CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2014 series

0620 CHEMISTRY

0620/23 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 should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the May/June 2014 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

CAMBRIDGE
International Examinations

1 **(a)** **(i)** copper sulfate / $CuSO_4$ [1]

(ii) calcium oxide / CaO [1]

(iii) hydrogen chloride / HC*l* [1]

(iv) potassium bromide / KBr [1]

(v) aluminium oxide / Al_2O_3 [1]

(vi) copper sulfate / $CuSO_4$ [1]

(b) chemically; different; fixed; [3]
(1 mark each)

[Total: 9]

2 **(a)** hydrochloric (acid) / HC*l* [1]
calcium hydroxide / calcium oxide [1]

(b) ⇌ [1]

$6H_2O$ on right [1]

(c) in tube A the calcium chloride absorbs the water vapour; [1]

In tube B there is both water and air / there is water (vapour) in the air; [1]

(d) 2nd box down ticked (oxidation state of iron) [1]

(e) **(i)** magnesium < zinc < iron < lead [2]
1 mark if one pair reversed / lead > iron > zinc > magnesium

(ii) oxygen removed from the copper oxide / it loses oxygen / hydrogen gains oxygen; [1]

[Total: 10]

3 **(a)** **(i)** carrots; potatoes; [1]

(ii) (pH) 7; [1]

(b) **(i)** Any **two** from: [2]
- plants won't grow if (conditions too) acid
- to raise the pH / to make the soil less acidic / lime is alkaline / lime has high pH;
- to neutralise (the soil) / neutralisation;

© Cambridge International Examinations 2014

(ii) lime is alkaline / lime is a base / lime reacts with ammonium salts; [1]

ammonia produced; [1]

(ammonia) escapes (into air) / (ammonia) is a gas; [1]

(c) (i) Any **two** from: [2]
- increases;
- up to pH 7.5 / up to quoted values between pH 7 and 8;
- then levels off / evens out / then stays at the same pH

(ii) pH 9.5 / between 9 and 10 [1]

[Total: 10]

4 (a) (i) capillary tube / very narrow tube; [1]

(ii) ink would undergo chromatography / ink would run up the paper / ink masks the results / ink would smear / ink mixes with spot ORA for pencil / lead [1]

(iii) B [1]

(iv) A [1]

(v) C [1]

(b) (i) 4 [1]

(ii) 212; [2]
For 1 mark one row correct e.g.
$H = 12 \times 1 = 12$
$N = 4 \times 14 = 56$

(c) (i) idea of substance formed by (addition of) monomers or simple units / idea of many monomers or simple units (joined); [1]

(ii) poly(ethene) / polyethene; [1]

[Total: 10]

5 (a) (i) increases as number of (carbon) atoms increase / both increase at the same time / proportional / more carbon the higher the boiling point; [1]

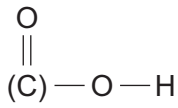
(ii) boiling point **allow:** between 130 and 150 °C; [1]
(actual = 141)

Density **allow:** between 0.80 and 1.00; [1]
(actual = 0.96)

© Cambridge International Examinations 2014

(iii) liquid because melting point below room temperature and boiling point above room temperature / room temperature is between melting and boiling point; [1]

(b)



[1]

(c) (i) burette; [1]

(ii) sodium hydroxide; [1]

(iii) indicator in flask / reference to indicator; [1]

run liquid from burette (until indicator changes colour); [1]

[Total: 9]

6 (a) $PbBr_2$ / $Pb^{2+}2Br^-$ [1]

(b) (i) to melt the lead bromide / to allow ions to move; [1]

(ii) graphite; [1]

(iii) anode: bromine and cathode: lead; [1]
(both required)

(c) (i) A; [1]

(ii) (anode): decreases in size / becomes eroded; [1]

cathode: increases in size; [1]

(iii) 134; [2]

[Total: 9]

7 (a) (i) Any **four** suitable differences e.g.: [4]

- no noble gases / only 7 (standard) Groups ORA;
- hydrogen / H in same column as Li ORA;
- some elements missing / named element missing / empty spaces ORA
- groups are horizontal rather than vertical / reference to groups or periods being different ORA
- not ordered according to atomic number / no proton numbers
- Zn put in same group as Be and Mg ORA

(ii) any **two** from: [1]
fluorine, chlorine, bromine, oxygen , nitrogen , hydrogen

© Cambridge International Examinations 2014

(b) any **three** from: [3]
- melting points / boiling points;
- density;
- catalytic activity;
- strength
- hardness
- electrical conductivity / heat conductivity
- malleability / ductility

(c) 2 (Cl_2); [1]
CO_2 (on right); [1]

(d) to prevent sodium reacting with air / to stop the Ti reacting with the air / to exclude air / to stop the hydrolysis of the titanium oxide / to exclude water (vapour); [1]

because argon is inert / unreactive / inactive / does not react; [1]

[Total: 12]

8 **(a)** 3rd box down ticked (giant ionic); [1]

(b) add barium chloride / barium nitrate; [1]

white precipitate; [1]
(both required)
note: second mark dependent on correct reagent

(c) Any **five** from: [5]
- condenser
- connected to flask
- mixture in flask
- idea of heating the solution / boil the solution
- water has lower boiling point than sodium sulfate / sodium sulfate is solid and water is liquid (at rtp)
- on heating water boils more easily / forms vapour more
- easily / water boils first / water will evaporate (not sodium sulfate)
- steam / water vapour goes to top of the flask and into condenser
- water vapour gets into condenser
- sodium sulfate does not turn to gas
- sodium sulfate remains in flask / sodium sulfate is left
- water vapour / steam goes to liquid in condenser
- water collected in receiver

(d) turns pink; [1]

© Cambridge International Examinations 2014

(e) filtered; [1]
chlorine added / chlorination; [1]
allow: other stages e.g. sedimentation / flocculation (use of iron chloride / aluminium sulfate etc.) / treatment with sulfur dioxide

[Total: 11]

© Cambridge International Examinations 2014