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

0620/23 Paper 2 (Core Theory), maximum raw mark 80

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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]