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Edexcel IGCSE

Chemistry

4335: 1F, 2H & 03

November 2006

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Mark Scheme

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IGCSE Chemistry (4335) – Foundation Tier

1. (a) water / moisture **(1)**
oxygen / air **(1)**

(b) galvanising: bucket / car body **(1)**
oiling: bicycle chain **(1)**
painting: car body / bridge **(1)**

(c) zinc **(1)**

Total 6 marks

2. (a) chromatography **(1)**
filtration **(1)**
fractional distillation **(1)**
distillation **(1)**

(b) boiling point / freezing point **(1)**
100°C / 0°C **(1)**

Total 6 marks

3. (a) nucleus **(1)**

(b) electron **(1)**

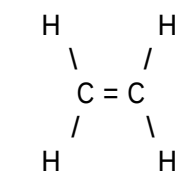
(c) electron **(1)**

(d) (i) 18 **(1)**
23 **(1)**
19 **(1)**
17 **(1)**
(ii) W & Z **(1)**
X & W or Z **(1)**
(iii) 2.8.1 **(1)**

(e) 7 **(1)**

Total 11 marks

4. (a) (i) ticks next to: bitumen **(1)**
gasoline **(1)**
kerosene **(1)**
(ii) fractional **(1)**
distillation **(1)**

(b)

(1)

(c) orange / brown **(1)**
to colourless **(1)**

(d) (i) poly(ethene) **(1)**
(ii) addition **(1)**
(iii) e.g. bags, buckets (any suitable use) **(1)**

Total 11 marks

5. (a) (i) cryolite **(1)**
(ii) high melting point / conducts electricity **(1)**
(iii) oxygen **(1)**
carbon dioxide / carbon monoxide **(1)**

(b) (i) → iron + carbon dioxide **(1)**
(ii) loss of oxygen / gain of electrons **(1)**

(c) ticks in first and second boxes **(2)**

(d) aluminium **(1)**

(e) iron: cars, railway tracks, any other suitable **(1)**
aluminium: drink cans, aeroplanes, cooking foil, any other suitable **(1)**

Total 11 marks

6. (a) first, third and last boxes ticked **(3)**

(b) (i) green solid left / no fizzing **(1)**
(ii) to remove copper(II) carbonate **(1)**
(iii) copper(II) sulphate **(1)**
water **(1)**
NB (II) not essential

(c) (i) white **(1)**
to blue **(1)**
(ii) reversible **(1)**

Total 10 marks

7. (a) (under)ground / mine / volcanoes **NOT** ores **(1)**
crude oil **(1)**

(b) air **NOT** oxygen **(1)**
water **(1)**

(c) (i) sulphur trioxide **(1)**
(ii) range or specific temperature within 350°C - 500°C / high temperature
range or specific pressure within 1 - 5 atm / slightly increased (**NOT** high) pressure
V_2O_5 / vanadium(V) oxide
any two **(2)**

Total 7 marks

8. (a) potassium manganate(VII) / manganese(IV) oxide **(1)**
purple / black (grey) **(1)**

(b) denser than air **(1)**

(c) green / yellow-green **(1)**

(d) (damp) litmus (paper) / starch iodide paper **(1)**
bleaches / white / black **(1)**

(e) (i) sodium chloride **(1)**
(ii) electrolysis **(1)**
(iii) bleach / treating **OR** sterilising water / manufacture of HCl **(1)**

Total 9 marks

9. (a) (i) only single bonds / no more atoms can be added **(1)**
(ii) (they contain) carbon and hydrogen <u>only</u> **(1)**

(b) (i) C_nH_{2n+2} **(1)**
(ii) alkanes **(1)**
(iii) similar chemical properties
gradation 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

10. (a) Na^+ **(1)**

(b) O^{2-} **(1)**

(c) Cl^- **(1)**

(d) Mg **(1)**

(e) Mg^{2+}, Na^+ and O^{2-} **(1)**

(f) MgO **(1)**
higher charges on the ions / ions have double charges **(1)**

Total 7 marks

11. (a) (i) enthalpy change / energy change / heat change **(1)**
(ii) reaction is exothermic / heat is given out **(1)**

(b) covalent **(1)**
two / pair of **(1)**
shared electrons **(1)**

(c) **(1)**

(d) forces between molecules (determine boiling point) **(1)**
(these are) weak **(1)**

