



GCE MARKING SCHEME

**CHEMISTRY (NEW)
AS/Advanced**

JANUARY 2010

CH2
Section A

1. D [1]

2. D [1]

3. BeCl₂ 2 (1)
PCl₃ pyramidal (1)
CCl₄ tetrahedral (1) [3]

4.  (1)
forming Na⁺ and O²⁻ 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

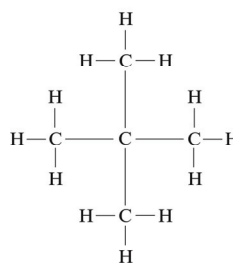
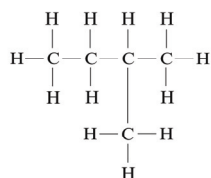
7. (a) Long chain hydrocarbons have more/stronger intermolecular forces (1)
 - **van der Waals** forces specified (1)
 Higher temperatures/more energy required to break these forces (1) [3]

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)

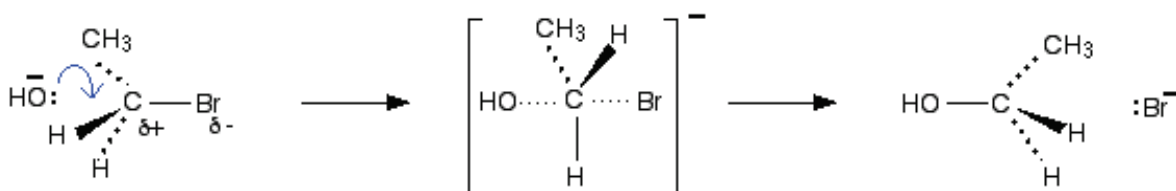
2-methylbutane (1) 2,2-dimethylpropane (1) [4]

- (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 ₂ H ₄ O | | | | | | (1) |
| molecular formula = C ₄ H ₈ O ₂ | | | | | | (1) [4] |
- (b) (i) Absorption at about 3300 cm⁻¹ characteristic of OH group [1]
- (ii) Propanoic acid (1)
- Absorption at around 1700 cm⁻¹ 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]
(1st 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 1st 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 x 40.1 = 0.802 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]