### 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

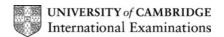
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(a) metal; non-metal; non-metal: non-metal: [5] non-metal; ALLOW: named metal or non-metal or correct symbols (b) metallic character decreases (across the table)/metals on the left and non-metals on the right [1] ALLOW: metals get less reactive (across the table)/metals conduct better across the table) (c) (i) electrons shown in shells as 2,8,1 [1] **ALLOW 2,8,1** [1] (ii) + e/electron (on the right) [4] (d) soft; increase; lithium; basic; [Total: 12] (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) [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;

[Total: 9]

[2]

[1]

fertilisers provide nitrogen or essential elements or nutrients or minerals/

fertilisers improve plant growth or yield;

NOT: ammonia nitrate/ammonium salt/nitrate salt

(v) ammonium nitrate

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(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 [2] (1 mark for correct reactants; 1 mark for correct products) 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<sup>3</sup> gas; [2] (v) (speed) decreased/less/slower; [2] (speed) increased/more/faster;

[Total: 13]

[1]

[1]

[Total: 11]

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(f) (i) electrolysis

(a)		ematite (or any other correct ore) T: iron oxide	[1]
(b)	(i)	calcium carbonate/limestone/CaCO <sub>3</sub>	[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 NOT: harmful/causes breathing difficulties	[1]
(d)	1 <sup>st</sup>	and 3 <sup>rd</sup> boxes ticked	[1]
(e)	bla alu iror car	y two of: st furnace can only be used for metals below zinc or carbon; minium is very reactive or high in the reactivity series or too reactive or higher then in the reactivity series; bon cannot remove oxygen from aluminium oxide/carbon cannot displace minium;	
		minium above carbon in reactivity series or more reactive than C = 2 marks much heat required for carbon to remove oxygen from aluminium oxide = 2 marks	[2]

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

Page 5	Mark Scheme	Syllabus	Paper
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(a) (	temperature of the water rises/heat given to the water/heat or energy given out/the thermometer reading goes up	[1]
(i	i) carbon dioxide + water (1 mark each)	[2]
À	ny two from coal/natural gas/wood/paraffin/any other suitable fuel containing carbon ALLOW: named alcohols (except ethanol) NOT: alkenes/named alkenes/naphtha	[2]
N	DH/–OH NOT: complete formula for ethanol	[1]
	olue cobalt chloride (paper); turns pink  or white/anhydrous copper sulphate; turns blue	[2]
(e) (	<ul> <li>painting/galvanising/covering with plastic/sacrificial protection/(electro)plating ALLOW: oiling/greasing NOT: removing air/removing water</li> </ul>	[1]
(i	i) contains water NOT: dissolves in water	[1]
(ii	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; ALLOW: general metallic properties e.g. conducts electricity; conducts heat; ductile etc. NOT: not very reactive	[2]

[Total: 12]

Page 6	Mark Scheme	Syllabus	Paper
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#### (a) Any two of; 6

(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<sub>2</sub> group;

ALLOW: can be made by same method

[2]

### (b) ethane;

correct structure of ethane;

[2]

ALLOW: correct structure from incorrectly named alkane

## (c) 1<sup>st</sup> row

correct structure of ethene;

use e.g. for making plastics/ethanol etc.;

[2]

correct structure of ethanoic acid;

[1]

3<sup>rd</sup> row  $C_2H_4Br_2$ ;

[1]

4<sup>th</sup> row

methane: fuel;

[2]

(d) 188

[1]

ALLOW: error carried forward from incorrect structure in the table

[Total: 11]

Page 7	Mark Scheme	Syllabus	Paper
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(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) [1] (iv) any noble gas 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]