

IGCSE Chemistry 4335 2H

Mark Scheme (Results)

Summer 2007

IGCSE

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IGCSE CHEMISTRY 4335, MAY 2007 MARK SCHEME

Paper 2H

1. (a) catalyst 1
- (b) (i) line steeper
reaches same level 2
- (ii) line shallower
reaches same level 2
- (c) glowing spill
relights (dependent on first point) 2
- Total 7 marks
2. (a) heat 1
- (b) (i) diffusion 1
- (ii) ammonium chloride / NH_4Cl 1
- (iii) ammonia faster / hydrogen chloride slower 1
- (iv) A : red
B : blue 2
- Total 6 marks
3. (a) (i) ticks in 1st and 3rd boxes 2
- (ii) contains a double/multiple bond /
can undergo addition reactions
(accept a specific **addition** reaction except bromine) 1
- (b) (i) orange / yellow
colourless 2
- (ii) correct structure of 1,2-dibromoethane 1
- (c) correct structures for two isomers of C_4H_8 2
but-1-ene, but-2-ene (G's + trans)
cyclo-butane, cyclo-methyl propane, methyl propene
- Total 8 marks
4. (a) anticlockwise from top:
haematite
molten iron
slag 3
- (b) (i) $\text{C} + \text{O}_2 \rightarrow \text{CO}_2$ ignore state symbols 1
- (ii) heats it up / raises temperature / exothermic 1
- (c) (i) $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$ 1
- (ii) SiO_2 acidic / neutralises SiO_2
forms slag / calcium silicate / $\text{CaO} + \text{SiO}_2 \rightarrow \text{CaSiO}_3$ 2
- (d) loss of oxygen / Fe^{3+} gains electrons / Fe ions gains electrons / 1

Fe (III) gains electrons (reject Fe gains electrons)

- (e) (i) aluminium too reactive / more reactive than carbon / accept Al **1**
very high in the reactivity series
- (ii) any suitable use e.g. aeroplanes **2**
property must be related e.g. low density
specified transport - low density (not light)
cooking foil / drink cans - easily moulded / malleable
power cables - good conductor of electricity
window frames - does not corrode
cars - does not corrode
cooking pans - conducts heat
ladders - low density
ignore references to strength

Total 12 marks

5. (a) (i) any two from:
fizz / bubble
move / darts about
melts / forms a ball **2**
gets smaller / disappears (reject dissolves)
- (ii) sodium + water → sodium hydroxide + hydrogen **1**
- (iii) blue / purple
(solution made is) alkaline / (contains) hydroxide ions / OH⁻ /
not just "alkali metal"
pH 11 → 14 (any in range) **2**
- (b) (i) orange / yellow **1**
(ii) flame test **1**
- (c) (i) electrons being transferred between oxygen and sodium (can be
wrong way round)
idea of sodium losing electron(s) and oxygen gaining electron(s)
correct numbers of electrons involved (sodium lose 1, oxygen
gain 2)
(sharing = 0 marks) **3**
- (ii) Na⁺
O²⁻ **2**

Total 12 marks

6. (a) bitumen
gasoline
bitumen **3**
- (b) cracking
heat / 400 - 1000 °C / high temperature (reject boil)
steam / catalyst / (high) pressure / 5-100 atm **3**
- (c) (i) 2CH₄ + 3O₂ → 2CO + 4H₂O
all formulas correct = 1; balancing = 1 **2**
- (ii) toxic / poisonous / death / fatal (reject suffocate)
correct reference to blood or haemoglobin **2**

Total 10 marks

7. (a) 2.8.7 **1**

- (b) 7 1
- (c) brown / orange
(to) colourless 2
- (d) (i) red / pink
(hydrobromic) acid formed / H⁺ ions present 2
(ii) blue
no acid formed / no reaction / no H⁺ ions 2

Total 8 marks

8. (a) (i) fermentation
dehydration 2
(ii) addition 1

- (b) (dissolved in) water
yeast
warm / stated temperature in range 20 - 35 °C 2
(any two for 1 each)

