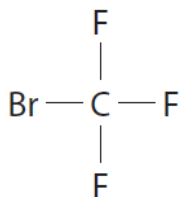


## ACTIVITY 4a – AO2 in Exams

### Paper 1C, Q9(b)

(b) The diagram shows the displayed formula of a molecule of Halon 1301.



Draw a dot-and-cross diagram to show all the outer electrons in this molecule.

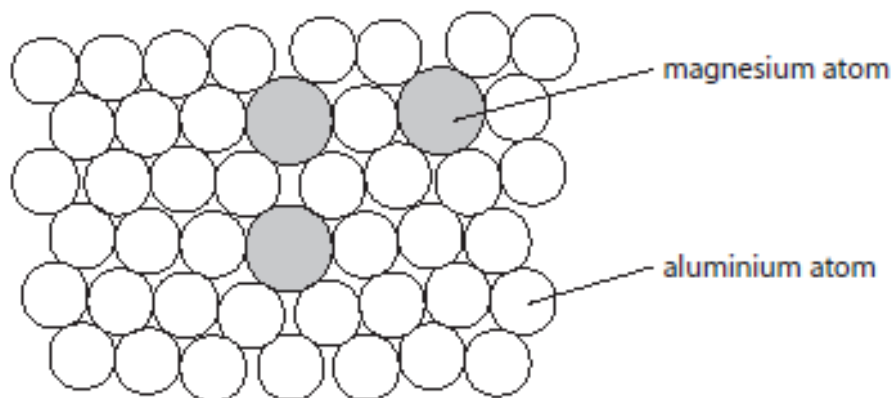
(2)

Question number	Answer	Notes	Marks
9 b	<p>M1 all four bonding pairs correct</p> <p>M2 rest of electrons correct</p>	<p>ACCEPT any combination of dots and crosses</p> <p>IGNORE inner shell electrons even if incorrect</p> <p>M2 DEP on M1</p>	2

## Paper 2C, Q4(c)(ii)

(c) Magnalium is an alloy of aluminium and magnesium.

The diagram shows how the atoms are arranged in this alloy.



(ii) Explain why magnalium is harder than aluminium.

(3)

Question number	Answer	Additional guidance	Marks
4 (c) (ii)	<p>An explanation that links together the following three points:</p> <p><b>M1</b> the regular arrangement of atoms is distorted/disrupted OWTTE</p> <p><b>M2</b> because magnesium atoms are larger than aluminium atoms</p> <p><b>M3</b> and therefore it is more difficult for the layers to slide over one another</p>	<p><b>ALLOW</b> lattice/layers/rows of atoms are disrupted/distorted</p> <p><b>ALLOW</b> lattice/layers/rows of atoms less regular</p> <p><b>ALLOW</b> magnesium and aluminium atoms are of different sizes</p> <p><b>ALLOW</b> layers cannot (as easily) slide over one another</p> <p><b>IGNORE</b> references to strength of metallic bonds</p>	3

## Paper 1C, Q14(f)(i) & (ii)

- (f) The overall equation for the formation of hydrated copper(II) sulfate crystals from copper(II) oxide is



- (i) In an experiment, a student completely reacts 9.54 g copper(II) oxide.

Show that the maximum possible mass of  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$  crystals that can be obtained is about 30 g.

[ $M_r$  of  $\text{CuO} = 79.5$        $M_r$  of  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O} = 249.5$ ]

Give your answer to an appropriate number of significant figures.

(3)

mass = ..... g

- (ii) In this experiment, the actual yield of  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$  crystals is 23.92 g.

Calculate the percentage yield of  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$

(2)

percentage yield = ..... %

Question number	Answer	Notes	Marks
14 f i	<ul style="list-style-type: none"> <li>calculate the moles of <math>\text{CuO}</math></li> <li>calculate the mass of <math>\text{CuSO}_4 \cdot 5\text{H}_2\text{O}</math></li> <li>give the answer to an appropriate number of significant figures</li> </ul> <p>Example calculation  <b>M1</b> <math>n[\text{CuO}] = 9.54 \div 79.5</math> OR <math>0.120</math> (mol)  <b>M2</b> mass of <math>\text{CuSO}_4 \cdot 5\text{H}_2\text{O} = 0.120 \times 249.5</math> OR <math>29.94</math> (g)  <b>M3</b> = <math>29.9</math>  <b>OR</b>  <b>M1</b> <math>79.5</math> (g) <math>\rightarrow 249.5</math> (g)  <b>M2</b> <math>9.94</math> (g) <math>\rightarrow (249.5 \div 79.5) \times 9.54</math> (g) OR <math>29.94</math> (g)  <b>M3</b> = <math>29.9</math></p>	<p>Final answer must be to 3 sig figs</p> <p>Final answer must be to 3 sig figs</p> <p>29.94 with no working scores 2</p> <p>29.9 with no working scores 3</p>	3
ii	<p><b>M1</b> <math>(23.92 \div 29.9) \times 100</math>  OR <math>(23.92 \div \text{M3 from (i)}) \times 100</math>  <b>M2</b> = <math>80(\%)</math></p>	<p><b>ALLOW</b> use of <b>M2</b> from (i)  29.94 gives 79.89%</p> <p><b>ALLOW</b> any number of sig figs</p> <p><b>ACCEPT</b> answer of 79.7(3)% using 30g</p> <p>Correct answer without working scores 2</p>	2
		<b>Total</b>	<b>14</b>