(e) colourless **(1)**
colourless **(1)**

(f) (i) silver nitrate **(1)**
(ii) white precipitate **(1)**
(iii) $AgNO_3$ (on left) **(1)**
AgCl and HNO_3 (on right) **(1)**

Total 14 marks

TOTAL FOR PAPER 100 MARKS

IGCSE Chemistry (4335) – Higher Tier

1. (a) (under)ground / mine / volcanoes **NOT** ores **(1)**
crude oil **(1)**

(b) air **NOT** oxygen **(1)**
water **(1)**

(c) (i) sulphur trioxide **(1)**
(ii) range or specific temperature within 350°C - 500°C / high temperature
range or specific pressure within 1 - 5 atm / slightly increased (**NOT** high) pressure
V_2O_5 / vanadium(V) oxide
any two **(2)**

Total 7 marks

2. (a) potassium manganate(VII) / manganese(IV) oxide **(1)**
purple / black (grey) **(1)**

(b) denser than air **(1)**

(c) green / yellow-green **(1)**

(d) (damp) litmus (paper) / starch iodide paper **(1)**
bleaches / white / black **(1)**

(e) (i) sodium chloride **(1)**
(ii) electrolysis **(1)**
(iii) bleach / treating **OR** sterilising water / manufacture of HCl **(1)**

Total 9 marks

3. (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
gradation 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

4. (a) Na^+ **(1)**

(b) O^{2-} **(1)**

(c) Cl^- **(1)**

(d) Mg **(1)**

(e) Mg^{2+}, Na^+ and O^{2-} **(1)**

(f) MgO **(1)**
higher charges on the ions / ions have double charges **(1)**

Total 7 marks

5. (a) (i) enthalpy change / energy change / heat change **(1)**
(ii) reaction is exothermic / heat is given out **(1)**

(b) covalent **(1)**
two / pair of **(1)**
shared electrons **(1)**

(c) H × H **(1)**
•

(d) forces between molecules (determine boiling point) **(1)**
(these are) weak **(1)**

(e) colourless **(1)**
colourless **(1)**

(f) (i) silver nitrate **(1)**
(ii) white precipitate **(1)**
(iii) $AgNO_3$ (on left) **(1)**
AgCl and HNO_3 (on right) **(1)**

Total 14 marks

6. (a) (i) solid **(1)**

(ii) 25 to 100 °C **(1)**

(b) (i) -1 **(1)**

(ii) each gain one electron **(1)**

to get full outer energy level / shell **(1)**

(c) fluorine **(1)**

(d) (i) $Cl_2 + 2KBr \rightarrow 2KCl + Br_2$

reagents and products **(1)**

balancing **(1)**

(ii) solution becomes red / orange / brown / yellow **(1)**

(e) K: $\frac{16.4}{39} = 0.421$; Cl: $\frac{30.0}{35.5} = 0.845$; 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: KCl_2I **(1)**

Total 12 marks

7. (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) (i) $2O^{2-} \rightarrow O_2 + 4e^-$ (or halved) **(1)**

(ii) $Al^{3+} + 3e^- \rightarrow Al$

species correct **(1)**

balanced **(1)**

(c) O^{2-} / oxide **(1)**

lost electrons **(1)**

(d) carbon / graphite (electrode) **(1)**

reacts with oxygen formed **(1)**

makes carbon dioxide / carbon monoxide **(1)**

(e) (i) regular lattice/arrangement of positive ions **NOT** atoms **(1)**

delocalised/sea of electrons **(1)**

(ii) electrons mobile / free to move **(1)**

Total 14 marks

8. (a) weak acids do not dissociate/ionise fully
weak acids have higher pH / turn U.I. orange-yellow } *any two*
weak acids react more slowly **(2)**
ACCEPT reverse arguments for strong acids

(b) (i) 138 **(1)**
(ii) 2.76 ÷ 138 = 0.02 (moles) **(1)**
(iii) volume = 0.02 ÷ 0.2 (= 0.1dm^3) **(1)**
= 100 (cm^3) **(1)**
(iv) 44 **(1)**
(v) 44 x 0.02 = 0.88 (g) **(1)**
(vi) 0.02 x 24 = 0.48 (dm^3) **(1)**

(c) (i) flame test / description of flame test **(1)**
lilac **(1)**
(ii) add dilute hydrochloric acid **(1)**
test gas with acidified $K_2Cr_2O_7$ / (damp) blue litmus **(1)**
orange to green / goes red **(1)**
NB If no test, can score last mark by stating SO_2 produced
OR
add barium chloride **(1)**
followed by hydrochloric acid **(1)**
white precipitate which dissolves on adding hydrochloric acid **(1)**

