

4th Form Chemistry Exam 2018

Mark Scheme

Section A

1D 2B 3C 4C 5B 6D 7D 8D 9B 10B 11C 12B 13C 14B 15C 16B

[Total: 16]

Section B

Question B1

- a. Has a valency of 2 [1]
- b. $\text{CuCO}_3(\text{s}) + 2\text{HCl}(\text{aq}) \rightarrow \text{CuCl}_2(\text{aq}) + \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{l})$
[M1 formulae correct, M1 balanced correctly, M1 state symbols correct] [3]
- c. Bubble carbon dioxide through limewater (A calcium hydroxide) and calcium carbonate will form, turning limewater cloudy/milky [2]
- d. Carbon dioxide can be soluble in water [1]
- e. i. green \rightarrow black [1]
ii. copper (II) oxide [1]
iii. thermal decomposition [1]

[Total: 10]

Question B2

		7	13	
⁴⁰ Ca			40	2.8.8.2
⁵¹ V	23	28		

M1 for each correct cell in the table

[Total: 8]

Question B3

- a. An isotope is the [M1] **same element** but inside the atom there are [M1] **more neutrons but the same number of protons**. Atomic mass varies.
- b. $\left(\frac{68}{100} \times 58\right) + \left(\frac{26}{100} \times 60\right) + \left(\frac{6}{100} \times 62\right) = 58.76$ [2]

[Total: 4]

Question B4

- a. $2\text{HNO}_3(\text{aq}) + \text{Zn}(\text{s}) \rightarrow \text{Zn}(\text{NO}_3)_2(\text{aq}) + \text{H}_2(\text{g})$
[M1 formulae correct, M1 balanced correctly, M1 state symbols correct] [3]
- b. Bubbles produced [1]
- c. i. Completed already [2]
ii. 140 – completed already [2]
iii. [M1] **Excess** unreacted zinc would then react with the added acid and form [M1] **more hydrogen gas**. [2]

[Total: 10]

Question B5

- a. Step 6 – Heat on a Bunsen burner until the volume has halved or it starts spitting.
Turn the Bunsen off.
Step 7 – Leave on the windowsill to evaporate the water and crystallise the sodium sulfate [2]
- b. Show when the solution is neutral/neutralized, and alkali has been used up [1]
- c. Pink -> colourless [1]
- d. We need a **pure** sample of sodium sulfate [1]
- e. $2\text{NaOH (aq)} + \text{H}_2\text{SO}_4 \text{ (aq)} \rightarrow \text{Na}_2\text{SO}_4 \text{ (aq)} + 2\text{H}_2\text{O (l)}$
[**M1** for formulae, **M1** for state symbols] [2]
- f.

Name	Conical flask	Burette	Evaporating basin	Measuring cylinder
Number of first step in which used	1	3	6	1

[1 mark off for every incorrect answer]

[3]

- g. The correct volume of acid is the volume added at the peak maximum temperature before it starts going back down [1]
- h. Completed for you [2]
- i. Completed for you [1]
- j. $\text{H}_2\text{SO}_4 + \text{NaOH} \rightarrow \text{NaHSO}_4 + \text{H}_2\text{O}$ [1]
- k. *[Very tricky question, 5 students in the whole year group got it correct]*
Prediction: [**M1**] **46**
Explanation: [**M1**] **Compare values, ratio is 1:2** [2]

[Total: 17]