   | 55<br>Mn<br>Manganese<br>25  | 56<br>Fe<br>Iron<br>26       | 59<br>Co<br>Cobalt<br>27   | 59<br>Ni<br>Nickel<br>28     | 64<br>Cu<br>Copper<br>29  | 65<br>Zn<br>Zinc<br>30     | 70<br>Ga<br>Gallium<br>31   | 73<br>Ge<br>Germanium<br>32 | 75<br>As<br>Arsenic<br>33   | 79<br>Se<br>Selenium<br>34   | 80<br>Br<br>Bromine<br>35   | 84<br>Kr<br>Krypton<br>36 |                             |                          |                             |                         |  |
| 85<br>Rb<br>Rubidium<br>37      | 88<br>Sr<br>Strontium<br>38 | 89<br>Y<br>Yttrium<br>39     | 91<br>Zr<br>Zirconium<br>40 | 93<br>Nb<br>Niobium<br>41   | 96<br>Mo<br>Molybdenum<br>42 | 98<br>Tc<br>Technetium<br>43 | 101<br>Ru<br>Ruthenium<br>44 | 103<br>Rh<br>Rhodium<br>45 | 106<br>Pd<br>Palladium<br>46 | 108<br>Ag<br>Silver<br>47 | 112<br>Cd<br>Cadmium<br>48 | 115<br>In<br>Indium<br>49   | 119<br>Sn<br>Tin<br>50      | 122<br>Sb<br>Antimony<br>51 | 128<br>Te<br>Tellurium<br>52 | 127<br>I<br>Iodine<br>53    | 131<br>Xe<br>Xenon<br>54  |                             |                          |                             |                         |  |
| 133<br>Cs<br>Caesium<br>55      | 137<br>Ba<br>Barium<br>56   | 139<br>La<br>Lanthanum<br>57 | 178<br>Hf<br>Hafnium<br>72  | 181<br>Ta<br>Tantalum<br>73 | 184<br>W<br>Tungsten<br>74   | 186<br>Re<br>Rhenium<br>75   | 190<br>Os<br>Osmium<br>76    | 192<br>Ir<br>Iridium<br>77 | 195<br>Pt<br>Platinum<br>78  | 197<br>Au<br>Gold<br>79   | 201<br>Hg<br>Mercury<br>80 | 204<br>Tl<br>Thallium<br>81 | 207<br>Pb<br>Lead<br>82     | 209<br>Bi<br>Bismuth<br>83  | 210<br>Po<br>Polonium<br>84  | 210<br>At<br>Astatine<br>85 | 210<br>Rn<br>Radon<br>86  |                             |                          |                             |                         |  |
| Fr<br>Francium<br>87            | 226<br>Ra<br>Radium<br>88   | 227<br>Ac<br>Actinium<br>89  |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 58-71 Lanthanoid series         |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 90-103 Actinoid series          |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 175<br>Lu<br>Lutetium<br>71     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 173<br>Yb<br>Ytterbium<br>70    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 169<br>Tm<br>Thulium<br>69      |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 167<br>Er<br>Erbium<br>68       |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 165<br>Ho<br>Holmium<br>67      |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 162<br>Dy<br>Dysprosium<br>66   |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 159<br>Tb<br>Terbium<br>65      |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 157<br>Gd<br>Gadolinium<br>64   |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 152<br>Eu<br>Europium<br>63     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 150<br>Sm<br>Samarium<br>62     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 144<br>Nd<br>Neodymium<br>60    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 141<br>Pr<br>Praseodymium<br>59 |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 140<br>Ce<br>Cerium<br>58       |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>U<br>Uranium<br>92       |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 236<br>Pu<br>Plutonium<br>94    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Np<br>Neptunium<br>93    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Am<br>Americium<br>95    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Cm<br>Curium<br>96       |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Bk<br>Berkelium<br>97    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Cf<br>Californium<br>98  |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Es<br>Einsteinium<br>99  |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Fm<br>Fermium<br>100     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Md<br>Mendelevium<br>101 |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>No<br>Nobelium<br>102    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Lr<br>Lawrencium<br>103  |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Lu<br>Lutetium<br>71     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Yb<br>Ytterbium<br>70    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Tm<br>Thulium<br>69      |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Er<br>Erbium<br>68       |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Ho<br>Holmium<br>67      |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Dy<br>Dysprosium<br>66   |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Tb<br>Terbium<br>65      |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Gd<br>Gadolinium<br>64   |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Eu<br>Europium<br>63     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Sm<br>Samarium<br>62     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Nd<br>Neodymium<br>60    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Pr<br>Praseodymium<br>59 |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Ce<br>Cerium<br>58       |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>La<br>Lanthanum<br>57    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Ac<br>Actinium<br>89     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Th<br>Thorium<br>90      |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Pa<br>Protactinium<br>91 |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>U<br>Uranium<br>92       |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Np<br>Neptunium<br>93    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Pu<br>Plutonium<br>94    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Am<br>Americium<br>95    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Cm<br>Curium<br>96       |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Bk<br>Berkelium<br>97    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Cf<br>Californium<br>98  |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Es<br>Einsteinium<br>99  |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Fm<br>Fermium<br>100     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Md<br>Mendelevium<br>101 |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>No<br>Nobelium<br>102    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Lr<br>Lawrencium<br>103  |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Lu<br>Lutetium<br>71     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Yb<br>Ytterbium<br>70    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Tm<br>Thulium<br>69      |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Er<br>Erbium<br>68       |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Ho<br>Holmium<br>67      |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Dy<br>Dysprosium<br>66   |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Tb<br>Terbium<br>65      |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Gd<br>Gadolinium<br>64   |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Eu<br>Europium<br>63     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Sm<br>Samarium<br>62     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Nd<br>Neodymium<br>60    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Pr<br>Praseodymium<br>59 |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Ce<br>Cerium<br>58       |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>La<br>Lanthanum<br>57    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Ac<br>Actinium<br>89     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Th<br>Thorium<br>90      |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Pa<br>Protactinium<br>91 |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>U<br>Uranium<br>92       |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Np<br>Neptunium<br>93    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Pu<br>Plutonium<br>94    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Am<br>Americium<br>95    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Cm<br>Curium<br>96       |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Bk<br>Berkelium<br>97    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Cf<br>Californium<br>98  |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Es<br>Einsteinium<br>99  |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Fm<br>Fermium<br>100     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Md<br>Mendelevium<br>101 |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>No<br>Nobelium<br>102    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Lr<br>Lawrencium<br>103  |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Lu<br>Lutetium<br>71     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Yb<br>Ytterbium<br>70    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Tm<br>Thulium<br>69      |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Er<br>Erbium<br>68       |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Ho<br>Holmium<br>67      |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Dy<br>Dysprosium<br>66   |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Tb<br>Terbium<br>65      |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Gd<br>Gadolinium<br>64   |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Eu<br>Europium<br>63     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Sm<br>Samarium<br>62     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Nd<br>Neodymium<br>60    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Pr<br>Praseodymium<br>59 |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Ce<br>Cerium<br>58       |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>La<br>Lanthanum<br>57    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Ac<br>Actinium<br>89     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Th<br>Thorium<br>90      |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Pa<br>Protactinium<br>91 |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>U<br>Uranium<br>92       |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Np<br>Neptunium<br>93    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Pu<br>Plutonium<br>94    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Am<br>Americium<br>95    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Cm<br>Curium<br>96       |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Bk<br>Berkelium<br>97    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Cf<br>Californium<br>98  |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Es<br>Einsteinium<br>99  |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Fm<br>Fermium<br>100     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Md<br>Mendelevium<br>101 |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>No<br>Nobelium<br>102    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Lr<br>Lawrencium<br>103  |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Lu<br>Lutetium<br>71     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Yb<br>Ytterbium<br>70    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Tm<br>Thulium<br>69      |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Er<br>Erbium<br>68       |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Ho<br>Holmium<br>67      |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Dy<br>Dysprosium<br>66   |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Tb<br>Terbium<br>65      |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Gd<br>Gadolinium<br>64   |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Eu<br>Europium<br>63     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Sm<br>Samarium<br>62     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Nd<br>Neodymium<br>60    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Pr<br>Praseodymium<br>59 |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Ce<br>Cerium<br>58       |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>La<br>Lanthanum<br>57    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Ac<br>Actinium<br>89     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Th<br>Thorium<br>90      |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Pa<br>Protactinium<br>91 |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>U<br>Uranium<br>92       |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Np<br>Neptunium<br>93    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Pu<br>Plutonium<br>94    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Am<br>Americium<br>95    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Cm<br>Curium<br>96       |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Bk<br>Berkelium<br>97    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Cf<br>Californium<br>98  |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Es<br>Einsteinium<br>99  |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Fm<br>Fermium<br>100     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Md<br>Mendelevium<br>101 |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>No<br>Nobelium<br>102    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Lr<br>Lawrencium<br>103  |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Lu<br>Lutetium<br>71     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Yb<br>Ytterbium<br>70    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Tm<br>Thulium<br>69      |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Er<br>Erbium<br>68       |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Ho<br>Holmium<br>67      |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Dy<br>Dysprosium<br>66   |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Tb<br>Terbium<br>65      |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Gd<br>Gadolinium<br>64   |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Eu<br>Europium<br>63     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Sm<br>Samarium<br>62     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Nd<br>Neodymium<br>60    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Pr<br>Praseodymium<br>59 |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Ce<br>Cerium<br>58       |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>La<br>Lanthanum<br>57    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Ac<br>Actinium<br>89     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Th<br>Thorium<br>90      |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Pa<br>Protactinium<br>91 |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>U<br>Uranium<br>92       |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Np<br>Neptunium<br>93    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Pu<br>Plutonium<br>94    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Am<br>Americium<br>95    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Cm<br>Curium<br>96       |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Bk<br>Berkelium<br>97    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Cf<br>Californium<br>98  |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Es<br>Einsteinium<br>99  |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Fm<br>Fermium<br>100     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Md<br>Mendelevium<br>101 |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>No<br>Nobelium<br>102    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Lr<br>Lawrencium<br>103  |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Lu<br>Lutetium<br>71     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Yb<br>Ytterbium<br>70    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Tm<br>Thulium<br>69      |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Er<br>Erbium<br>68       |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Ho<br>Holmium<br>67      |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Dy<br>Dysprosium<br>66   |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Tb<br>Terbium<br>65      |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Gd<br>Gadolinium<br>64   |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Eu<br>Europium<br>63     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Sm<br>Samarium<br>62     