UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

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

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International Examinations

1 **(a)** **(i)** medicines / food / (drinking) water / air quality [1]
ignore: kitchens / clothes

(ii) 1st 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 paperbottom 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: 2nd 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]

3 (a) (i) Na / Mg / sodium / magnesium [1]

(ii) any two of Si / P / S / C*l* (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_2 on right [1]
correct balance 2 (KBr) and 2(KCl) [1]
allow: balance mark if 2Br on right
reject: if incorrect species

(f) 3rd box down ticked (argon has a complete outer…) [1]

[Total: 14]

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]

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) 2nd 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_2 gets reduced
ignore: repeating what is in the equation
note: oxidation and reduction occurs together = 1

[Total: 12]

6 **(a)** O_2 [1]
2 (O_2) dependent on O_2 [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]

7 **(a)** 3rd box down ticked (endothermic) [1]

(b) **(i)** ring around OH [1]
reject: round OH and C / around OH of COOH

(ii) $C_6H_8O_7$ [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]

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]