

**CAMBRIDGE INTERNATIONAL EXAMINATIONS**

Cambridge International General Certificate of Secondary Education

**MARK SCHEME for the October/November 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.

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- 1 (a) (i) B and D
- (ii) A
- (iii) C [1]
- (iv) A [1]
- (v) D [1]
- (b) KBr [1]  
**allow:**  $K^+Br^-$
- (c) 146 [2]  
**allow:** 1 mark for correct atomic masses 19 and 32

[Total: 9]

- 2 (a) Any **four** from: [4]  
solids: particles close together / no space between particles / particles arranged regularly / particles touching  
solids: particles only vibrate  
**allow:** particles cannot move / particles in fixed positions  
liquids: particles can slide over each other / particles have limited movement  
**ignore:** particles can move unqualified  
liquids: particles close together / particles not arranged regularly / particles arranged randomly / particles not in fixed positions  
**ignore:** particles further apart than in solids  
gases: particles far apart / particles arranged randomly  
gases: particles can move everywhere / particles move anywhere / particles move randomly  
**note:** It must be clear which state is being referred to  
**note:** there must be reference to particles (or atoms / molecules / ions) in the answer to gain marks
- (b) (i) A [1]  
(ii) E and F [2]  
**allow:** B  
(iii) C and E [2]  
(iv) B and F [2]

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(c) (i) 4<sup>th</sup> box down (last box) ticked

(ii) argon is unreactive/inert

air (or oxygen) may oxidise metals/air (or oxygen) may react with the (hot) metals /to prevent the air (or oxygen) reacting with the metals

[1]

[Total: 14]

3 (a) (i) mortar

**allow:** mortar and pestle

[1]

(ii) any suitable solvent other than water e.g. ethanol

**allow:** ethanoic acid/aqueous ammonia

**ignore:** hydrochloric/sulfuric/nitric acids/strong alkalis/aqueous solutions of salts

[1]

(iii) evaporate some of the solvent

**allow:** evaporate/heat

**allow:** add more rhubarb

[1]

(b) (i) it would dissolve/it would mix with the solvent/solvent would wash it off/so that the spot/Y didn't dissolve in the solvent/Z would dissolve in the solvent

[1]

(ii) any **two** from:

[2]

dip paper into the solvent

put lid on jar

let solvent run up paper/let solvent separate spots

**ignore:** wait for spots to appear/spots start to spread (unqualified)

take paper out before solvent reaches the top/record solvent front

**ignore:** reference to  $R_f$  values/locating agents

(c) (i) ring around one or both carboxylic acid groups;

**do not allow:** ring around whole structure

[1]

(ii)  $C_2H_2O_4$

**ignore:**  $(COOH)_2$

[1]

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- (d) (i)  $\text{H}_2\text{O}$
- (ii)  $\text{CO}$  and  $\text{CO}_2$  are gases /  $\text{CO}$  and  $\text{CO}_2$  are given off / the products are gases (and water)  
**ignore:** other substances evaporated
- (iii) any suitable source e.g. respiration / burning fuels / burning named carbon-containing fuel / from limekilns or other suitable decomposition reaction [1]  
**ignore:** from burning (unqualified) / exhaled air / animals (unqualified)  
**allow:** from car exhausts
- (iv) any two of: [2]  
 it is a greenhouse gas / absorbs infrared radiation  
**allow:** warms the atmosphere / traps heat in the atmosphere  
 causes global warming / increase temperature of the atmosphere  
**allow:** warms the atmosphere / traps heat in the atmosphere  
**reject:** absorbs heat from the Sun  
 effects of global warming e.g. desertification / rise in sea level / more extreme weather / climate change  
**ignore:** references to ozone layer

[Total: 13]

- 4 (a) filter funnel with filter paper + container to collect filtrate [1]  
 correct labels for two of: (filter) funnel, filter paper, beaker or flask [1]  
**ignore:** incorrect labels  
**ignore:** filtrate / water / sand
- (b) (i) potassium nitrate [1]  
 (ii)  $\text{Na}^+$  and  $\text{CO}_3^{2-}$  (both required) [1]  
 (iii) sodium chloride [1]  
 (iv) total mass = 20g [1]  
 % by mass = 14% [1]  
**allow:** error carried forward from incorrect total mass
- (c) (i)  $\text{CO}_2$  [1]  
 (ii) pH 12 [1]

[Total: 9]

Page 5	Mark Scheme	Syllabus	Paper
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- 5 (a) alcohol(s)/alkanol
- (b) O–H  
allow: OH
- (c) (i) 3 (H<sub>2</sub>) [1]
- (ii) (hydrogen is) flammable/explosive [1]  
allow: fire hazard
- (CO is) poisonous/toxic [1]  
ignore: CO harmful
- (d) (i) decreases [1]  
then remains constant [1]
- (ii) 0.28 (mol / dm<sup>3</sup>) [1]
- (iii) allow: values between 44–46 (hours) [1]
- (iv) curve steeper at start; [1]  
curve levels out at same level and before 45 hrs [1]
- (e) bonding pair of electrons between H and Cl [1]  
do not allow: if extra electrons on the H atom
- Six non-bonding electrons around the Cl [1]  
ignore: inner shell electrons in Cl
- [Total: 13]
- 6 (a) (i) acidic oxide because oxide of non-metal [1]
- (ii) Any **three** from: [3]  
sulfur dioxide reacts with water in air / reacts with water on surface of building / forms acid rain  
allow: sulfur dioxide is acidic / it is acidic  
limestone is a carbonate  
idea of reaction of acid with limestone / carbonate  
carbon dioxide (+ salt + water) formed

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- (b) (i) carry out in fume cupboard
- (ii) speeds up reaction
- (iii) O<sub>2</sub> (on left) [1]  
 correct balance (2 on right) [1]  
**note:** second mark dependent on O<sub>2</sub> or 2O on left
- (iv) to prevent it turning into liquid/vapour [1]  
**allow:** so temperature is below melting point/so that it can form crystals
- (v) 200 g [1]
- (c) (i) 4<sup>th</sup> box down ticked (pipette) [1]
- (ii) indication that indicator changes colour [1]  
**allow:** any stated colour change
- (d) water absorbed [1]

[Total: 13]

- 7 (a) Any **four** from: [4]  
 colour gets darker down the Group  
 correct colours of two of the halogens (chlorine green/yellow green + bromine brown/reddish-brown + iodine grey/grey-black/black)  
**note:** all three halogen colours correct is 2 marks  
 correct state of two of the halogens (chlorine gas, bromine liquid, iodine solid)  
**note:** all three states correct is 2 marks  
 reactivity decreases down the Group  
**allow:** any two differences in reactivity correctly compared e.g. chlorine is more reactive than bromine (1 mark maximum)  
**do not allow:** mention of incorrect difference in reactivity  
 example of reactivity of pair of halogens/halides e.g. chlorine reacts with potassium bromide  
**allow:** density increases down Group  
**allow:** boiling points/melting points get higher down the Group

- (b) diatomic [1]
- (c) 7 electrons in the outer shell [1]  
 2 electrons in inner shell [1]  
**note:** this mark cannot be obtained if other inner shells are drawn
- (d) bromine + potassium iodide → iodine + potassium bromide [2]

[Total: 9]