

**MARK SCHEME for the October/November 2011 question paper  
for the guidance of teachers**

**0620 CHEMISTRY**

**0620/21**

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.

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

- Cambridge will not enter into discussions or correspondence in connection with these mark schemes.

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Page 2	Mark Scheme: Teachers' version	Syllabus	Paper
	IGCSE – October/November 2011	0620	21

- 1 (a) (i) medicines / food / (drinking) water / air quality [1]  
**ignore:** kitchens / clothes
- (ii) 1<sup>st</sup> box down ticked (boils slightly above 100°C) [1]
- (b) all 4 correct = 2 marks [2]  
2 or 3 correct = 1 mark  
0 or 1 correct = 0 marks  
top right → solvent front  
bottom right → chromatography paper  
bottom left → solvent  
top left → origin line
- (c) (i) C [1]
- (ii) A, C and D (all three correct for 1 mark) [1]
- (iii) B [1]
- [Total: 7]**
- 2 (a) air / oxygen [1]  
water [1]  
**allow:** damp / humid
- (b) idea of reaction of the oxygen (in first two weeks) [1]  
**ignore:** air reacting  
(oxygen reacting) with the iron / rusting / iron reacts [1]  
**ignore:** reaction with rust / reaction with iron oxide  
(after 2 weeks) all the oxygen had reacted / there was no further reaction / reaction had  
stopped / no more oxygen [1]  
**ignore:** no more air / experiment was finished
- (c) (at start →) shiny / silvery [1]  
**allow:** grey  
(after 2 weeks →) brown / reddish brown / orange [1]  
**allow:** red  
**ignore:** dull
- (d) add (aqueous) sodium hydroxide / (aqueous) ammonia [1]  
reddish-brown / brown precipitate (both colour and ppt needed) [1]  
**reject:** red precipitate  
**note:** 2<sup>nd</sup> mark dependent on correct reagent
- (e) iron + hydrochloric acid → iron chloride + hydrogen [2]  
1 mark for iron chloride; 1 mark for hydrogen  
**ignore:** wrong oxidation numbers / numbers in equation

**[Total: 11]**

Page 3	Mark Scheme: Teachers' version	Syllabus	Paper
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- 3 (a) (i) Na / Mg / sodium / magnesium [1]
- (ii) any two of Si / P / S / Cl (1 mark each) [2]
- (b) decreases / less metallic / from metals (on left) to non-metals (on right) [1]  
**allow:** metals on left and non metals on right  
**ignore:** just reference to metals or non-metals alone i.e. metals on left  
**ignore:** reactivity decreases
- (c) atomic number / number of protons [1]  
**ignore:** number of electrons
- (d) (i) Any 4 of: [4]  
nucleus in centre of atom  
neutrons and protons in nucleus  
number of protons = 13  
number of neutrons = 14  
number of electrons = 13  
electrons on outside of atom  
electrons in shells / 3 shells  
3 electrons in outer shell  
electron configuration = 2,8,3  
**allow:** marks from labelled diagram
- (ii) very good (electrical) conductivity / it is the best conductor / it is a better conductor [1]  
**ignore:** good conductor  
has a low density [1]  
**ignore:** other properties
- (e) Br<sub>2</sub> on right [1]  
correct balance 2 (KBr) and 2(KCl) [1]  
**allow:** balance mark if 2Br on right  
**reject:** if incorrect species
- (f) 3<sup>rd</sup> box down ticked (argon has a complete outer...) [1]

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Page 4	Mark Scheme: Teachers' version	Syllabus	Paper
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- 4 (a) ethene decolourises (bromine water) / bromine goes colourless in ethane [1]  
 ethane does not / no change / remains reddish-brown [1]  
**allow:** only ethene decolourises bromine = 2  
**ignore:** ethene reacts and ethane does not
- (b) (i) heat / high temperature [1]  
**ignore:** warm  
**allow:** quoted values between 300–1000°C  
 catalyst / named catalyst e.g. aluminium oxide / porous pot [1]  
**ignore:** high pressure
- (ii) alkene collects above the water / alkene not mixed with water [1]  
**ignore:** bubbles / it goes up
- (iii) 42 [1]
- (iv)  $C_4H_8 / 2C_2H_4$  [1]
- (c) addition [1]  
 polymerisation [1]

