

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

**MARK SCHEME for the October/November 2011 question paper
for the guidance of teachers**

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 must be read in conjunction with the question papers and the report on the examination.

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Page 2	Mark Scheme: Teachers' version	Syllabus	Paper
	IGCSE – October/November 2011	0620	23

- 1 (a) (i) C [1]
- (ii) A [1]
- (iii) E [1]
- (iv) D [1]
- (v) C [1]
- (b) (i) limestone / chalk / marble [1]
ignore: lime / formulae
- (ii) 3rd box down ticked (heavier than air) [1]
- (iii) H₂O on right [1]
2(HCl) [1]
second mark dependent on correct formula for water

[Total: 9]

Page 3	Mark Scheme: Teachers' version	Syllabus	Paper
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- 2 (a) copper → any common use e.g. electrical wiring / pipes jewellery [1]
ignore: for alloys / for brass / for wires (unqualified)
- platinum → any common use e.g. inert electrode / jewellery [1]
allow: for catalyst (as long as not incorrect catalyst)
- aluminium → any common use e.g. food containers / car (bodies) / aircraft (bodies) / kitchen utensils / pots and pans [1]
allow: for roofing / for high voltage electrical cables
ignore: for wires / for knives
- (b) (i) poisonous / harms nervous system or brain [1]
ignore: harmful (without qualification)
- (ii) protons → 82 [1]
neutrons → 125 [1]
- (c) (i) Any three of: [3]
sodium goes into a ball /
gets smaller / disappears
allow: dissolves **ignore:** reacts
moves (over surface)
bubbles / effervescence /
ignore: hydrogen given off
floats on the water (as it reacts) /
fizzes / hissing / crackling
ignore: sound
litmus turns blue /
ignore: changes colour
- (ii) sodium hydroxide [1]
hydrogen [1]
- (iii) electron [1]
lon [1]
gains [1]
negative [1]

[Total: 15]

Page 4	Mark Scheme: Teachers' version	Syllabus	Paper
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- 3 (a) Any two of: [2]
 temperature
 mass / amount of manganese(IV) oxide / volume of manganese(IV) oxide
 size of manganese dioxide particles
allow: pressure
ignore: concentration
- (b) (i) the greater the concentration the greater the speed / rate increases with concentration [1]
ignore: concentration increases speed / more oxygen the greater the concentration
- (ii) less hydrogen peroxide present (in B) / more hydrogen peroxide (in A) [1]
allow: hydrogen peroxide less concentrated (in B)
- (iii) time taken → 27 (s) [1]
allow: 26 (s)
 volume → 37 (cm³) [1]
- (c) magnesium → copper → manganese → lead [1]
ignore: oxide / oxidation numbers
- [Total: 7]**
- 4 (a) methane [1]
- (b) arrangement → random / irregularly arranged / no fixed position [1]
 proximity → close together / touching [1]
 motion → random/ sliding over each other / movement not entirely free [1]
allow: move slightly
- (c) (i) arrow at tube at bottom left [1]
ignore: direction of arrow
- (ii) group of (different) molecules / group of (different) hydrocarbons [1]
 implication of different molecules
 with similar / (particular) range of boiling points / molecules with similar molecular masses or small range of molecular masses [1]
- (iii) X → naphtha [1]
 Y → diesel (oil) [1]
- (iv) structure of ethane showing all atoms and all bonds [1]
- (v) 2nd box down ticked (saturated hydrocarbon) [1]
- [Total: 11]**

Page 5	Mark Scheme: Teachers' version	Syllabus	Paper
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- 5 (a) molecule → two or more atoms [1]
atom → the smallest part [1]
ion → an atom that has become [1]
- (b) (i) pH 13 [1]
(ii) 40 [1]
(iii) neutralisation [1]
(iv) pH decreases / pH goes from higher to lower pH / suitable reference to pH values e.g. from pH 12 to pH 8 [1]
final pH below 7 / stated value below 7 [1]
ignore: gets more acidic
- (c) Any six of: [6]
bubbles (from the electrodes)
solution goes yellow(ish) / solution goes green(ish)
hydrogen at cathode
chlorine at anode
(hydrogen and chlorine gases produced at wrong electrodes = 1)
electrodes are graphite / electrodes are carbon
electrodes conducts electricity / electrons move in electrodes
hydrogen (ions) go to cathode
chloride (ions) go to the anode
smell of chlorine
electrolyte conducts electricity
ignore: hydroxide ions

[Total: 14]

Page 6	Mark Scheme: Teachers' version	Syllabus	Paper
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- 6 (a) as a reducing agent / in the blast furnace / for extracting iron or zinc or other suitable metal / to extract metals / in making lime [1]
- (b) (i) layers can slide over each other [1]
both ideas of layers and sliding needed
strong bonding in all directions / covalent bonding in all directions /
strong bonding in macromolecules in giant structure [1]
both ideas of type of bonding and giant structure needed
- (ii) for cutting / drill bits / for drills [1]
- (c) (i) ammonium sulfate [1]
ignore: water / hydrogen
- (ii) nitrogen [1]
- (d) one pair of electrons in each overlap area [1]
- (e) 1st box ticked [1]
last box ticked [1]

[Total: 9]

Page 7	Mark Scheme: Teachers' version	Syllabus	Paper
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- 7 (a) (i) Any two of: [2]
 have same general formula / have same pattern of formula / members differ by CH₂ group
 have same functional group
 have similar chemical properties / prepared by similar methods
allow: same chemical properties
not: similar properties
 show gradual change in physical properties / show trend in boiling points
- (ii)
- $$\begin{array}{c}
 \text{H} \quad \text{H} \\
 | \quad | \\
 \text{H} - \text{C} - \text{C} - \text{O} - \text{H} \\
 | \quad | \\
 \text{H} \quad \text{H}
 \end{array}$$
- allow:** OH in place of O – H [1]
- (b) (i) exothermic and temperature increases / goes from 18 to 37 [1]
both: exothermic and temperature increase needed for the mark
allow: exothermic because heat is given off
- (ii) grey / black / grey-black [1]
not: brown / purple
- (c) filter (off zinc); [1]
note: second mark dependent on filtration for first mark
 (let alcohol) evaporate / evaporate (off the alcohol) [1]
allow: warm gently (to remove some alcohol)
allow: use drying agent
ignore: heat unqualified / crystallise
reject: residue left to dry
- (d) (i) ZnI₂ [1]
allow: 5ZnI₂
- (ii) 2nd answer ringed (giant ionic) [1]
allow: underlined or ticked
- (e) 1 mark for each product [3]
 zinc nitrate
 ammonium nitrate **not:** ammonia nitrate
 water
- (f) add (aqueous) sodium hydroxide (and warm) [1]
 test gas evolved with red litmus paper/ universal indicator paper [1]
 litmus paper/ universal indicator paper turns blue [1]
note: the 2nd and 3rd marks are dependent on the first mark being correct

[Total: 15]