UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2008 question paper

0620 CHEMISTRY

0620/32 Paper 32 (Extended Theory), maximum raw mark 80

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UNIVERSITY of CAMBRIDGE
International Examinations

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An incorrectly written symbol, e.g. NA **or** CL, should be penalised once in a question.

1 **(a)** bromine [1]

(b) selenium [1]

(c) potassium **or** calcium [1]

(d) krypton [1]

(e) iron **or** cobalt [1]

(f) potassium **or** copper [1]

(g) iron [1]

ACCEPT name or symbol

[Total: 7]

2 **(a)**

electron	e^-	1/1840 **or** 1/2000 **or** 1/1837 **or** negligible	-1
proton	p	1	+1
neutron	n	1	0

each correct row (1) [3]

equal numbers of protons and electrons of positive and negative charges **or** charges cancel/balance [1]
or net charge = 0 [1]

(ii) gain electron(s) [1]
more electrons than protons [1]
NOT more – than +

(iii) different number of neutrons [1]
same number of protons **or** electrons [1]

(iv) an element is known for each proton number [1]
accept any sensible idea, for example – no gaps between z = 1 and z = 103

[Total: 10]

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3 **(a)** impure copper [1]
(pure) copper [1]
ACCEPT any (soluble) copper salt **or** Cu^{2+} [1]
if both name and formulae given, both have to be correct

(b) $Cu - 2e \rightarrow Cu^{2+}$ **or** $Cu \rightarrow Cu^{2+} + 2e$ [2]
for having $Cu \rightarrow Cu^{2+}$ [1] **ONLY**

(c) **(i)** good conductor [1]
malleable **or** ductile [1]

good conductor of heat
high melting point (and high boiling point)
unreactive **or** resists corrosion
appearance [2]
do not accept malleable **or** ductile if either is given for wiring

(ii) alloys **or** named alloy **or** pipes **or** ornaments **or** jewellery **or** integrated circuit boards **or** electroplating **or** roofs, etc. [1]

[Total: 10]

4 **(a)** **(i)** magnesium + sulphuric acid → magnesium sulphate + hydrogen [1]
accept hydrogen sulphate

(ii) $Li_2O + H_2SO_4 \rightarrow Li_2SO_4 + 2H_2O$ [2]
all formulae correct, not balanced [1]

(iii) $CuCO_3 + H_2SO_4 \rightarrow CuSO_4 + H_2O + CO_2$ [2]
OR $CuCO_3 + 2HCl \rightarrow CuCl_2 + H_2O + CO_2$
OR $CuCO_3 + 2HNO_3 \rightarrow Cu(NO_3)_2 + H_2O + CO_2$
all formulae correct, not balanced [1]

(iv) sodium carbonate + sulphuric acid → sodium sulphate + carbon dioxide + water [1]

(b) it accepts a proton [2]
it accepts a hydrogen ion [1] **ONLY**

(c) electrical conductivity [1]
sulphuric acid is a better conductor **or** ethanoic acid is a poorer conductor [1]
OR rate of reaction
a suitable metal or metal carbonate must be named [1]
sulphuric acid reacts faster **or** ethanoic acid reacts slower [1]
NOTE [1] for method explicitly stated or implied for valid comparison [1]
sulphuric acid is a better conductor [2]
sulphuric acid is a good conductor [1]
Accept a correct test for a sulphate with a soluble barium salt

[Total: 10]

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5 **(a)** **(i)** (concentration) of reactants/CO and Cl_2 decreases [1]
(concentration) of product/$COCl_2$ increases [1]

(ii) (an increase in pressure favours the) side with fewer molecules **or** moles, side with smaller volume (of gas) [2]
NB [2] or [0]

(b) forward reaction is exothermic [1]
COND because it is favoured by low temperatures **or** cool [1]
ACCEPT argument re back reaction

(c) hydrogen chloride **or** hydrochloric acid [1]
carbon dioxide **or** carbonic acid **or** hydrogen carbonate [1]

(d) 8e around both chlorine atoms [1]
4e between the carbon atom and the oxygen atom [1]
8e around carbon [1]
8e around oxygen [1]
if a bond contains a line with no electrons, no marks for atoms joined by that line
ignore keying

[Total: 12]

6 **(a)** **(i)** (fine powder) large surface area [1]
high/faster/collision rate/more collisions/fast collisions
(between solid and oxygen in air) [1]

(ii) carbohydrate + oxygen → carbon dioxide + water [1]
ACCEPT flour

(b) rate depends on light
more light more silver **or** blacker
thicker card less light [3]

(c) **(i)** biological catalyst [1]
accept protein catalyst

(ii) production of energy (from food) [1]
by living "things" **or** by cells, etc. [1]

(iii) "kill" yeast **or** denature **or** damage the enzymes (due to increase in temperature) [1]

(iv) all glucose used up [1]
yeast "killed/denature/damaged by ethanol/alcohol [1]

(v) filter **or** centrifuge [1]
fractional distillation [1]

[Total: 14]

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7 **(a)** repeat experiment <u>without indicator</u> **or** use carbon to remove indicator [1]
(partially) evaporate **or** heat or boil [1]
allow to cool **or** crystallise or crystals [1]
dry crystals [1]
NOTE evaporate to dryness, marks one and two **ONLY**
must be in correct order

(b) number of moles of NaOH used = 0.025 x 2.64 = 0.066 [1]

maximum number of moles of $Na_2SO_4.10H_2O$ that could be formed = 0.033 [1]

mass of one mole of $Na_2SO_4.10H_2O$ = 322g

maximum yield of sodium sulphate - 10 - water = 10.63g [1]

percentage yield = 37.2% [1]
mark **ecf** but **NOT** to simple integers
if **ecf** marking, mark to at least one place of decimals
if percentage > 100% then 3/4 maximum

[Total: 8]

8 **(a)** burning wood produces carbon dioxide [1]
less photosynthesis **or** trees take up carbon dioxide [1]

(b) **(i)** fats **or** lipids [1]

(ii) -O- linkage, no other atoms in linkage [1]
COND same monomer [1]
COND continuation bonds at each end -A- [1]

(iii) **same** linkage **or** amide linkage **or** peptide **or** –CONH- [1]

differences
synthetic polyamide usually two monomers
protein many monomers
protein monomers are amino acids **or** proteins hydrolyse to
amino acids **or** a protein monomer has one $–NH_2$ and one –COOH group.
synthetic polyamide each monomer has 2 $–NH_2$ **or** 2COOH groups.
accept diagrams **or** comments that are equivalent to the above
ANY **TWO** [2]

[Total: 9]

[Total for paper: 80]

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