[Total: 9]

Page 5	Mark Scheme: Teachers' version	Syllabus	Paper
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- 5 (a) (i) correct points (each within one small square) [2]  
 –1 mark for each incorrect point  
 smooth curve [1]  
**ignore:** continuation of curve at either end
- (ii) 75 °C / the highest [1]  
**allow:** values above 75 °C
- (iii) the higher the temperature the faster the reaction / speed greater at higher temperature [1]  
**allow:** the higher the temperature the faster the word disappear  
**ignore:** gets faster without qualification / faster with temperature / higher temperature increases rate of collisions / it takes less time the higher the temperature
- (b) increases / gets faster [1]  
**not:** goes fast
- (c) (i) sodium chloride [1]  
**apply:** listing if extra species
- (ii) VI / vi / 6 / six [1]
- (iii) forest death / acidifies lakes or rivers / kills fish / plant in lakes or rivers / slows crop growth / leaches harmful minerals from soil / erodes (or corrodes) buildings (or metals) / kills corals [1]  
**ignore:** acid rain / kills animals / kills plants or fish in sea
- (iv) 2<sup>nd</sup> box down ticked (calcium oxide) [1]
- (v) magnesium gains oxygen / increases its oxidation number / gets oxidised [1]  
**allow:** loses electrons / Mg gets oxidised  
 sulfur dioxide loses oxygen / decreases its oxidation number; [1]  
**allow:** gains electrons / SO<sub>2</sub> gets reduced  
**ignore:** repeating what is in the equation  
**note:** oxidation and reduction occurs together = 1

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Page 6	Mark Scheme: Teachers' version	Syllabus	Paper
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- 6 (a) O<sub>2</sub> [1]  
 2 (O<sub>2</sub>) dependent on O<sub>2</sub> [1]
- (b) carbon monoxide / CO [1]
- (c) there was no air / the gas was at a low temperature / gas was unburnt [1]  
**ignore:** there was no gas / there is no combustion
- (d) (i) water [1]  
 (ii) heat it / warm it / put in dessicator [1]  
 (iii) gets heavier / increases absorbs carbon dioxide / carbon dioxide has mass / carbon dioxide added [1]  
 both points needed for 1
- (e) (i) cow flatulence / marshes / waste sites / paddy fields [1]  
**allow:** bacterial decomposition  
 (ii) global warming / named effect of global warming e.g. rise in air temperature / melting of polar ice / desertification / more extreme weather [1]  
**ignore:** melting of ice unqualified  
**allow:** greenhouse effect

[Total: 9]

Page 7	Mark Scheme: Teachers' version	Syllabus	Paper
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- 7 (a) 3<sup>rd</sup> box down ticked (endothermic) [1]
- (b) (i) ring around OH [1]  
**reject:** round OH and C / around OH of COOH
- (ii) C<sub>6</sub>H<sub>8</sub>O<sub>7</sub> [1]
- (c) (i) catalyst / substance which speeds up rate of reaction [1]  
protein / (substance) found in living things / biological [1]  
**ignore:** found in washing powder
- (ii) filtration [1]  
**allow:** decanting
- (iii) limewater [1]  
turns milky / cloudy / white precipitate [1]
- (d) put indicator in flask [1]  
**allow:** any named indicator (even if can't be used for weak acid)  
add sodium hydroxide (from burette) [1]  
stop adding / endpoint when indicator changes colour [1]

**[Total: 11]**

Page 8	Mark Scheme: Teachers' version	Syllabus	Paper
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- 8 (a) (i) electrolyte → D [1]  
**allow:** (molten) sodium chloride  
cathode → C [1]
- (ii) graphite [1]
- (b) floats on top of the sodium chloride [1]  
**allow:** sodium is on top
- (c) chlorine /  $Cl_2$  [1]  
**allow:**  $Cl$   
**reject:** chloride
- (d) (anode →) chlorine /  $Cl_2$  [1]  
**allow:** oxygen /  $O_2$   
**allow:**  $Cl / O$   
**reject:** chloride / oxide  
(cathode →) hydrogen /  $H_2$  [1]  
**allow:** H

[Total: 7]