

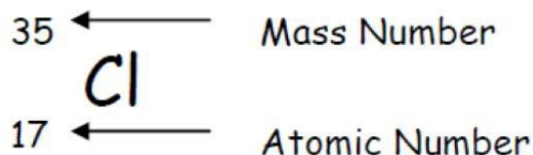
# EP\_4D N5 Nuclide Notation/ Isotopes

Write the date in the margin of your jotter. Write the title of this Exercise as a heading: EP\_4D N5 Nuclide notation



## SUMMARY

### Nuclide Notation

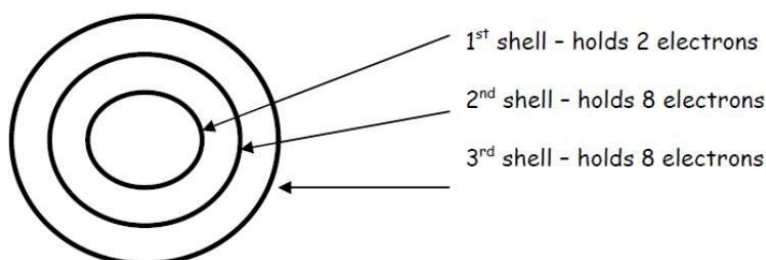


No Protons = 17

No Electrons = 17

No Neutrons =  $35 - 17 = 18$

Outside the nucleus, the electrons fill shells, (or energy levels)



e.g. sodium, Na  $\rightarrow$  11 electrons, arranged 2, 8, 1

In a group, each element has the same number of outer electrons  $\rightarrow$  fixes the chemical properties of the group.

ISOTOPES - are atoms of the same element but have different mass numbers.

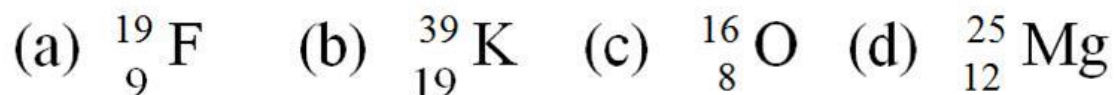


Relative Atomic Mass - is the average mass taking into account the isotopes present and the proportions of each.

## QUESTIONS

1.

State the number of protons, electrons and neutrons in the following atoms.



2.

Naturally occurring silver (atomic number 47, relative atomic mass 108) consists of a mixture of two isotopes with mass numbers 107 ( ${}^{107}\text{Ag}$ ) and 109 ( ${}^{109}\text{Ag}$ ).

Identify the true statement(s).

A	Isotopes of silver have the same number of neutrons.
B	Isotopes of silver have the same number of protons.
C	All silver atoms have a relative atomic mass of 108.
D	Atoms of ${}^{107}\text{Ag}$ are more abundant than those of ${}^{109}\text{Ag}$ .
E	All silver atoms have 47 electrons.

3.

The group 7 element bromine was discovered by Balard in 1826.

Bromine gets its name from the Greek 'bromos' meaning stench.

Bromine consists of a mixture of two isotopes,  ${}^{79}_{35}\text{Br}$  and  ${}^{81}_{35}\text{Br}$ .

(a) What is meant by the term isotope? 1

(b) Complete the table for  ${}^{79}_{35}\text{Br}$ . 1

<i>Isotope</i>	<i>Number of protons</i>	<i>Number of neutrons</i>
${}^{79}_{35}\text{Br}$		

(c) The relative atomic mass of an element can be calculated using the formula:

$$\frac{(\text{mass of isotope A} \times \% \text{ of isotope A}) + (\text{mass of isotope B} \times \% \text{ of isotope B})}{100}$$

100

A sample of bromine contains 55% of the isotope with mass 79 and 45% of the isotope with mass 81.

Calculate the relative atomic mass of bromine in this sample. 2

Show your working clearly.

4

Gold has been associated with wealth since before the first gold coins were minted in Lydia (modern Turkey) about 550 BC. It does not react with water, air, alkalis and almost all acids. Gold only has one naturally occurring isotope with mass 197.

- (b) Calculate the number of neutrons present in the naturally occurring isotope of gold. 1

You may wish to use the data booklet to help you.

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The table shows the numbers of protons, electrons and neutrons in four particles, W, X, Y and Z.

Particle	Protons	Electrons	Neutrons
W	17	17	18
X	11	11	12
Y	17	17	20
Z	18	18	18

Which pair of particles are isotopes?

- A W and X
- B W and Y
- C X and Y
- D Y and Z

6.

The isotopes of carbon and oxygen are given in the table.

Isotopes of carbon	$^{12}_6\text{C}$	$^{13}_6\text{C}$	$^{14}_6\text{C}$
Isotopes of oxygen	$^{16}_8\text{O}$	$^{17}_8\text{O}$	$^{18}_8\text{O}$

A molecule of carbon dioxide with mass 46 could contain

- A one  $^{12}\text{C}$  atom and two  $^{16}\text{O}$  atoms
- B one  $^{14}\text{C}$  atom and two  $^{18}\text{O}$  atoms
- C one  $^{12}\text{C}$  atom, one  $^{16}\text{O}$  atom and one  $^{18}\text{O}$  atom
- D one  $^{14}\text{C}$  atom, one  $^{16}\text{O}$  atom and one  $^{18}\text{O}$  atom.

8.

The element boron contains two types of atoms, of mass numbers 10 and 11.

This tells us that

- A the relative atomic mass of boron will be between 10 and 11
- B the relative atomic mass of boron will be less than 10
- C the boron atom of mass number 10 will be more reactive than that of mass number 11
- D the boron atom of mass number 11 will have more electrons in the atom than that of mass number 10.

7.

Isotopes of the same element have identical

- A nuclei
- B mass numbers
- C numbers of neutrons
- D numbers of protons.

9.

Which of the following numbers is the same for lithium and oxygen atoms?

- A Mass number
- B Atomic number
- C Number of outer electrons
- D Number of occupied energy levels

**NOW CHECK YOUR ANSWERS**

