UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2008 question paper

0620 CHEMISTRY

0620/02 Paper 2 (Core Theory), maximum raw mark 80

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1 **(a)** metal;
non-metal;
non-metal;
non-metal;
non-metal; [5]
ALLOW: named metal or non-metal or correct symbols

(b) metallic character decreases (across the table)/metals on the left and non-metals on the right [1]
ALLOW: metals get less reactive (across the table)/metals conduct better across the table)

(c) **(i)** electrons shown in shells as 2,8,1 [1]
ALLOW 2,8,1

(ii) + e/electron (on the right) [1]

(d) soft; increase; lithium; basic; [4]

[Total: 12]

2 **(a)** sulphur dioxide → combustion of fossil fuels containing sulphur;
carbon monoxide → incomplete combustion of fossil fuels;
ALLOW: carbon monoxide → car exhausts
nitrogen oxides → car exhausts; [3]

(b) **(i)** oxygen is added [1]
ALLOW: electrons are lost (from sulphur dioxide)

(ii) 21% [1]
ALLOW 19-22%

(iii) neutralisation [1]

(iv) Any two of:
crops remove nitrogen (or phosphorus or potassium) from soil/
nitrogen or essential elements etc. removed when crops harvested;
fertilisers provide nitrogen or essential elements or nutrients or minerals/
fertilisers improve plant growth or yield; [2]

(v) ammonium nitrate [1]
NOT: ammonia nitrate/ammonium salt/nitrate salt

[Total: 9]

3 (a) (i) heating (calcium carbonate in a furnace) [1]

(ii) $CaCO_3 \rightarrow CaO + CO_2$ [1]

(iii) neutralising (acid) soil/neutralising industrial waste [1]
ALLOW: for making mortar/for making limewater
NOT: for limewater

(b) (i) thermometer;
flask;
measuring cylinder; [3]

(ii) calcium carbonate + hydrochloric acid → calcium chloride + carbon dioxide + water
(1 mark for correct reactants; 1 mark for correct products) [2]
ALLOW: hydrogen chloride in place of hydrochloric acid

(iii) 86s [1]
ALLOW: between 81 and 90s

(iv) slope of graph steeper and always above other line;
graph flattens out at 80 cm^3 gas; [2]

(v) (speed) decreased/less/slower;
(speed) increased/more/faster; [2]

[Total: 13]

4 **(a)** haematite (or any other correct ore) [1]
NOT: iron oxide

(b) **(i)** calcium carbonate/limestone/$CaCO_3$ [1]

(ii) C/just above the iron [1]

(c) **(i)** $2C + O_2 \rightarrow 2CO$
1 mark for O_2; 1 mark for 2C and 2CO; [2]

(ii) poisonous/toxic/kills you/deadly/suffocates you [1]
NOT: harmful/causes breathing difficulties

(d) 1st and 3rd boxes ticked [1]

(e) Any two of:
blast furnace can only be used for metals below zinc or carbon;
aluminium is very reactive or high in the reactivity series or too reactive or higher then iron in the reactivity series;
carbon cannot remove oxygen from aluminium oxide/carbon cannot displace aluminium;

aluminium above carbon in reactivity series or more reactive than C = 2 marks
too much heat required for carbon to remove oxygen from aluminium oxide = 2 marks [2]

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

(ii) aircraft bodies/car bodies/(overhead) power cables/drinks cans/window frames etc. [1]

[Total: 11]

5 **(a)** **(i)** temperature of the water rises/heat given to the water/heat or energy given out/the thermometer reading goes up [1]

(ii) carbon dioxide + water (1 mark each) [2]

(b) any two from coal/natural gas/wood/paraffin/any other suitable fuel containing carbon [2]
ALLOW: named alcohols (except ethanol)
NOT: alkenes/named alkenes/naphtha

(c) OH/–OH [1]
NOT: complete formula for ethanol

(d) blue cobalt chloride (paper); turns pink
or white/anhydrous copper sulphate; turns blue [2]

(e) **(i)** painting/galvanising/covering with plastic/sacrificial protection/(electro)plating [1]
ALLOW: oiling/greasing
NOT: removing air/removing water

(ii) contains water
NOT: dissolves in water [1]

(iii) Any two of:
high boiling point or melting point;
can act as catalyst;
forms coloured compounds;
high density;
compounds can have variable oxidation states or have ions with different charges; [2]
ALLOW: general metallic properties e.g. conducts electricity; conducts heat; ductile etc.
NOT: not very reactive

[Total: 12]

6 **(a)** Any two of;
(group of similar organic) compounds with same chemical properties;
(group of similar organic) compounds showing trend in physical properties;
have same functional group;
have same general formula;
members differ by CH_2 group; [2]
ALLOW: can be made by same method

(b) ethane;
correct structure of ethane; [2]
ALLOW: correct structure from incorrectly named alkane

(c) 1st row
correct structure of ethene;
use e.g. for making plastics/ethanol etc.; [2]
2nd row
correct structure of ethanoic acid; [1]
3rd row
$C_2H_4Br_2$; [1]
4th row
methane;
fuel; [2]

(d) 188 [1]
ALLOW: error carried forward from incorrect structure in the table

[Total: 11]

7 (a) (i) ions cannot move in solid;
ions move when molten; [2]

(ii) calcium has atoms/particles closely packed together/regularly arranged/strong forces between particles/particles can't move;
ALLOW: calcium has high boiling point (because of strong forces between particles)
chlorine has molecules/particles randomly arranged/far apart/particles can move easily (from place to place); [2]
ALLOW: chlorine has low boiling point (because of weak forces between particles)

(b) (i) chlorine;
calcium; [2]
ALLOW: For 1 mark: calcium and chlorine the wrong way round
NOT: chloride/chloride ions

(ii) graphite/carbon [1]

(iii) to prevent it from reacting with the air/oxygen [1]
ALLOW: does not react/prevents (other) reactions (with calcium)

(iv) any noble gas [1]
ALLOW: nitrogen

(c) with sodium hydroxide
white precipitate; insoluble in excess; [2]

with ammonia
no precipitate/(very slight) white precipitate [1]
ALLOW: no reaction/no change

[Total: 12]