UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2011 question paper

for the guidance of teachers

0620 CHEMISTRY

0620/22 Paper 2 (Core Theory), maximum raw mark 80

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1 (a) (i) C [1]

(ii) B [1]

(iii) E [1]

(iv) C [1]

(v) D [1]

(vi) A [1]

(b) (i) electrons [1]
atoms [1]

(ii) 1st box from left ticked [1]

2 (a) (i) iron → nickel → zinc → aluminium [1]

(ii) too reactive / takes too much energy / too high temperature needed [1]

(iii) bauxite [1]

(b) (i) air [1]
limestone [1]
allow calcium carbonate

(ii) 3 (CO) [1]
2 (Fe) [1]
apply listing for extra incorrect additions to equation

(iii) carbon dioxide [1]
loses oxygen [1]
allow oxidation number of carbon in carbon dioxide decreases
allow carbon gains electrons
ignore electrons gained unqualified

(iv) poisonous / toxic [1]
ignore harmful

(v) takes in heat / energy (from surroundings) [1]
allow temperature of the reaction mixture / surroundings falls
allow temperature goes down

(c) (i) mixture of metals / mixture of metal with non-metal OR carbon [1]

(ii) any suitable e.g. for car bodies / bridges / girders / railings etc. [1]
allow e.g. nuts / bolts / bullets / chains / hinges / knives / pipes / magnets / road signs / wire (for fences) / cans etc.
ignore for building without qualification

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3 (a) (i) 80 (%) [1]
allow 79–81

(ii) any two of: [2]
carbon dioxide / argon / neon / xenon
allow helium / radon / water <u>vapour</u>
reject hydrogen

(b) (i) decreases / gets less / gets lower [1]

(ii) increases / gets more / greater [1]

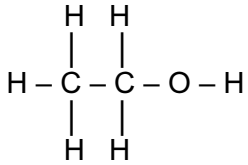
(c) any suitable use e.g. electrical conductor / electrical wiring / saucepans [1]
not wires unqualified

(d) electrolyte is soluble copper salt / named soluble copper salt e.g. copper sulfate [1]
the spoon is the cathode / the copper rod is the anode [1]
accept implication of this e.g. the positive ions move to the spoon
spoon gets coated with copper / spoon becomes brown [1]

4 (a) (i) carbon dioxide [1]
allow CO_2

(ii) any one of: [1]
- room temperature OR temperature quoted from 20–40°C /
  ignore low temperature / high temperature
- yeast / enzymes / zymase
  ignore catalyst alone
  ignore microbes / viruses / bacteria
- absence of oxygen / anaerobic
- pH 7 / pH near neutral

(b) (i) H – O – H [1]
not H_2O



[1]

allow – OH in place of – O – H
not C_2H_5OH

(ii) aqueous bromine / bromine water [1]
allow bromine / aqueous (acidified) potassium permanganate

turns colourless / decolourises [1]
ignore goes clear

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(c) carbon dioxide [1]
water [1]

(d) homologous [1]
similar [1]
functional [1]

5 **(a)** diamond: covalent (bonding) [1]
giant structure allow macromolecule [1]
chlorine: any two of: [2]
- molecule
- covalent
- diatomic

(b) C_6Cl_{12} [1]

(c) **(i)** green / yellow green / light green [1]
reject bluish-green / yellow alone

(ii) allow values between 2.5–4.0 (actual = 3.12) [1]

(iii) increases [1]
reject decreases then increases

(d) **(i)** iodine [1]
allow I_2

potassium bromide [1]
allow KBr

(ii) chlorine is more reactive than bromine / bromine is less reactive than chlorine / [1]
ignore chlorine is higher in the group
reject chloride / chloride is more reactive than bromide

(e) ionic compounds soluble AND molecular not (soluble) [1]
(both needed for mark)

ionic compounds conduct electricity when molten / in (aqueous) solution
AND molecular ones do not [1]
(both needed for mark)

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6 **(a)** any three of: [3]

- add excess iron to sulfuric acid /
- filter off (excess) iron /
- concentrate filtrate / iron sulfate solution OR heat filtrate to crystallisation point
  allow heat filtrate so that some of water evaporated
  allow leave on windowsill for water to evaporate / allow water to evaporate
  ignore heat filtrate without qualification
- filter off crystals / pick out crystals /
- dry crystals with filter paper

(b) **(i)** oxidation number / iron forms 2+ ions [1]
allow charge on the iron ion

(ii) add (aqueous) sodium hydroxide [1]
green [1]
precipitate [1]

(iii) water was given off / iron sulfate lost water / dehydration (reaction) [1]

(iv) double headed arrow / equilibrium sign [1]

(c) **(i)** turns red / pink [1]
bubbles / effervescence [1]
allow iron disappears / tube gets hot / solution turns light green
ignore hydrogen given off / gas given off

(ii) so plants can grow better / so crops can grow better / plants cannot grow well in alkaline conditions [1]

(iii) pH 8 [1]

(iv) calcium oxide / lime / limestone / chalk / calcium carbonate [1]
allow slaked lime

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7 **(a)** **(i)** any value between 15–35 seconds [1]

(ii) any three of: [3]
- particles escape from (ammonium) carbonate or solid
  allow particles evaporate from (ammonium) carbonate /
- diffusion /
- particles are in random motion /
- particles gradually mix up (with air particles) /
- particles spread out everywhere /
- particles collide with air particles /

(b) 96 [1]

(c) **(i)** nitrogen phosphorus potassium (1 mark for each) [3]
NPK = 2 marks

(ii) 3rd box down ticked [1]

(d) 330 (g) [1]

[Total: 80]

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