



# **GCE MARKING SCHEME**

**CHEMISTRY (NEW)  
AS/Advanced**

**JANUARY 2010**

## CH2

## Section A

1. D [1]

2. D [1]

3.  $\text{BeCl}_2$  2 (1)  
 $\text{PCl}_3$  pyramidal (1)  
 $\text{CCl}_4$  tetrahedral (1) [3]

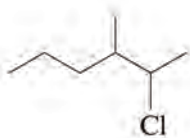
4.  (1)

forming  $\text{Na}^+$  and  $\text{O}^{2-}$  ions (1) [2]

5. Mass in 100 g water = 41 g (1)

Mass in 50 g water = 20.5 g (1) [2]

6.



[1]

**Section A Total [10]**

## Section B

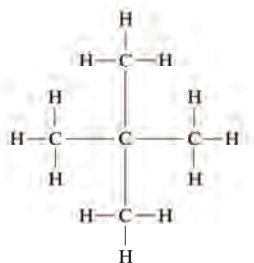
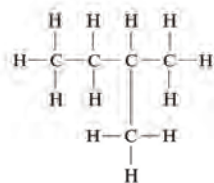
7. (a) Long chain hydrocarbons have more/stronger intermolecular forces (1)  
 - **van der Waals** forces specified (1)  
 Higher temperatures/more energy required to break these forces (1) [3]

QWC The information is organised clearly and coherently,  
 using specialist vocabulary where appropriate [1]

- (b) (i) Alkanes [1]

- (ii) I Same molecular formula (1)  
 different structure / arrangement /  
 structural formula / displayed formula (1) [2]

II



(1) (1)

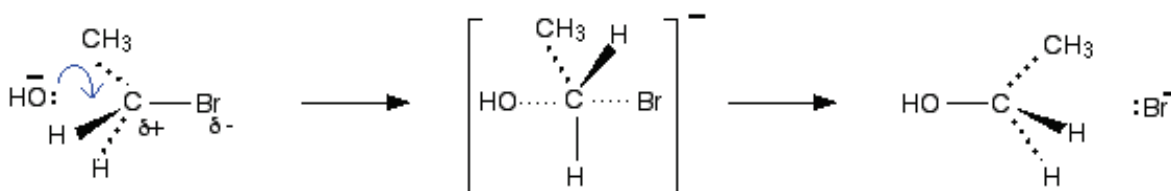
- 2-methylbutane (1) 2,2-dimethylpropane (1) [4]

- (c) Breaking down of a long chain hydrocarbon into smaller ones (1)  
 Which are more useful / one of which is an alkene (1) [2]

**Total [13]**

8. (a) (i) Chlorofluorocarbon [1]
- (ii) Anaesthetics / propellants in aerosols / cleaning solvents / blowing plastics / fire extinguishers [1]
- (iii) I A species / atom / molecule with an unpaired electron [1]
- II C – F bond stronger than C – Cl bond [1]
- (iv) I To neutralise the sodium hydroxide [1]
- II Silver nitrate [1]
- III Cream precipitate [1]
- IV  $\text{Ag}^+ + \text{Br}^- \longrightarrow \text{AgBr}$  [1]

(b)

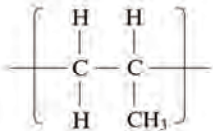


Reactants:  
Polarisation (1)  
curly arrow (1)

Intermediate (1)  
(accept curly arrow to show  
C-Br breaking instead of -ve charge) [3]

- (c) (i) Ethene [1]
- (ii) In alcohol (and heat) [1]

**Total [13]**

9. (a)
- |       |  |   |      |   |      |     |
|-------|--|---|------|---|------|-----|
|       | C  | : | H    | : | O    |     |
| %     | 54.5   |   | 9.10 |   | 36.4 | (1) |
| moles | 4.54   |   | 9.01 |   | 2.28 | (1) |
| ratio | 1.99   |   | 3.95 |   | 1    |     |
|       | empirical formula = C <sub>2</sub> H <sub>4</sub> O              |   |      |   |      | (1) |
|       | molecular formula = C <sub>4</sub> H <sub>8</sub> O <sub>2</sub> |   |      |   |      | (1) |
- [4]
- (b) (i) Absorption at about 3300 cm<sup>-1</sup> characteristic of OH group [1]
- (ii) Propanoic acid (1)
- Absorption at around 1700 cm<sup>-1</sup> due to C = O group (1) [2]
- (c) (Concentrated) sulphuric acid / phosphoric acid / aluminium oxide [1]
- (d) Add bromine (water) (1)
- turns from brown to colourless (1) [2]
- (e)
- 

$$\left[ \begin{array}{cc} \text{H} & \text{H} \\ | & | \\ -\text{C} & - & \text{C}- \\ | & | \\ \text{H} & \text{CH}_3 \end{array} \right]$$
- [1]
- (f) PVC / Polystyrene / PTFE [1]

**Total [12]**

10. (a) (i) Ability to attract electrons in a covalent bond/a shared electron pair [1]  
(ii) Increases [1]  
(iii) Increase in number of protons / charge on the nucleus (1)  
But same number of electron shells / no increase in shielding (1)  
Greater power to attract (bonding pair of) electrons (1) [2]  
(1<sup>st</sup> marking point + 1 other)
- (b) (i) Increases from group I to group IV, large decrease to group V, slight decrease / not much change to group VII [2]  
(All three trends 2 marks, any two trends 1 mark)
- (ii) 930 – 1650 K [1]
- (iii) Mg has more outer electrons (1)  
Therefore stronger bonds since it has more delocalised (valence) electrons / stronger metallic bond (1) [2]
- (iv) Electron cloud / molecular size increases down group (1)  
Greater van der Waals / induced dipole forces need to be overcome (1) [2]
- (c) Giant molecular structure (or similar) (1)  
with strong covalent bonds between atoms (1) [2]

**Total [13]**

11. (a) (i) I Stream of bubbles / fizzing (1)  
 White precipitate / cloudiness (1)  
 Calcium sinks and rises (1)  
 (any 2 from 3) [2]
- II  $\text{Ca} + 2\text{H}_2\text{O} \longrightarrow \text{Ca}(\text{OH})_2 + \text{H}_2$  [2]  
 products (1) balancing (1)
- III More reactive (1)  
 Electrons in strontium lost more easily / ionisation  
 energy is less (1)  
 (Must have reason to obtain 1<sup>st</sup> mark)  
 (More reactive as reactivity increases down group – (1) only) [2]
- (ii) I No. moles =  $\frac{2 \times 20}{1000} = 0.04$  [1]
- II Moles Ca = 0.02 (1)  
 Mass Ca =  $0.02 \times 40.1 = 0.802 \text{ g}$  (1) [2]
- III Flame test (1)  
 Flame turns brick-red (1) [2]
- (b) Sodium is too reactive to add to acid (1)  
 Hydrochloric acid + sodium hydroxide / sodium carbonate (1) [2]
- (c) Calcium chloride conducts electricity when molten / in solution (1)  
 Calcium conducts electricity when (molten or) solid (1)  
 When molten, ions in calcium chloride are mobile (1)  
 Calcium has delocalised electrons in solid state (1) [4]
- QWC Legibility of text; accuracy of spelling, punctuation and  
 grammar, clarity of meaning (1)  
 Selection of a form and style of writing appropriate to purpose and to  
 complexity of subject matter (1) [2]

Total [19]

**Section B Total [70]**