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

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

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UNIVERSITY of CAMBRIDGE
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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) H_2O on right [1]
2(HC*l*) [1]
second mark dependent on correct formula for water

[Total: 9]

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]
Ion [1]
gains [1]
negative [1]

[Total: 15]

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 grater 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 (cm^3) [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]

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]

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]

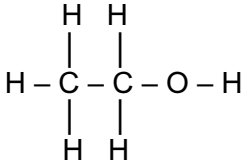
(d) one pair of electrons in each overlap area [1]

(e) 1st box ticked [1]
last box ticked [1]

[Total: 9]

7 (a) (i) Any two of: [2]
have same general formula / have same pattern of formula / members differ by CH_2 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)



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) ZnI_2 [1]
allow: $5ZnI_2$

(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]