

**PAGE 27**

**1**

**a.**

An atom is the smallest indivisible particle of a substance that retains the (chemical) properties of that substance.

**b.**

An element is a substance that is made up of the same type of atoms.

**2**

Most of the atom is empty.

The nucleus is at the centre of an atom, and a cloud of electrons whizz around the nucleus in the empty space surrounding it.

**3**

**a.**

Sodium

**b.**

Iron

**c.**

Lead

**d.**

Silver

**4**

**a.**

Calcium

**b.**

Magnesium

**c.**

Nitrogen



**PAGE 27**

**5**

Einsteinium, Es

**6**

**a.**

any three metals from Groups I or II

**b.**

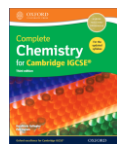
any three non-metals from Group 0 or Group VII.

(In the other groups there is a change from non-metallic to metallic character down the group.)

**NOTE:**

Metals / Non-metals belonging to the same group behave in the same way.

EDUCATALYST



**PAGE 29**

**1**

protons, electrons, and neutrons

**2**

**a.**

proton

**b.**

Neutron

**c.**

electron

**3**

Fluorine

**4**

In an atom, the number of protons = number of electrons, hence the positive and negative charges cancel out.

**5**

**a.**

The number of protons in the nucleus of an atom.

**b.**

The total number of protons and neutrons in the nucleus of an atom

**6**

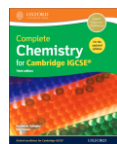
carbon atom: 6p, 6e, 6n

oxygen atom: 8p, 8e, 8n

magnesium atom: 12p, 12e, 12n

aluminium atom: 13p, 13e, 14n;

copper atom: 29p, 29e, 35n

**PAGE 31****1****a.**

Isotopes are atoms of the same element, with the same number of protons (and electrons) but a different number of neutrons.

**b.**

carbon-12,  $^{12}_6\text{C}$

carbon-13,  $^{13}_6\text{C}$

carbon-14,  $^{14}_6\text{C}$

**2**

Carbon-14 has an unstable nucleus which breaks down to emit radiations.

**3**

Radioisotopes are radioactive isotopes.

for example, carbon-14, uranium-235, cobalt-60

**4****a.**

Radiations can kill cells causing damage to the organs. They can trigger genetic mutations.

**b.**

Radiation kills cancerous cells more readily than it kills normal or non-cancerous healthy cells.

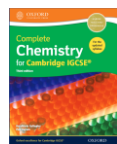
**5****a.**

Radioactive material can be mixed with the liquid or gas in the pipe. The radiations can be detected using a GM counter.

No radiations are generally detected through an intact pipe but can be detected at the position/s from where leaks occur.

**b.**

No radiation will be detected along the pipe externally.



**PAGE 31**

**6**

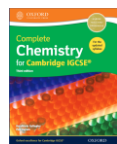
**a.**

to kill the micro-organisms (bacteria) that may cause it to decay

**b.**

cobalt-60 and caesium-137

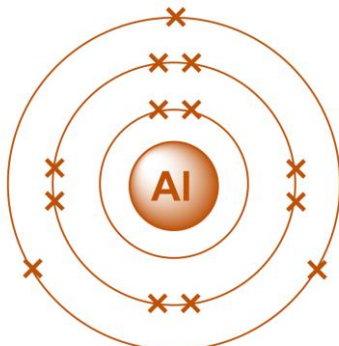
EDUCATALYST



**PAGE 33**

**1**

**a.**



**b.**

$$2 + 8 + 3$$

**c.**

Aluminium

**2**

**a.**

$$2 + 1$$

**b.**

$$2 + 8 + 2$$

**c.**

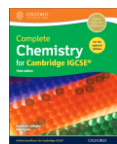
1

**3**

Group V

**4**

3



**PAGE 33**

**5**

**a.**

$$2 + 8 + 18 + 8$$

**b.**

Krypton is chemically unreactive (inert), as it has an octet of electrons in its outermost shell.

EDUCATALYST



**PAGE 39**

**1**

This task is meant for Candidates. They can check their answers using the periodic table on page 27.

**2**

Answers can be checked using the Glossary (page 320 – page 323).

