UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2010 question paper

for the guidance of teachers

0620 CHEMISTRY

0620/21 Paper 21 (Core Theory), maximum raw mark 80

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes must be read in conjunction with the question papers and the report on the examination.

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1 **(a)** methane

(b) methane / propane [1]

(c) ammonia [1]

(d) oxygen [1]

(e) chlorine [1]

(f) ethene [1]

2 **(a)** arrangement: random / far apart OWTTE [1]
motion: random / fast / irregular OWTTE [1]

(b) two paired electrons and two atoms indicated [1]

(c) **(i)** atom of (same) element with different number of neutrons / atoms with same number of protons and different number of neutrons [1]

(ii) number of electrons 1 and 1 [1]
number of neutrons for H-1 = 0 [1]
number of neutrons for H-3 = 2 [1]
number of protons 1 for both [1]

(d) exothermic [1]

(e) **(i)** magnesium>zinc>iron>cobalt [2]
one pair reversed = 1 mark

(ii) calcium chloride; carbon dioxide; water; [3]

3 **(a)** **(i)** reversible / decomposition [1]

(ii) hydrated; water; [2]

(b) **(i)** any two e.g. conducts electricity / conducts heat / sonorous / shiny etc [2]

(ii) forms coloured compounds / forms ions or compounds with variable oxidation state / good catalyst / high melting point OR high boiling point / forms complex ions [2]

(c) reacts with acids / forms a salt and water with acids [1]

4 **(a)** chloride / Cl^-

(b) K^+ and Br^- (both needed for the mark) [1]

(c) 3.5 (g) [1]

(d) add (nitric acid and) silver nitrate / lead nitrate [1]
yellow ppt [1]

(e) **(i)** I_2 [1]

(ii) brown / yellowish brown [1]
not: grey / black

(iii) bromine is more reactive than iodine OWTTE [1]

(f) 95 [1]

5 **(a)** nitrogen; phosphorus; potassium; [3]

(b) any two of:
plants take up nitrogen / phosphorus / potassium;
nitrogen / phosphorus / potassium needs to be replaced;
to enable better plant growth / greater yield / otherwise plants won't grow as well (idea of increase / more needed) [2]

(c) **(i)** dissolves or idea of dissolving [1]

(ii) titration of acid with alkali / last box ticked [1]

(d) ammonia [1]

(e) **(i)** calcium oxide / lime [1]
allow: calcium hydroxide / limestone / calcium carbonate

(ii) plants grow best at certain pH's / link between pH and plant growth;
farmers want to get best yield; OWTTE [2]

(f) **(i)** 4 [1]

(ii) 15 [1]

6 **(a)** haematite

(b) **(i)** Any two of:
limestone / coke / air [2]

(ii) iron oxide + carbon → iron + carbon monoxide [2]
1 error = 1 mark

(iii) each arrow or number in the correct position (1 mark each) [4]

(c) ZnS [1]

7 **(a)** boiling point / first box down ticked [1]

(b) fuel oil: fuel for home heating;
kerosene: jet fuel;
lubricating fraction: waxes and polishes;
naphtha: making chemicals; [4]

(c) **(i)** high temperature; catalyst; [2]

(ii) $C_{12}H_{26}$ [1]

(iii) correct structure showing all atoms and bonds [1]

(d) poly(ethene) **allow:** polythene [1]

(e) **(i)** steam [1]

(ii) substance which speeds up rate / speed of reaction [1]

8 **(a)** 1st, 3rd and 4th boxes down ticked (aqueous sodium chloride, copper and graphite) [3]

(b) insulator [1]

(c) **(i)** anode [1]

(ii) negative electrode: zinc [1]
positive electrode: chlorine [1]

(iii) graphite [1]
allow: carbon