Total 14 marks

9. (a) (refinery) gases **(1)**

(b) global warming **(1)**

(c) (i) high temperature / alumina catalyst **(1)**
(ii) fractional distillation of crude oil produces more long chain fractions than required **(1)**

(d) (i) 2640 (kJ/mol)
if incorrect, give 1 mark for 4 x 412 **OR** 2 x 496 **(2)**
(ii) 3338 (kJ/mol)
if incorrect give 1 mark for 2 x 743 **OR** 4 x 463 **(2)**
(iii) - 698 (kJ/mol) **cq on (i) and (ii)** **(1)**

(e) (i) $2CH_4 + 3O_2 \rightarrow 2CO + 4H_2O$ (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 13 marks

10. (a) (i) natural gas / oil **NOT** methane **(1)**

(ii) $H_2O + CH_4 \rightarrow CO + 3H_2$

correct species **(1)**

balancing **(1)**

ALLOW correct equation producing hydrogen from cracking

(iii) iron **(1)**

(b) A: oxygen / O_2 **(1)**

B: water / H_2O **(1)**

(c) (i) reference to the arrow **(1)**

(ii) forward and reverse reactions take place **(1)**

same rate / concentrations do not change **(1)**

(iii) more / increases **(1)**

(iv) less / decreases **(1)**

(d) (i) acid rain **(1)**

(ii) kills trees
kills fish
damages buildings
} *any two* **(2)**

Total 14 marks

11. (a) Each C bonded to 4 others **(1)**

arranged tetrahedrally **(1)**

each C held rigidly in place/strong bonds need to be broken to deform structure **(1)**

(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 120 MARKS

IGCSE Chemistry (4335) – Paper 3

1. (a) **A** burette **(1)**
B pipette **(1)**
C conical flask **(1)**
D (filter) funnel **(1)**

(b) (i) **D** **(1)**
(ii) **A** **(1)**

Total 6 marks

2. (a) they would dissolve (in the water) **(1)**

(b) water rises up paper **(1)**
colours separate / new colours appear / dyes move up paper **(1)**

(c) (i) 3.5 cm **(1)**
(ii) Q and R **(1)**
(iii) use another liquid/organic solvent / use longer paper **(1)**

Total 6 marks

3. (a) amount/mass/volume of organic liquid
OR temp of water (in beaker) **(1)**

(b) organic liquids are flammable/would catch fire **(1)**

(c) 67 (°C) **(1)**
52 (s) **(1)**

(d) (i) **Z** **(1)**
(ii) **X** (ALLOW **Z**) **(1)**
(iii) 50 (s) **(1)**
(iv) **Z** **(1)**
(v) **X** **(1)**

(e) (i) (fractional) distillation **(1)**
(ii) label line entering lower half of flask being heated **(1)**
(iii) (water / Liebig) condenser **(1)**
(iv) boiling point **(1)**

Total 13 marks

4. (a) air expands on heating / contracts on cooling **(1)**
NOT just 'fair test'

(b) (i) 60 (cm^3) **(1)**
45 (cm^3) **(1)**
(ii) 90 of air and 72 of gas **(1)**
18 of oxygen (*ECF from air and gas volumes)* **(1)**

(c) points plotted correctly: 5 correct = **2**, 4 correct = **1** **(2)**
line of best fit **(1)**

(d) second point circled **(1)**

(e) (i) higher **(1)**
(ii) (magnesium) combines with oxygen (in air) **(1)**
(iii no graduation marks on jar / wider cross-section **(1)**

Total 12 marks

5. (a) number of moles/mass of MnO_2 **(1)**

(b) **D** **(1)**

(c)

(**B**)	40	14
(**C**)	50	25
(**D**)	50	20
(**E**)	70	40

Award up to 2 marks for concentrations **(2)**
Award up to 2 marks for rates **(2)**
In each case: all four correct = **2**
three or two correct = **1**

(d) (i) points plotted correctly: 5 correct = **2**, 4 correct = **1** **(2)**
line of best fit **(1)**
(ii) rate is (directly) proportional to concentration **(1)**

(e) repeat experiment(s) using:
same concentration/volume of H_2O_2 solution
same temperature
same amount of solids
same surface area of solids
measure time to collect fixed volume of O_2 gas
} *any three* **(3)**

Total 13 marks

TOTAL FOR PAPER 50 MARKS

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