

CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International General Certificate of Secondary Education

MARK SCHEME for the March 2015 series

0620 CHEMISTRY

0620/22

Paper 2 (Core Theory), maximum raw mark 80

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- 1 (a) (i) C [1]
- (ii) A [1]
- (iii) B [1]
- (iv) C [1]
- (v) D [1]

(b) It has only one type of atom / it cannot be broken down into any other substance by chemical means [1]

[6 marks]

- 2 (a) (i) Any value within the range: 190–490 °C (actual = 337 °C) [1]
- (ii) gas [1]

(b) (i) chlorine + potassium iodide → iodine + potassium chloride. [2]

(ii) iodine is less reactive than chlorine / chlorine is more reactive than iodine [1]

(c) (i) exothermic [1]

(ii) sodium (atom) loses an (outer) electron; [1]
iodine (atom) gains an (outer) electron [1]

note: an electron is transferred from a sodium (atom) to an iodine atom
scores 2 marks

[8 marks]

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- 3 (a) Any **four** from: [4]
- column becomes eroded / column is being eaten away
 - sulfur from burning of fossil fuels
 - (forms) sulfur dioxide / nitrogen dioxide
 - sulfur dioxide / nitrogen dioxide (dissolved in rainwater)
 - to form acid rain / acidic solution formed
 - acid reacts with the limestone / acid decomposes limestone
 - carbon dioxide given off
 - calcium sulfate formed
- note:** marks can be obtained from relevant equations e.g.
sulfur + oxygen → sulfur dioxide scores 1 mark
sulfur dioxide + water → (sulfurous) acid scores 1 mark
calcium carbonate + sulfuric acid → calcium sulfate + water + carbon dioxide scores 3 marks
- (b) Any **two** from: [2]
painting / oiling / covering with plastic / coating with zinc or another (more reactive) metal [2]
Prevents oxygen (air) and / or water getting to the surface [1]
- (c) Any **two** from: [2]
- forms coloured compounds
 - forms ions with different charges / variable valency
 - catalytic activity
 - forms complex ions
 - (very) high density
- (d) 26 electrons [1]
32 neutrons [1]
electron negatively charged / - [1]
proton positively charged / + [1]
- (e) H₂ on right [1]
2(HCl) on left (dependent on H₂ or 2H on right) [1]
- [15 marks]
- 4 (a) N and P / nitrogen and phosphorus [1]
- (b) (i) burette [1]
(ii) **allow:** any pH value below pH7 [1]

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(iii) pH decreases [1]

(iv) neutralisation [1]

(c) 3(NH₃) [1]
(3) H₂O [1]

[7 marks]

5 (a) (i) calcium / Ca²⁺ [1]

(ii) iodide [1]

(iii) calcium and magnesium / Ca²⁺ and Mg²⁺ [1]

(iv) Any **two** from:
bromide / chloride / iodide / sulfate [2]

(b) (i) graphite conducts electricity / graphite is inert / graphite is unreactive [1]

(ii) hydrogen [1]

(iii) structure of chlorine completely correct (1 bonding pair of electrons and 6 unbonded electrons the right hand chlorine atoms) [2]

(c) anode: bromine [1]
cathode: magnesium [1]

[11 marks]

6 (a) so as not to harm the skin / idea of causing harm or being poisonous [1]

(b) (i) removal of oxygen from a compound / gain of electrons / decrease in oxidation number [1]

(ii) zinc oxide + carbon → zinc + carbon monoxide [1]

(iii) poisonous gas formed / carbon monoxide formed [1]

(c) lead < nickel < zinc < magnesium [2]

(d) water [1]

(e) (i) filtration [1]

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- (ii) Any **three** from: [3]
- evaporate until first crystals seen/heat to crystallisation point/evaporate of some of the water
 - leave to crystallise/leave in a warm place
 - pick out crystals/filter off crystals
 - dry between filter paper

(iii) zinc carbonate/zinc hydroxide [1]

(f) (i) 64.4 g [1]

(ii) 161 [2]

[15 marks]

7 (a) (i) X placed in the bottom 'cell' of the column [1]

(ii) naphtha [1]

(iii) waxes/polishes [1]

(b) last two boxes ticked [2]

(c) (i) Any **two** from: [2]

- decomposition/breaking down (of alkanes)
- of alkanes/hydrocarbons
- idea of longer chains being converted to shorter chains/larger molecules being converted to smaller molecules
- alkenes formed/hydrogen formed

(ii) C₃H₆ [1]

(d) (i) structure of ethene correct [1]

structure of ethanol correct [1]

(ii) reversible reaction/equilibrium reaction [1]

[11 marks]

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- 8 (a) Any **three** from: [3]
- particles in the crystal separate (in the water)/ particles in the crystal dissolve
 - particles of potassium manganate(VII) become free to move
 - diffusion
 - particles move randomly/in any direction/mix with the water
 - particles collide with water molecules
 - particles spread out
 - particles move from where they are in high concentration to where they are in low concentration
- (b) closeness: close together/touching/tightly packed [1]
 motion: vibrating/do not move (from place to place) [1]
- (c) X on the base line and solvent level below the base line and above the bottom of the chromatography paper [2]

[7 marks]