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Nd<br>Neodymium<br>60    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Pr<br>Praseodymium<br>59 |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Ce<br>Cerium<br>58       |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>La<br>Lanthanum<br>57    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Ac<br>Actinium<br>89     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Th<br>Thorium<br>90      |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Pa<br>Protactinium<br>91 |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>U<br>Uranium<br>92       |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Np<br>Neptunium<br>93    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Pu<br>Plutonium<br>94    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Am<br>Americium<br>95    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Cm<br>Curium<br>96       |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Bk<br>Berkelium<br>97    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Cf<br>Californium<br>98  |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Es<br>Einsteinium<br>99  |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Fm<br>Fermium<br>100     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Md<br>Mendelevium<br>101 |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>No<br>Nobelium<br>102    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Lr<br>Lawrencium<br>103  |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Lu<br>Lutetium<br>71     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Yb<br>Ytterbium<br>70    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Tm<br>Thulium<br>69      |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Er<br>Erbium<br>68       |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Ho<br>Holmium<br>67      |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Dy<br>Dysprosium<br>66   |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Tb<br>Terbium<br>65      |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Gd<br>Gadolinium<br>64   |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Eu<br>Europium<br>63     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Sm<br>Samarium<br>62     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Nd<br>Neodymium<br>60    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Pr<br>Praseodymium<br>59 |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Ce<br>Cerium<br>58       |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>La<br>Lanthanum<br>57    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Ac<br>Actinium<br>89     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Th<br>Thorium<br>90      |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Pa<br>Protactinium<br>91 |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>U<br>Uranium<br>92       |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Np<br>Neptunium<br>93    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Pu<br>Plutonium<br>94    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Am<br>Americium<br>95    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Cm<br>Curium<br>96       |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Bk<br>Berkelium<br>97    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Cf<br>Californium<br>98  |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Es<br>Einsteinium<br>99  |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Fm<br>Fermium<br>100     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Md<br>Mendelevium<br>101 |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>No<br>Nobelium<br>102    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Lr<br>Lawrencium<br>103  |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Lu<br>Lutetium<br>71     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Yb<br>Ytterbium<br>70    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Tm<br>Thulium<br>69      |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Er<br>Erbium<br>68       |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Ho<br>Holmium<br>67      |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Dy<br>Dysprosium<br>66   |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Tb<br>Terbium<br>65      |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Gd<br>Gadolinium<br>64   |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Eu<br>Europium<br>63     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Sm<br>Samarium<br>62     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Nd<br>Neodymium<br>60    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Pr<br>Praseodymium<br>59 |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Ce<br>Cerium<br>58       |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>La<br>Lanthanum<br>57    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Ac<br>Actinium<br>89     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Th<br>Thorium<br>90      |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Pa<br>Protactinium<br>91 |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>U<br>Uranium<br>92       |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Np<br>Neptunium<br>93    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Pu<br>Plutonium<br>94    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Am<br>Americium<br>95    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Cm<br>Curium<br>96       |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Bk<br>Berkelium<br>97    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Cf<br>Californium<br>98  |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Es<br>Einsteinium<br>99  |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Fm<br>Fermium<br>100     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Md<br>Mendelevium<br>101 |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>No<br>Nobelium<br>102    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Lr<br>Lawrencium<br>103  |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Lu<br>Lutetium<br>71     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Yb<br>Ytterbium<br>70    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Tm<br>Thulium<br>69      |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Er<br>Erbium<br>68       |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Ho<br>Holmium<br>67      |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Dy<br>Dysprosium<br>66   |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Tb<br>Terbium<br>65      |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Gd<br>Gadolinium<br>64   |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Eu<br>Europium<br>63     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Sm<br>Samarium<br>62     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Nd<br>Neodymium<br>60    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Pr<br>Praseodymium<br>59 |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Ce<br>Cerium<br>58       |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>La<br>Lanthanum<br>57    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Ac<br>Actinium<br>89     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Th<br>Thorium<br>90      |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Pa<br>Protactinium<br>91 |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>U<br>Uranium<br>92       |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Np<br>Neptunium<br>93    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Pu<br>Plutonium<br>94    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Am<br>Americium<br>95    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Cm<br>Curium<br>96       |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Bk<br>Berkelium<br>97    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Cf<br>Californium<br>98  |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Es<br>Einsteinium<br>99  |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Fm<br>Fermium<br>100     