Section A

Answer **all** the questions in the spaces provided.

1 Choose from the words below the one which best describes each of the chemical changes from **(a)** to **(c)**.

displacement	neutralisation	substitution
combustion	addition	sublimation

(a) methane burns in air, …….. [1]

(b) zinc + copper (II) sulfate → zinc sulfate + copper, ..…….. [1]

(c) $C_2H_6 + Cl_2 \rightarrow C_2H_5Cl + HCl$. [1]
……..

2 Fig. 2.1 shows the 'dot and cross' diagrams for the electronic structures of the ions in calcium chloride.

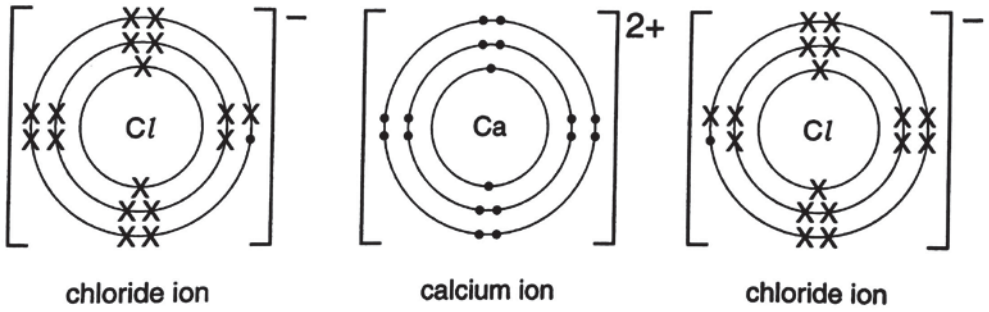

Fig. 2.1

(a) When calcium reacts with chlorine, neutral chlorine atoms changed into chloride ions, each with a charge of 1- . [2]

Use Fig. 2.1 to explain

(i) how this change takes place,

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……...

(ii) why this change has taken place.

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……...

(b) Molten calcium chloride can conduct electricity while solid calcium chloride cannot.

Use the information in Fig. 2.1 and your knowledge of Kinetic Particle Theory to explain this difference. [2]

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3 The following reaction sequence shows the formation of barium sulfate from barium oxide, which is a basic oxide.

$$BaO\,(s) \xrightarrow{\text{substance A}} Ba(NO_3)_2\,(aq) \xrightarrow{H_2SO_4\,(aq)} BaSO_4\,(s)$$

(a) Substance A reacts with barium oxide to form barium nitrate.

Name substance A. [1]

Substance A: ……

(b) Explain why barium sulfate cannot be prepared by adding excess dilute sulfuric acid to barium oxide directly. [2]

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(c) Describe how a pure and dry sample of barium sulfate can be obtained from the reaction aqueous of barium nitrate and excess dilute sulfuric acid. [3]

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(d) In an experiment, 100 g of barium sulfate was obtained. Use the Periodic Table and your understanding of mole concept to complete the table below. [1]

compound	formula	relative formula mass, M_r	number of moles
barium sulfate	$BaSO_4$		