

Paper 5H

1. (a) 1 1  
2 1
- (b) (i) sodium + water  $\rightarrow$  sodium hydroxide + hydrogen 1  
(ii) sodium moves around / floats  
melts / becomes a ball / gets smaller / disappears  
NOT dissolves  
effervescence / fizzing / bubbles NOT 'gas made'  
*any two - max one from each line* 2
- (c) indicator NOT 'universal indicator' 1  
blue 1
- (d) (i)  $\text{Mg} + \text{H}_2\text{O} \rightarrow \text{MgO} + \text{H}_2$  1  
(ii) white 1
- (e) potassium / K 1  
magnesium / Mg 1

Total 11 marks

2. (a) carbon and hydrogen 1
- (b) (i) fractional distillation 1  
(ii) (group of) compounds with same / similar boiling points 1  
(iii) crude oil heated / boiled 1  
(vapour) passed into column / tower 1  
fractions collect at different heights 1
- (d) (i) carbon monoxide 1  
(ii) poisonous / toxic / lethal / causes death 1  
reduces capacity of blood to carry oxygen / combines with 1  
haemoglobin

Total 9 marks

3. (a) acts as solvent  
mixture melts at lower temperature / reduces operating temperature  
 / allows lower temperature to be used  
 increases conductivity of mixture (any two) 2
- (b) (i) carbon / graphite / C 1  
 (ii) oxygen 1  
 (iii) they burn/combine with oxygen/form carbon dioxide 1
- (c) (aluminium) more reactive than carbon / too reactive 1
- (d) electricity / replacing anodes 1
- (e) (aeroplanes) low density NOT light 1  
 (overhead power cables) (good) conductor of electricity 1  
 low density (if not scored above)  
 (pans for cooking food) (good) conductor of heat 1
- (Accept resists corrosion once as alternative for any of the above)

Total 10 marks

4. (a)  $C + O_2 \rightarrow CO_2$   
 C / carbon reacted with oxygen 1  
 equation correct 1
- (b)  $Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$   
 all formulae correct 1  
 balancing correct 1
- (c) limestone decomposes to make CaO or  $CaCO_3 \rightarrow CaO + CO_2$  (2) 1  
 this reacts with silicon dioxide or  $CaO + SiO_2 \rightarrow CaSiO_3$  (2) 1  
 to form slag / calcium silicate 1
- (d) prevents rusting 1  
 zinc more reactive than iron 1  
 oxidises /corrodes instead of iron 1

Total 11 marks

5. (a)  $\text{Mg(s)} + 2\text{HCl(aq)} \rightarrow \text{MgCl}_2\text{(aq)} + \text{H}_2\text{(g)}$  1  
 all formulae correct 1  
 state symbols correct 1  
 balanced 1
- (b) (i) line steeper 1  
 same final volume 1  
 (ii) line not as steep 1  
 produces half the final volume of gas 1
- (c) particles/ions move faster / have more energy 1  
 more collisions per second / more frequent collisions / greater chance 1  
 of collisions  
 more successful/effective/fruitful collisions / idea of more collisions 1  
 with  $E_A$
- (d) add nitric acid 1  
and silver nitrate (solution) 1  
 white ppt (ONLY if silver nitrate mark awarded) 1

Total 13 marks

6. (a) electrolysis 1  
 brine / sodium chloride solution 1
- (b) (i)  $\text{Cl}_2 + 2\text{KBr} \rightarrow \text{Br}_2 + 2\text{KCl}$  1  
 all species correct 1  
 balanced 1  
 ACCEPT correct ionic equation / multiples of above
- (ii) redox / displacement 1
- (c) (i) (goes red then) bleached / goes white / decolorised / colourless 1  
 (ii) goes red / pink 1
- (d) (i) division of percentages by  $A_r$  values 1  
 division of numbers of moles by the smallest 1  
 $\text{CH}_2\text{Cl}$  1  
 (ii)  $\text{C}_2\text{H}_4\text{Cl}_2$  only 1

Total 11 marks

7. (a) stoichiometric coefficients are: 2:3:2:2 1
- (b) (i) gives out (heat) energy / products have less energy than reactants 1
- (ii)  $2\text{SO}_2 + \text{O}_2 \rightleftharpoons 2\text{SO}_3$   
correct species and balanced 1  
using  $\rightleftharpoons$  (indep) 1
- (iii) temperature: decreases/less NOT "shifts left" 1  
pressure: increases/more NOT "shifts right" 1
- (c) pipette to measure sodium hydroxide 1  
sulphuric acid in burette 1  
indicator used and colour change (NOT universal indicator) 1  
add sodium hydroxide gradually near end point (and swirl) 1

Total 10 marks

8. (a) (i) carbon and hydrogen only 1  
double bond / can undergo addition reactions / has multiple bond 1
- (ii) same molecular formula / same atoms 1  
different spatial arrangement/structural formula 1
- (b) three isomers of  $\text{C}_5\text{H}_{10}$  (1 mark per isomer) 3  
ACCEPT condensed methyl groups
- (c) correct structure with continuation bonds and brackets 1  
poly(propene) / polypropylene 1  
styrene / phenylethene 1  
correct structure 1
- (d) (i) orange / yellow / brown 1  
colourless NOT clear 1
- (ii) correct structure of 1,2 dibromoethane 1
- (iii) has no double bonds/saturated 1

Total 15 marks

PAPER TOTAL 90 MARKS