- (c) C₂H₅OH → C₂H₄ + H₂O (reject C₂H₆O)
ethanol = 1 (accept ethanol + ethane)
ethene & water formulae and no coefficients = 1 2
(accept H₂O + no coefficients - dependent on first point)

- (d)
$$\begin{array}{c} \text{H} \quad \text{H} \\ | \quad | \\ \text{H} - \text{C} - \text{C} - \text{O} - \text{H} \\ | \quad | \\ \text{H} \quad \text{H} \end{array}$$
 NB the - O - H may be condensed to - OH 1

- (e)
$$\begin{array}{cccccc} \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} \\ | & | & | & | & | & | \\ - \text{C} & - \text{C} & - \text{C} & - \text{C} & - \text{C} & - \text{C} - \\ | & | & | & | & | & | \\ \text{H} & \text{H} & \text{H} & \text{H} & \text{H} & \text{H} \end{array}$$

six single-bonded carbons = 1
all carbons with two hydrogens and continuation bonds = 1 2
(ignore brackets and n subscripts)

- (f) condensation
HCl / water / other molecule formed / two (different) monomers /
molecules react



Total 12 marks

9. (a) atoms of the same element / atoms with same number of

- protons/atomic number
(but) different numbers of neutrons/mass numbers 2
- (b) (i) 26 54
26 30
both 26 = 1; 54 = 1; 30 = 1 3
- (ii) $(54 \times 0.08) + (56 \times 0.92)$
55.8 2
(final answer = 2)
- (c) same number of (outer shell) electrons / same electronic configuration 1
- (d) variable valency / oxidation state
(formation of) coloured compounds
(formation of) complex ions 2
catalyst
high melting point (any two for 1 each)
- (e) (i) hydrochloric acid
iron(II) hydroxide (accept ferrus) 2
- (ii) 2NaOH 2NaCl
both formulae correct = 1
balancing = 1 2
- (iii) oxidation / redox
green
(to) brown / orange-brown / foxy brown / rusty brown 3
(reject orange / rusty)

Total 17 marks

10. (a) products shown at lower level than reactants 1
- (b) bonds broken = $944 + (3 \times 436) / 2252$
bonds formed = $6 \times 388 / 2328$
energy change = -76 (kJ/mol) / diff. between above two values 3
- (c) decreased
decreased 2
- (d) (i) move closer together
move more slowly 2
- (ii) H_2 1
- (e) 6 shared electrons between two N atoms (ideally 3 • and 3 x)
both N atoms with 2 unshared electrons (dependent on above)
(ACCEPT all dots or all crosses or any mixture) 2

Total 11 marks

11. (a) (i) $(1 + 80 =) 81$ 1

- (ii) $1.62 \div 81$
 $= 0.02$ **ALLOW ecf** 2
- (iii) $0.02 \div 0.25$
 $= 0.08$ **ALLOW ecf** 2
- (iv) 0.08×81
 $= 6.5 / 6.48$ **ALLOW ecf** 2
- (b) (i) $\text{HBr} + \text{NaOH} \rightarrow \text{NaBr} + \text{H}_2\text{O}$ 1
- (ii) protons from HBr/acid **OR** protons transferred
 protons gained by NaOH/alkali OH^- /
OR from HBr/acid to NaOH/alkali OH^-
 (answers using H^+ instead of proton max 1) 2
- (iii) 0.02×0.2
 $= 0.004$ 2
 $(20 \times 0.2$
 $= 4 (=1 \text{ ecf}))$ 2
- (iv) $0.004 \div 0.1$ **OR** $20 \times (0.2 \div 0.1)$
 $= 0.04 \text{ dm}^3$ **OR** $= 40 \text{ cm}^3$
 units needed
ALLOW ecf
- (v) methyl orange / phenolphthalein
 red / colourless
 yellow / orange / pink / red 3

Total 17 marks

PAPER TOTAL 120 MARKS