

GCSE Chemistry B (Twenty First Century Science)
J258/01 Breadth in Chemistry (Foundation Tier)

Question Set 33

Multiple Choice Questions

1 Titanium is used for hip replacements.

(a) Which term describes titanium?

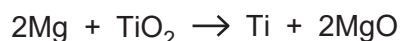
Put a **ring** around the correct answer.

Group 1 metal Group 7 element alloy transition metal

[1]

(b) Titanium, Ti, can be made from titanium oxide by **two** methods.

Method 1 uses magnesium which reacts with titanium oxide:



Complete the sentences below, by putting a **ring** around the correct answers.

Use the symbol equation in **Method 1** to help you.

Magnesium is more reactive than

titanium oxide / titanium / magnesium oxide.

Magnesium reduces **titanium oxide / titanium / magnesium oxide**

to **titanium oxide / titanium / magnesium oxide.**

[3]

(c) Calculate the relative formula mass of magnesium oxide (MgO).

Use the Periodic Table.

Relative formula mass = [1]

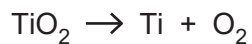
(d) Calculate the percentage of magnesium in magnesium oxide (MgO).

Use relative formula mass of magnesium = 24.

Percentage of magnesium =% [2]

(e) (i)

Method 2 uses electrolysis to make titanium:



Method 2 has a higher atom economy than **Method 1**.

Some relative formula masses are given in the table.

Formula	Ti	O ₂	TiO ₂
Relative formula mass	47.9	32.0	79.9

Calculate the atom economy for **Method 2**.

Use the data from the table.

Use the formula: atom economy = $\frac{\text{mass of atoms in desired product}}{\text{total mass of atoms in reactants}} \times 100\%$

Give your answer to 1 decimal place.

Atom economy = % **[3]**

(ii) Look at the equations again for **Method 1** and **Method 2**.



Explain why **Method 2** has a higher atom economy than **Method 1**.

[2]

(f) Magnesium oxide (MgO) is formed in **Method 1**.

(i) **Fig. 1.1** shows the 'dot and cross' diagrams for a magnesium (Mg) atom and an oxygen (O) atom.

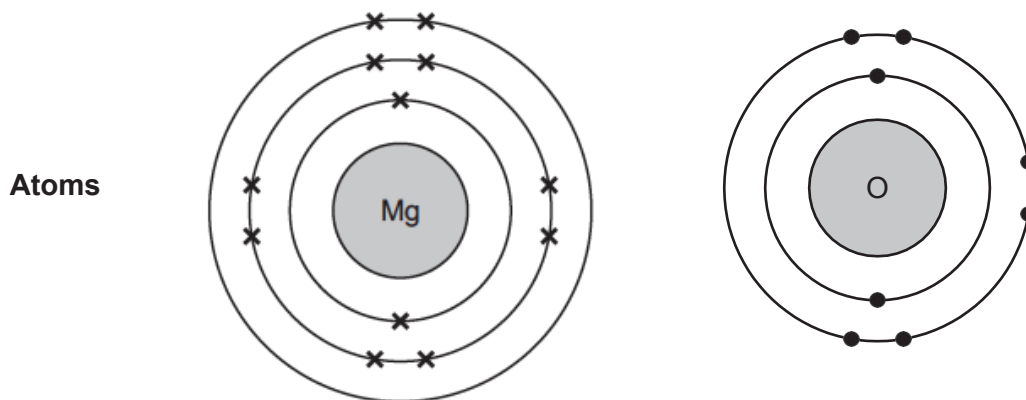


Fig. 1.1

Complete **Fig. 1.2** to show the 'dot and cross' diagrams for an Mg^{2+} ion and an O^{2-} ion.