**3**

Aluminium is a good conductor of electricity, has a low density (lightweight), is considerably strong and resistant to corrosion. It is also the most abundant metal.

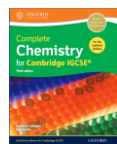
**4**

Metals conduct electricity, are hard and strong, have high melting points and boiling points and form positive ions when they react.

**5**

Refer to general properties of non-metals (table) on page 38  
The last two properties are chemical properties.





**PAGE 40: Core**

**1**

**a.**

A, B and E

**b.**

D, 2- (two more electrons than protons)

**c.**

C, 2+ (two more protons than electrons)

**d.**

A and B

(same number of protons and electrons, but different number of neutrons)

**e.**

A and B = Mg,

C =  $\text{Mg}^{2+}$ , D =  $\text{O}^{2-}$ , E = F

**2**

A p

B n

C n

D e

E e

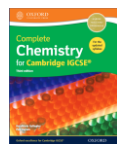
F e

G n

H n

I p

J p



**PAGE 40: Core**

**3**

**a.**

**i.**

symbol of the element

**ii.**

proton number

**iii.**

nucleon number

**b.**

**i.**

60

**ii.**

34

**iii.**

0

**iv.**

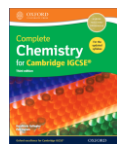
10

**v.**

146

**c.**

${}_{35}^{81}\text{Br}$

**PAGE 41: Core****4****a.**

This table gives the answers:

	<b>Al</b>	<b>B</b>	<b>N</b>	<b>O</b>	<b>P</b>	<b>S</b>
<b>i</b>	3	2	2	2	3	3
<b>ii</b>	3	3	5	6	5	6
<b>iii</b>	13	5	7	8	15	16
<b>iv</b>	13	5	7	8	15	16
<b>v</b>	2.8.3	2.3	2.5	2.6	2.8.5	2.8.6
<b>vi</b>	3	3	5	6	5	6

**b.**

valency

**c.**

Al and B; O and S; N and P

These elements have the same number of valence electrons, hence have similar chemical properties.

**5****a.**

B has an extra neutron

**b.**

isotopes

**c.**

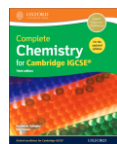
A,  $^{10}_5\text{Br}$ ;  $^{11}_5\text{Br}$

**d.**

10

**e.**

Atom B is heavier than atom A.



**PAGE 41: Core**

**5**

**f.**

**i.**

2 + 3

**ii.**

Isotopes have the same number of electrons, and the same electronic configuration.

**6**

**a.**

**i.**

same

**ii.**

different

**b.**

sodium, since its relative atomic mass is a whole number (and note that the value for magnesium is usually rounded off to 24, for school chemistry)

**7**

**a.**

38

**b.**

5

**c.**

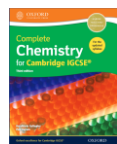
2

**8**

**a.**

**i.** 2 + 8

**ii.** It is a stable arrangement (8 outer electrons) so the element will be unreactive.



**PAGE 41: Core**

**8**

**b.**

Group 0

**c.**

**Any one of:**

helium, argon, krypton, xenon or radon (except Neon as the diagram represents Neon)

**9**

**a.**

**i.**

38

**ii.**

40

**b.**

It has an unstable nucleus which disintegrates to emit radiations.

**c.**

Refer to uses on page 31.

**10**

**a.**

electrical conductors – allow electricity to pass through them

density – the mass per unit volume of a substance (measure of heaviness)

ductile – can be drawn into a wire

malleable – can be beaten into shapes without breaking

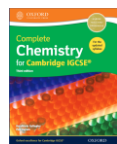
sonorous – makes a ringing noise when hit with another object

**b.**

making electrical wires

**c.**

malleability



**PAGE 41: Core**

**10**

**d.**

Any one of:

sodium, lithium, potassium, rubidium, caesium, aluminium

**e.**

They are sonorous.

**f.**

heat

**g.**

For example, you could choose strength (needed for structures such as bridges and aeroplanes) or hardness (needed for things like railway lines, coins, hammers).

**h.**

non-conductor of heat / electricity, brittle, dull, low density

**i.**

Metals generally form basic oxides, and non-metals form acidic oxides.