

Paper 5H

1. (a) (i) sodium chloride (1)  
(ii) electrolysis (1)  
(iii) making soap / paper / ceramics (1)
- (b) green / yellow-green (1)
- (c) (i) white / colourless (1)  
(ii) bleach / oxidising agent (1)  
(iii) blue (1)  
(iv) alkali / alkaline / alkalinity (1)

Total 8 marks

2. (a) (i) only single bonds / no more atoms can be added (1)  
(ii) (they contain) carbon and hydrogen only (1)
- (b) (i)  $C_nH_{2n+2}$  (1)  
(ii) alkanes (1)  
(iii) similar chemical properties  
graduation in physical properties  
neighbouring members differ by  $CH_2$  } *any two* (2)
- (c) (compounds with) the same molecular formula (1)  
(but) different structures / structural formula (1)

Total 8 marks

3. (a)  $Na^+$  (1)  
(b)  $O^{2-}$  (1)  
(c)  $Cl^-$  (1)  
(d) Mg (1)  
(e)  $Mg^{2+}$ ,  $Na^+$  and  $O^{2-}$  (1)

Total 5 marks

4. (a) (i) enthalpy change / energy change / heat change (1)  
(ii) reaction is exothermic / heat is given out (1)
- (b)  $H \begin{matrix} \times \\ \cdot \end{matrix} H$  (1)
- (c) forces between molecules (determine boiling point) (1)  
(these are) weak (1)
- (d) (i) silver nitrate (1)  
(ii) white precipitate (1)  
(iii)  $AgNO_3$  (on left) (1)  
 $AgCl$  and  $HNO_3$  (on right) (1)

Total 9 marks

5. (a) (i) solid (1)  
(ii) 25 to 100 °C (1)
- (b) (i) -1 (1)  
(ii) each need to gain one electron (1)  
to get full outer energy level / shell (1)
- (c) fluorine (1)
- (d) (i)  $\text{Cl}_2 + 2\text{KBr} \rightarrow 2\text{KCl} + \text{Br}_2$  (1)  
reagents and products (1)  
balancing (1)  
(ii) solution becomes red / orange / brown / yellow (1)
- (e)  $\text{K: } \frac{16.4}{39} = 0.421$ ;  $\text{Cl: } \frac{30.0}{35.5} = 0.845$ ;  $\text{I: } \frac{53.6}{127} = 0.422$  (1)  
simplification of ratio / dividing all by 0.421 i.e. K = 1; Cl = 2; I = 1 (1)  
correct formula:  $\text{KCl}_2\text{I}$  (1)

Total 12 marks

6. (a) (i) needs lots of energy / container would melt (1)  
(ii) cryolite has a lower melting point (1)  
aluminium oxide dissolves in molten cryolite (1)  
**OR**  
mixture of aluminium oxide and cryolite (1)  
has lower melting point (1)
- (b)  $\text{Al}^{3+} + 3\text{e}^- \rightarrow \text{Al}$  (1)  
species correct (1)  
balanced (1)
- (c)  $\text{O}^{2-}$  / oxide (1)  
lost electrons (1)
- (d) carbon / graphite (electrode) (1)  
reacts with oxygen formed (1)  
makes carbon dioxide / carbon monoxide (1)

Total 10 marks

7. (a) no more bubbles (1)
- (b) (i) 138 (1)  
(ii)  $2.76 \div 138 = 0.02$  (moles) (1)  
(iii) 44 (1)  
(iv)  $44 \times 0.02 = 0.88$  (g) (1)  
(v)  $0.02 \times 24 = 0.48$  (dm<sup>3</sup>) (1)
- (c) (i) flame test / description of flame test (1)  
lilac (1)
- (ii) add dilute hydrochloric acid  
test gas with acidified K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> / (damp) blue litmus  
orange to green / goes red  
**NB** If no test, can score last mark by stating SO<sub>2</sub> produced  
**OR**  
add barium chloride (1)  
followed by hydrochloric acid (1)  
white precipitate which dissolves on adding hydrochloric acid (1)

Total 11 marks

8. (a) (refinery) gases (1)
- (b) (i) high temperature / alumina catalyst (1)  
(ii) fractional distillation of crude oil produces more long chain  
fractions than required (1)
- (c) exothermic (1)
- (d) (i)  $2\text{CH}_4 + 3\text{O}_2 \rightarrow 2\text{CO} + 4\text{H}_2\text{O}$  (accept equation to produce C)  
all reagents and products correct = 1 (1)  
balancing = 1 (1)  
(ii) CO poisonous / toxic (1)  
reduces ability of blood to carry oxygen / correct reference to  
haemoglobin (1)

Total 8 marks

9. (a) (i) natural gas / oil **NOT** methane (1)  
(ii)  $\text{H}_2\text{O} + \text{CH}_4 \rightarrow \text{CO} + 3\text{H}_2$   
correct species (1)  
balancing (1)  
**ALLOW** correct equation producing hydrogen from cracking  
(iii) iron (1)
- (b) (i) forward and reverse reactions take place (1)  
same rate / concentrations do not change (1)  
(ii) more / increases (1)  
(iii) less / decreases (1)
- (c) (i) acid rain (1)  
(ii) kills trees  
kills fish  
damages buildings } *any two* (2)

Total 11 marks

10. (a) Each C bonded to 4 others (1)  
arranged tetrahedrally (1)  
each C held rigidly in place/strong bonds need to be broken to (1)  
deform structure
- (b) Each C bonded to 3 others (1)  
arranged in layers of hexagons (1)  
weak forces between layers/layers can slide over each other (1)
- (c) strong (covalent) bonds (between atoms) (1)  
need lots of energy to overcome/break (1)

**Total 8 marks**

**PAPER TOTAL 90 MARKS**