CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2013 series

0620 CHEMISTRY

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

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1 **(a)** **(i)** D / chlorine / Cl_2 [1]

E / carbon / graphite [1]
IGNORE: C
REJECT: diamond

(ii) E / carbon / graphite [1]
IGNORE: C
REJECT: diamond

(iii) C / ammonia / NH_3 [1]

(iv) A / ethanol [1]
IGNORE: alcohol

(v) E / graphite / carbon [1]
IGNORE: C
REJECT: diamond

(b) atom; combined; molecules; ionic (1 mark each) [4]

[Total: 10]

2 **(a)** increases [1]

(b) 5.2–6.6 (actual = 5.96) [1]

(c) (substance which) speeds up chemical reaction / increases reaction rate / lowers activation energy [1]

(d) Any three of: [3]

- high boiling point / high melting points
- high density / they are very dense **IGNORE:** they are dense
- form coloured <u>compounds</u> **REJECT:** they are coloured
- have different oxidation states / form ions with different charges
- form complex ions
- **ALLOW:** they are hard<u>(er)/</u> strong

(e) 3 (Fe) [1]

4 (H_2O) [1]

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(f) iron sulfate [1]
IGNORE: incorrect oxidation number of iron
IGNORE: formula

hydrogen [1]
IGNORE: formula

[Total: 10]

3 **(a)** A = (volumetric) pipette [1]
B = burette [1]
C = (conical) flask
ALLOW: Erlenmeyer (flask) [1]
D = (filter) funnel [1]

(b) **(i)** 13.2 [1]

(ii) 10 (cm^3) [1]

(iii) (pH) 7 [1]

(c) **(i)** 2nd and 3rd boxes ticked (calcium carbonate and calcium oxide) [2]
(one mark each)
APPLY: listing

(ii) so that crops grow well / so crops grow better / allows maximum growth/ plants don't grow as well in too acidic conditions/plants killed/plants die [1]
IGNORE: plants can grow

[Total: 10]

4 **(a)** **(i)** correct structure of methane showing all atoms and bonds [1]

(ii) name of any alkane other than methane [1]
IGNORE: formulae

(iii) Any one of: [1]

(waste product from digestion in) cows / other suitable animals/
marshes / paddy fields / bacterial decay / decomposition of vegetation
IGNORE: industrial sources / leaking from the Earth

(iv) CO_2 on right [1]

2 on left [1]
NOTE: second mark dependent on the first being correct

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(b) (i) (differences in) boiling point(s) [1]

(ii) 1 mark each [4]

diesel → fuel for cars / lorries
fuel oil → fuel for ships
kerosene → fuel for jet aircraft
naphtha → making chemicals

[Total: 10]

5 (a) oxygen + 20/21 (%) [1]

nitrogen + 78/79 (%) [1]

sulfur dioxide + correct source e.g. burning <u>fossil fuels</u> or named fossil fuel [1]

carbon monoxide + correct source e.g. car exhausts / car engines / incomplete combustion (of fossil fuels) [1]

oxides of nitrogen + correct source e.g. car exhausts / car engines / lightning [1]

(b) (i) PbS [1]

(ii) oxygen removed (from lead oxide) / carbon takes away the oxygen [1]
IGNORE: reference to electrons

(c) (i) arrangement: irregular / (fairly) random / not ordered [1]

closeness: (very) close / touching / near [1]

(ii) $C_2H_4Cl_2$ (**ALLOW:** any order) [1]

(iii) 99 [2]
(If 2 marks not scored **ALLOW** correct atomic masses seen C = 12, H = 1, C*l* = 35.5 anywhere in the question for 1 mark)

[Total: 12]

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6 **(a)** zinc → magnesium → calcium → rubidium [2]

1 mark for 1 pair reversed
ALLOW: all reversed for 1 mark

(b) zinc/ iron [1]
REJECT: if K / Na / Al included = 0 marks

(c) **(i)** 2 electrons in outer shell [1]

8 electrons in middle shell [1]
ALLOW: 2,8,2 in numbers for 2 marks

(ii) 14 [1]

[Total: 6]

7 **(a)** <u>ions</u> can <u>move</u> / <u>ions</u> are <u>mobile</u> [1]
IGNORE: it has an ionic structure
REJECT: if mention of atoms/ molecules

(b) it is a molecular structure / it has <u>no ions</u> [1]
IGNORE: electrons can't move

(c) add water and shake / stir / mix [1]

filter [1]

(d) **(i)** C [1]

(ii) graphite [1]

(iii) negative electrode: zinc / Zn [1]

positive electrode: chlorine / Cl_2 [1]
IGNORE: Cl
REJECT: Chloride / Cl

(iv) acidify / add nitric acid [1]
REJECT: add sulfuric acid / add hydrochloric acid

add (aqueous) silver nitrate [1]

<u>white precipitate</u> [1]

3rd marking point dependent on correct reagent (silver nitrate)

[Total: 11]

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8 (a) Any four of: [4]

- sugar dissolves
- sugar particles become separated or water molecules get in between sugar particles
- diffusion
- movement of <u>particles</u> (in solution)
- random (movement)
- (sugar) particles constantly collide with (water) molecules
- particles (in solution) spread out / seperate
- **ALLOW:** particles move from concentrated to dilute (sugar) solution

(b) (i) 3 [1]

(ii) 12 [1]

(iii) any OH group ringed / all OH groups ringed [1]

(iv) carbon dioxide [1]
IGNORE: CO_2

(v) yeast [1]

no <u>air</u> / <u>oxygen</u> present [1]
IGNORE: reference to temperatures between 5–45 ^{o}C

(vi) solvent / fuel / making a named chemical e.g. making ethanoic acid and esters / antiseptic / medical wipes / cleaning fluid / vodka sauce / paints/ disinfectant / preservatives [1]
IGNORE: unqualified uses e.g. in cars / food / cooking

[Total: 11]

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