CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2013 series

0620 CHEMISTRY

0620/21 Paper 2 (Core Theory), maximum raw mark 80

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1 (a) (i) E [1]

(ii) B [1]

(iii) E [1]

(iv) A [1]

(v) A [1]

(vi) D [1]

(b) 1 mark for each correct word
atom;
two;
covalent **ALLOW**: atom;
transition; [4]

[Total: 10]

2 (a) melting point below (34 °C) and boiling point above (34 °C) [1]
ALLOW: its melting point is 29 °C and its boiling point is 669 °C

(b) **ALLOW**: 740–800 °C (actual is 760 °C)` [1]

(c) (i) increases (down the group) [1]
ALLOW: goes up / goes up except for potassium

(ii) sodium / Na [1]

(d) 1 mark for each of:

- shiny (when freshly cut) **ALLOW**: silvery / silver colour
- conducts heat / conducts electricity / conducts
- ductile / can be drawn into wires
- malleable / can be shaped **ALLOW**: can be bent
- **ALLOW**: solid at room temperature
- soft (for 1 mark) [3]

IGNORE: sonorous / it is a metal

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(e) (i) Any two of:

- bubbles
- moves (around)
- floats / on surface
- catches fire / flame
- lilac (flame) **ALLOW**: mauve or purple
- explodes / spits
- fizzing
- forms a ball
- beaker gets hotter
- gets smaller [2]

IGNORE: water goes cloudy / water goes purple or blue

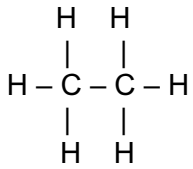
(ii) H_2 on right; [1]
2 on left (dependent on H_2 or 2H on right) [1]

[Total: 11]

3 (a) 1 mark for each correct line / indication

alkane → C_2H_6
alkene → C_2H_4
alcohol → C_2H_5OH
carboxylic acid → CH_3COOH [4]

(b) Full structural formula shown i.e.



[1]

ALLOW: correct dot and cross diagram

(c) saturated has <u>only</u> single bonds / no double bonds; [1]

unsaturated has double bond(s) [1]
IGNORE: one has single bonds and the other has double bonds

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(d) bromine water / aqueous bromine / bromine / **ALLOW**: correct formula; [1]
IGNORE: Br

(saturated hydrocarbon) no reaction / stays the same colour / remains orange / remains orange-brown [1]
ALLOW: remains brown
ALLOW: remains yellow (if aqueous bromine used) / remains red (if bromine used)
IGNORE: remains yellow (if bromine used)
REJECT: incorrect colour, e.g. stays same blue colour, does not score

(unsaturated hydrocarbon) decolourises / goes colourless [1]
IGNORE: goes clear
IGNORE: initial incorrect colour of bromine

(acidified) potassium permanganate / potassium manganate(VII) (1 mark)
goes colourless / purple to colourless (1 mark)

IF: incorrect reagent 0 for this question

[Total: 10]

4 (a) two marks for names of elements present: [2]
nitrogen + phosphorus + potassium (or correct symbols) = 2 marks
NOT: N_2
any two of nitrogen, phosphorus or potassium (or symbols) = 1 mark

two marks for reasons: [2]
any two of:

- soil depleted of minerals / depleted of essential elements / depleted of any of N or P or K
  ALLOW: plants use up minerals / use up essential elements / use up N or P or K
- to increase the nitrogen or phosphorus or potassium in the soil
  ALLOW: to increase the nitrates in the soil / to increase the phosphates in the soil
- increased growth / more growth / better growth (idea of <u>more</u> growth needed)
  ALLOW: more rapid growth / quicker growth
  ALLOW: produce more crops
  IGNORE: produce more unqualified
  IGNORE: for growth / to grow / to keep plants healthy / for healthier growth
- (for making) more protein

NOTE: to increase the nitrogen (or N) in the soil = 1
(0 mark for elements and 1 for increase of that element)
to increase the N + P in the soil = 2
(1 mark for two of the elements and one for idea of increase)

(b) (i) CON_2H_4 [1]
ALLOW: any order

(ii) 60 [2]
if 2 marks not scored: **ALLOW** 1 mark for correct atomic masses
N = 14, O = 16, H = 1, C = 12 anywhere in working
NOTE: no e.c.f.