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Md<br>Mendelevium<br>101 |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>No<br>Nobelium<br>102    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Lr<br>Lawrencium<br>103  |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Lu<br>Lutetium<br>71     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Yb<br>Ytterbium<br>70    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Tm<br>Thulium<br>69      |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Er<br>Erbium<br>68       |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Ho<br>Holmium<br>67      |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Dy<br>Dysprosium<br>66   |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Tb<br>Terbium<br>65      |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Gd<br>Gadolinium<br>64   |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Eu<br>Europium<br>63     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Sm<br>Samarium<br>62     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Nd<br>Neodymium<br>60    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Pr<br>Praseodymium<br>59 |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Ce<br>Cerium<br>58       |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>La<br>Lanthanum<br>57    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Ac<br>Actinium<br>89     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Th<br>Thorium<br>90      |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Pa<br>Protactinium<br>91 |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>U<br>Uranium<br>92       |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Np<br>Neptunium<br>93    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Pu<br>Plutonium<br>94    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Am<br>Americium<br>95    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Cm<br>Curium<br>96       |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Bk<br>Berkelium<br>97    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Cf<br>Californium<br>98  |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Es<br>Einsteinium<br>99  |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Fm<br>Fermium<br>100     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Md<br>Mendelevium<br>101 |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>No<br>Nobelium<br>102    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Lr<br>Lawrencium<br>103  |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Lu<br>Lutetium<br>71     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Yb<br>Ytterbium<br>70    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Tm<br>Thulium<br>69      |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Er<br>Erbium<br>68       |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Ho<br>Holmium<br>67      |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Dy<br>Dysprosium<br>66   |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Tb<br>Terbium<br>65      |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Gd<br>Gadolinium<br>64   |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Eu<br>Europium<br>63     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Sm<br>Samarium<br>62     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Nd<br>Neodymium<br>60    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Pr<br>Praseodymium<br>59 |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Ce<br>Cerium<br>58       |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>La<br>Lanthanum<br>57    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Ac<br>Actinium<br>89     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Th<br>Thorium<br>90      |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Pa<br>Protactinium<br>91 |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>U<br>Uranium<br>92       |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Np<br>Neptunium<br>93    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Pu<br>Plutonium<br>94    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Am<br>Americium<br>95    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Cm<br>Curium<br>96       |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Bk<br>Berkelium<br>97    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Cf<br>Californium<br>98  |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Es<br>Einsteinium<br>99  |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Fm<br>Fermium<br>100     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Md<br>Mendelevium<br>101 |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>No<br>Nobelium<br>102    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Lr<br>Lawrencium<br>103  |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Lu<br>Lutetium<br>71     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Yb<br>Ytterbium<br>70    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Tm<br>Thulium<br>69      |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Er<br>Erbium<br>68       |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Ho<br>Holmium<br>67      |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Dy<br>Dysprosium<br>66   |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Tb<br>Terbium<br>65      |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Gd<br>Gadolinium<br>64   |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Eu<br>Europium<br>63     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Sm<br>Samarium<br>62     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Nd<br>Neodymium<br>60    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Pr<br>Praseodymium<br>59 |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Ce<br>Cerium<br>58       |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>La<br>Lanthanum<br>57    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Ac<br>Actinium<br>89     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Th<br>Thorium<br>90      |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Pa<br>Protactinium<br>91 |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>U<br>Uranium<br>92       |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Np<br>Neptunium<br>93    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Pu<br>Plutonium<br>94    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Am<br>Americium<br>95    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Cm<br>Curium<br>96       |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Bk<br>Berkelium<br>97    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Cf<br>Californium<br>98  |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Es<br>Einsteinium<br>99  |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Fm<br>Fermium<br>100     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Md<br>Mendelevium<br>101 |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>No<br>Nobelium<br>102    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Lr<br>Lawrencium<br>103  |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Lu<br>Lutetium<br>71     |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Yb<br>Ytterbium<br>70    |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Tm<br>Thulium<br>69      |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238<br>Er<br>Erbium<br>68       |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |
| 238                             |                             |                              |                             |                             |                              |                              |                              |                            |                              |                           |                            |                             |                             |                             |                              |                             |                           |                             |                          |                             |                         |  |



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