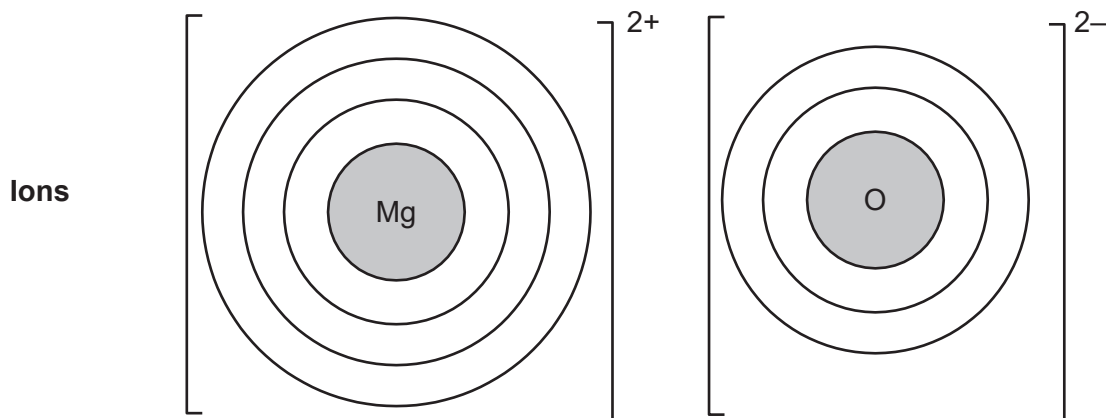


Fig. 1.2

(ii) Magnesium oxide can be formed by burning magnesium in oxygen. [2]

Complete the balanced symbol equation for this reaction.



[1]

Total Marks for Question Set 33: 15

Resource Materials

Question Set No: 33

The Periodic Table of the Elements

(1)	(2)											(3)	(4)	(5)	(6)	(7)	(0)	
1 H hydrogen 1.0																		18 He helium 4.0
3 Li lithium 6.9	4 Be beryllium 9.0											5 B boron 10.8	6 C carbon 12.0	7 N nitrogen 14.0	8 O oxygen 16.0	9 F fluorine 19.0	10 Ne neon 20.2	
11 Na sodium 23.0	12 Mg magnesium 24.3											13 Al aluminium 27.0	14 Si silicon 28.1	15 P phosphorus 31.0	16 S sulfur 32.1	17 Cl chlorine 35.5	18 Ar argon 39.9	
19 K potassium 39.1	20 Ca calcium 40.1	21 Sc scandium 45.0	22 Ti titanium 47.9	23 V vanadium 50.9	24 Cr chromium 52.0	25 Mn manganese 54.9	26 Fe iron 55.8	27 Co cobalt 58.9	28 Ni nickel 58.7	29 Cu copper 63.5	30 Zn zinc 65.4	31 Ga gallium 69.7	32 Ge germanium 72.6	33 As arsenic 74.9	34 Se selenium 79.0	35 Br bromine 79.9	36 Kr krypton 83.8	
37 Rb rubidium 85.5	38 Sr strontium 87.6	39 Y yttrium 88.9	40 Zr zirconium 91.2	41 Nb niobium 92.9	42 Mo molybdenum 95.9	43 Tc technetium	44 Ru ruthenium 101.1	45 Rh rhodium 102.9	46 Pd palladium 106.4	47 Ag silver 107.9	48 Cd cadmium 112.4	49 In indium 114.8	50 Sn tin 118.7	51 Sb antimony 121.8	52 Te tellurium 127.6	53 I iodine 126.9	54 Xe xenon 131.3	
55 Cs caesium 132.9	56 Ba barium 137.3	• 57–71 lanthanoids	72 Hf hafnium 178.5	73 Ta tantalum 180.9	74 W tungsten 183.8	75 Re rhenium 186.2	76 Os osmium 190.2	77 Ir iridium 192.2	78 Pt platinum 195.1	79 Au gold 197.0	80 Hg mercury 200.6	81 Tl thallium 204.4	82 Pb lead 207.2	83 Bi bismuth 209.0	84 Po polonium	85 At astatine	86 Rn radon	
87 Fr francium	88 Ra radium	• 89–103 actinoids	104 Rf rutherfordium	105 Db dubnium	106 Sg seaborgium	107 Bh bohrium	108 Hs hassium	109 Mt meitnerium	110 Ds darmstadtium	111 Rg roentgenium	112 Cn copernicium		114 Fl flerovium		116 Lv livermorium			

Key atomic number Symbol name relative atomic mass
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