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(c) regular arrangement; [1]
NOTE: minimum of 2 rows of 3 molecules required

molecules touching each other [1]
NOTE: minimum of 6 (O) are required all of which are touching or very close together.
REJECT: molecules in a single row touching

(d) (damp red) litmus (paper); [1]
ALLOW: pH paper

turns blue [1]
NOTE: second mark dependent on first being correct

ALLOW: universal indicator / full range indicator (paper) (1 mark)
turns purple / blue (1 mark)
ALLOW: hydrochloric acid (1) gives white fumes (1)

[Total: 11]

5 (a) (i) **D** [1]

(ii) **C** [1]

(iii) **A** [1]

(b) (i) loss of carbon dioxide / loss of gas [1]

(ii) accept values from 360–380 [1]
ALLOW: 6 min to 6 min 20 s / 6⅓ min

(iii) 0.5 (g) [1]

(iv) (initial) gradient greater / slope greater and starts at 0, 0; [1]
same final volume [1]

(v) (rate) increases [1]
IGNORE: more carbon dioxide per second
ALLOW : (rate) faster

[Total: 9]

6 (a) (i) Any three of: [3]

- add propanol to the mixture <u>and</u> shake (or stir)
- implication of filtration of solution / diagram of filter funnel <u>and</u> filter paper
  REJECT: diagram of filter paper circle on top of funnel
- sugar solution goes through the filter paper / sugar solution is the filtrate / diagram shows sugar solution (labelled) passing through filter paper
- salt or sodium chloride remains on filter paper / diagram shows salt or sodium chloride (labelled) remaining on filter paper

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(ii) evaporate the water / evaporation [1]
IGNORE: heat
ALLOW: distillation

(b) (i) NaCl [1]
ALLOW: $Na^+C l^-$
REJECT: Na^+ + $C l^-$ / multiples, e.g. 2NaCl

(ii) ionic [1]

(c) (i) **D** [1]

(ii) positive electrode → chlorine / Cl_2 [1]
IGNORE: Cl

negative electrode → hyrdrogen / H_2 [1]
IGNORE: H

IF: correct electrode products reversed = 1 mark

[Total: 9]

7 (a) Any four of:

- evaporates or evaporation (of hydrogen chloride)
- movement of particles
- hydrogen chloride particles (move) / HCl particles (move)
  ALLOW: hydrochloric acid particles (move)
- diffusion
- particles collide (with each other)
- spreading out of particles
- random (movement of particles)
- HCl particles hit litmus
- **ALLOW**: (HCl) particles (move from higher) to lower concentration

ALLOW: molecules or atoms in place of particles

NOTE: no mark for acid turning damp blue litmus red
NOTE: hydrogen chloride particles move = 2 mark
NOTE: random movement of hydrogen chloride particles = 3 marks [4]

(b) ammonium chloride [1]
REJECT: ammonia chloride

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(c) (i) iron + hydrochloric acid → iron(II) chloride + hydrogen [1]
IGNORE: symbol equation

REJECT: iron chloride

(ii) add sodium hydroxide (solution / aqueous) ammonia; [1]
ALLOW: add ammonium hydroxide

greyish-green precipitate [1]
ALLOW: green ppt.
IGNORE: what happens in excess reagent
NOTE: second mark dependent on first being correct

(d) (i) control / standard / idea of making fair comparison [1]

(ii) water / H_2O [1]

air / oxygen / O_2 [1]
IGNORE: O
APPLY: listing for other incorrect substances

(iii) air not present / oxygen not present / water not present [1]

(iv) air and water can get to the surface of the iron / oxygen and water can get to the iron [1]
IGNORE: ideas that not all surface is protected

[Total: 13]

8 (a) (i) better conductor ORA [1]
IGNORE: it conducts / good conductor
IGNORE: it is softer / easier to draw into wire

(ii) too expensive / higher cost [1]
IGNORE: it has a low melting point

(iii) higher melting point; [1]
IGNORE: high melting point

cheaper [1]

(iv) (plastic) is an insulator; [1]
explanation of insulator, e.g. does not conduct electricity [1]
ALLOW: so you don't get an electric shock

(b) B [1]

[Total: 7]

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