

**UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS**  
**International General Certificate of Secondary Education**

**MARK SCHEME for the May/June 2008 question paper**

**0620 CHEMISTRY**

**0620/31**

Paper 31 (Extended Theory), maximum raw mark 80

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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) germanium [1]
- (c) potassium **or** calcium [1]
- (d) krypton [1]
- (e) iron **or** cobalt [1]
- (f) bromine [1]
- (g) vanadium [1]
- ACCEPT** name or symbol

[Total: 7]

2 (a)

electron	e <sup>-</sup> <b>or</b> e	1/1840 <b>or</b> 1/2000 <b>or</b> 0 1/1837 <b>or</b> negligible	- <u>1</u>
proton	p <b>or</b> p <sup>+</sup> <b>or</b> H <sup>+</sup>	1	+ <u>1</u>
neutron	n	1	0 <b>or</b> neutral

each correct row (1) [3]

- (b) (i) equal numbers of protons and electrons of positive and negative charges **or** charges cancel/balance [1]  
or net charge = 0 [1]
- (ii) lose electron(s) [1]  
more protons than electrons [1]  
**NOT** more + than –
- (iii) different numbers of neutrons [1]  
same number of protons **or** same number of electrons [1]  
for just giving- they are isotopes [1] **ONLY**
- (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**  $\text{Cu}^{2+}$  [1]  
 if both name and formulae given, both have to be correct
- (b)  $\text{Cu} - 2\text{e} \rightarrow \text{Cu}^{2+}$  **or**  $\text{Cu} \rightarrow \text{Cu}^{2+} + 2\text{e}$  [2]  
 for having  $\text{Cu} \rightarrow \text{Cu}^{2+}$  [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  
 any **TWO** [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)  $\text{Li}_2\text{O} + \text{H}_2\text{SO}_4 \rightarrow \text{Li}_2\text{SO}_4 + \text{H}_2\text{O}$  [2]  
 formulae correct but not balanced [1]
- (iii)  $\text{CuO} + \text{H}_2\text{SO}_4 \rightarrow \text{CuSO}_4 + \text{H}_2\text{O}$  [2]  
**OR**  $\text{CuO} + 2\text{HCl} \rightarrow \text{CuCl}_2 + \text{H}_2\text{O}$   
**OR**  $\text{CuO} + 2\text{HNO}_3 \rightarrow \text{Cu}(\text{NO}_3)_2 + \text{H}_2\text{O}$   
 formulae correct but not balanced [1]
- (iv) sodium carbonate + sulphuric acid  $\rightarrow$  sodium sulphate + carbon dioxide + water [1]
- (b) it accepts a proton [2]  
 it accepts a hydrogen ion [1] **ONLY**
- (c) sulphuric acid is completely ionised [1]  
**or** few molecules and many ions  
 ethanoic acid is partially ionised [1]  
**or** many molecules and few ions
- [Total: 10]**

Page 4	Mark Scheme	Syllabus	Paper
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- 5 (a) (i) (concentration) of reactants/CO and  $Cl_2$  increases [1]  
 (concentration) of product decreases/ $COCl_2$ ) [1]
- (ii) (decrease in pressure favours side)  
 with more molecules **or** moles **or** side with bigger 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 carbon and oxygen atoms [1]  
 8e around carbon atom [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  $\rightarrow$  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 enzymes (due to increase in temperature) [1]
- (iv) all glucose used up [1]  
 yeast "killed" **or** denatured **or** damaged by ethanol/alcohol [1]
- (v) filter **or** centrifuge [1]  
fractional distillation [1]

[Total: 14]

Page 5	Mark Scheme	Syllabus	Paper
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- 7 (a) repeat experiment without indicator **or** use carbon to remove indicator [1]  
 (partially) evaporate **or** boil **or** heat [1]  
 allow to cool **or** crystallise **or** crystals [1]  
 dry crystals [1]  
**MUST be in correct order**  
**NB** evaporate to dryness, marks one and two **ONLY**
- (b) number of moles of NaOH used =  $0.025 \times 2.24 = 0.056$  [1]  
 maximum number of moles of  $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$  that could be formed = 0.028 [1]  
 mass of one mole of  $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O} = 322\text{g}$   
 maximum yield of sodium sulphate – 10 - water = 9.02g [1]  
 percentage yield = 42.8% [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 proteinmonomer has one -NH<sub>2</sub> and one -COOH groupsynthetic polyamide each monomer has 2 -NH<sub>2</sub> **or** 2COOH groups **or** monomers are

dioic acid and diamine

**accept** diagrams **or** comments that are equivalent to the aboveANY **TWO**

[2]

[Total: 9]

[Total for paper: 80]