UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2012 question paper

for the guidance of teachers

0620 CHEMISTRY

0620/22 Paper 2 (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.

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Page 2	Mark Scheme: Teachers' version	Syllabus	Paper
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1 **(a)** carbon dioxide → turns limewater milky; [1]
chlorine → bleaches damp litmus paper; [1]
oxygen → relights a glowing splint; [1]
hydrogen → pops with a lighted splint; [1]

(b) **(i)** manganese(IV) oxide + hydrochloric acid → manganese chloride + chlorine + water [3]
note: –1 mark per error
allow: manganese oxide (on left)
ignore: incorrect oxidation numbers of manganese chloride

(ii) C [1]

(c) **(i)** O_2 (on left); [1]
correct balance dependent on O_2 or 2O on left i.e. 2 (on right); [1]

(ii) hydrogen: for fuel / as a reducing agent / any other specific use
e.g. manufacture of margarine, making ammonia [1]
water: any suitable use e.g. coolant / washing / cooking / drinking etc. [1]

[Total: 12]

2 **(a)** sodium hydroxide solution; [1]

(b) any pH above 7; [1]

(c) any two of: [2]
place indicator into solution;
universal indicator paper or solution / pH meter;
compare colour with pH colour chart / take reading on pH meter;

(d) **(i)** plants might die / to allow good crop growth / good growth of grass etc. [1]

(ii) any two of: [2]
calcium carbonate is a <u>base;</u>
reacts (with acids);
neutralises (the acid);

[Total: 7]

3 **(a)** **(i)** chlorine: (light) green; [1]
not: yellow
bromine: brown / red / red-brown; [1]

(ii) chlorine: the boiling point is below / less than / lower than room temperature; [1]
bromine: the melting point is below / less than / lower than room temperature **and** the boiling point is above / higher than room temperature: [1]

(iii) any value between +190 °C to 450 °C [1]

(b) (i) I_2 (on the right) [1]
correct balance i.e. 2 on left (if I_2 or 2I on right) [1]

(ii) potassium chloride; iodine; [2]

(iii) 3 [1]

(c) nitric; silver; yellow; precipitate; [4]

[Total: 14]

4 (a) (i) B; [1]

(ii) C; [1]

(iii) D; [1]

(b) lightning activity / car engines / high temperature furnaces; [1]

(c) irritation of nose / asthma / acid rain (or named effect of acid rain) [1]

(d) 46; [1]

(e) (i) CO / carbon monoxide; [1]
gains oxygen; [1]
allow: oxidation number of carbon increases / loss of electrons

(ii) substance which speeds up a reaction / increases reaction rate; [1]

(iii) amount of oxygen reduced; [1]
so incomplete combustion occurs / the carbon is not fully oxidised; [1]

(iv) CO is poisonous / toxic; [1]
allow: higher level answers e.g. combining with haemoglobin / haem

[Total: 12]

5 (a) any three of:
hard / high density / high melting (or boiling) points;
allow: forms coloured compounds / general metallic properties [3]

(b) (i) iron + sulfuric acid → iron sulfate + hydrogen [2]
note: –1 per error

(ii) suitable apparatus for measuring gas volume e.g. syringe / upturned measuring cylinder; [1]
closed system; [1]
measure volume of gas; [1]
at given time intervals; [1]
ALLOW: (for max 3 marks) unstoppered flask on top of balance (1)
measure decrease in mass of flask (1)
at given time intervals (1)

(c) (i) exothermic; [1]

(ii) two (or more) different atoms / elements bonded / joined together; [1]
note: both atoms / elements **and** bonded / joined needed

(iii) FeS; [1]

[Total: 12]

6 (a) X drawn in bottom compartment or in tube leading from arrow showing petroleum in; [1]

(b) naphtha [1]

(c) kerosene: jet fuel / fuel for heating / cooking fuel / kerosene lamps; [1]
diesel: fuel for lorries / cars / tractors; [1]

(d) mixture; heated; lower; condenses; boiling; [5]

(e) (i) B **and** D; [1]

(ii) B and D [2]

[Total: 12]

7 (a) any 4 of:
in solid salt the particles can't move / fixed;
salt dissolves / dissolving;
(because) forces between particles / ions (in solid) are overcome;
diffusion;
salt particles in solution move;
randomly;
water particles moving;
water and salt particles (constantly) colliding;
salt particles spread themselves out or mix with water; [4]

(b) (i) a sodium atom loses its outermost electron and a chlorine atom gains an electron / 2nd box down ticked; [1]

(ii) in solid sodium chloride, the ions can't move / fixed; [1]
in molten sodium chloride the ions can move / free; [1]

(iii) positive electrode: chlorine; [1]
negative electrode: hydrogen; [1]

(iv) cathode; [1]

(v) conducts electricity; [1]
allow: non-reactive / inert;

[Total: 11]