Oxford Cambridge and RSA

GCSE Chemistry B (Twenty First Century Science)

J258/04 Depth in chemistry (Higher Tier)

Question Set 27

1. Eve investigates the reaction between magnesium and oxygen to make magnesium oxide.

This is part of her method:

- Weigh the empty crucible.
- Put some magnesium ribbon into the crucible and weigh it again.
- Heat the magnesium ribbon in the crucible.

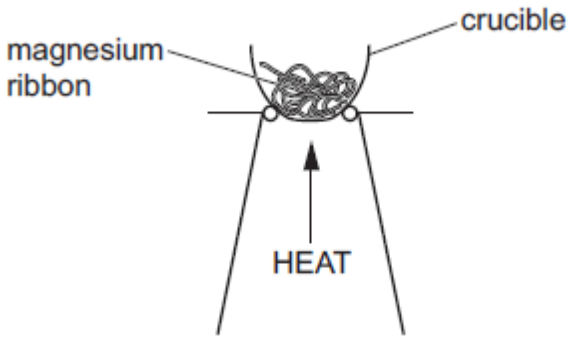


Table 6.1 shows Eve's results.

Mass of empty crucible (g)	20.0
Mass of crucible and magnesium ribbon before heating (g)	21.2
Mass of crucible and magnesium oxide after heating (g)	22.0

Table 6.1

(a) Eve weighs the crucible after heating. She heats it again and reweighs it. She does this until the mass does **not** change.

Why does she do this?

[1]

(b) Eve writes a word equation for the reaction.

magnesium + oxygen → magnesium oxide

Which reactant limits the amount of magnesium oxide that can be formed?

Explain your answer.

[1]

(c) Use Eve's results in **Table 6.1** to calculate the mass of magnesium and oxygen used and the mass of magnesium oxide formed in the experiment.

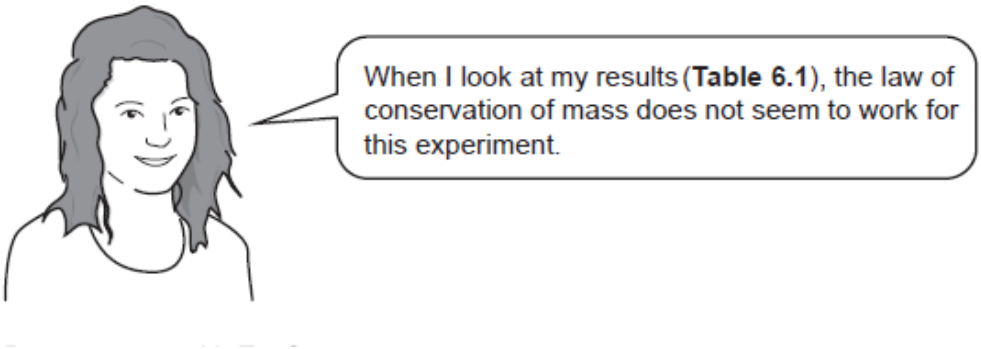
Write your answers in **Table 6.2**.

Mass of magnesium used (g)	.....
Mass of oxygen used (g)	.....
Mass of magnesium oxide formed (g)	.....

Table 6.2

[3]

(d) Eve thinks about her results.



Do you agree with Eve?

Yes ☐

No ☐

Explain your answer.

[3]

(e) Eve repeats her experiment with a different mass of magnesium.

She measures the mass of magnesium and oxygen used and the mass of magnesium oxide formed.

Table 6.3 shows her results.

	Formula	Mass used or formed in experiment (g)	Mass of one mole (g)	Number of moles used or formed in experiment
magnesium	Mg	4.8	24	0.2
oxygen	O_2	3.2	.....	.....
magnesium oxide	MgO	8.0	40	.....

Table 6.3

(i) Complete **Table 6.3** by calculating the missing values. **[2]**

(ii) Eve writes a balanced symbol equation for the reaction.

$2Mg + O_2 \rightarrow 2MgO$

Explain how the results in **Table 6.3** show that the balanced symbol equation is correct.

Use ideas about moles in your answer.

[2]

Total Marks for Question Set 27: 12

Resource Materials

The Periodic Table of the Elements

(1)	(2)											(3)	(4)	(5)	(6)	(7)	(0)
1																	18
1 **H** hydrogen 1.0	2											13	14	15	16	17	2 **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	3	4	5	6	7	8	9	10	11	12	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