**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

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.

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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

**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]

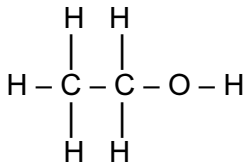
**(c)** any suitable use e.g. electrical conductor / electrical wiring / saucepans [1]
not wires unqualified

**(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

**(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)

**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

**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]**