As part of CIE's continual commitment to maintaining best practice in assessment, CIE has begun to use different variants of some question papers for our most popular assessments with extremely large and widespread candidature, The question papers are closely related and the relationships between them have been thoroughly established using our assessment expertise. All versions of the paper give assessment of equal standard.

The content assessed by the examination papers and the type of questions are unchanged.

This change means that for this component there are now two variant Question Papers, Mark Schemes and Principal Examiner's Reports where previously there was only one. For any individual country, it is intended that only one variant is used. This document contains both variants which will give all Centres access to even more past examination material than is usually the case.

The diagram shows the relationship between the Question Papers, Mark Schemes and Principal Examiner's Reports.

Question Paper	**Mark Scheme**	**Principal Examiner's Report**
Introduction	Introduction	Introduction
First variant Question Paper	First variant Mark Scheme	First variant Principal Examiner's Report
Second variant Question Paper	Second variant Mark Scheme	Second variant Principal Examiner's Report

Who can I contact for further information on these changes?
Please direct any questions about this to CIE's Customer Services team at: international@cie.org.uk

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

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.

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UNIVERSITY of CAMBRIDGE
International Examinations

Page 2	Mark Scheme	Syllabus	Paper
	IGCSE – May/June 2008	0620	31

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⁻ **or** e	1/1840 **or** 1/2000 **or** 0 1/1837 **or** negligible	<u>-1</u>
proton	p **or** p⁺ **or** H⁺	1	<u>+1</u>
neutron	n	1	0 **or** 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]

Page 3	Mark Scheme	Syllabus	Paper
	IGCSE – May/June 2008	0620	31

3 **(a)** <u>impure copper</u>   [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)** <u>good conductor</u>   [1]
          malleable **or** ductile   [1]

          <u>good conductor of heat</u>
          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) $Li_2O + H_2SO_4 \rightarrow Li_2SO_4 + H_2O$ [2]
           formulae correct but not balanced [1]

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

      (iv) sodium carbonate + sulphuric acid $\rightarrow$ sodium sulphate + carbon dioxide + water   [1]

    (b) it <u>accepts a proton</u>   [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
			IGCSE – May/June 2008	0620	31

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) <u>large surface area</u> [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)** <u>biological catalyst</u> [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 <u>glucose</u> used up [1]
yeast "killed" **or** denatured **or** damaged by <u>ethanol/alcohol</u> [1]

    (v) filter **or** centrifuge [1]
<u>fractional distillation</u> [1]

                                                        [Total: 14]

Page 5	Mark Scheme	Syllabus	Paper
	IGCSE – May/June 2008	0620	31

7 (a) repeat experiment <u>without indicator</u> **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 x 2.24 = 0.056 [1]

maximum number of moles of $Na_2SO_4.10H_2O$ that could be formed = 0.028 [1]

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

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 protein monomer has one – NH_2 and one –COOH group
synthetic polyamide each monomer has 2 –NH_2 **or** 2COOH groups **or** monomers are dioic acid and diamine
accept diagrams **or** comments that are equivalent to the above
ANY **TWO** [2]

[Total: 9]

[Total for paper: 80]

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

Page 2	Mark Scheme	Syllabus	Paper
	IGCSE – May/June 2008	0620	32

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]

Page 3	Mark Scheme	Syllabus	Paper
	IGCSE – May/June 2008	0620	32

3 **(a)** <u>impure copper</u> [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)** <u>good conductor</u> [1]
malleable **or** ductile [1]

<u>good conductor of heat</u>
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 $\rightarrow$ 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 $\rightarrow$ sodium sulphate + carbon dioxide + water [1]

(b) it <u>accepts a proton</u> [2]
it accepts a hydrogen ion [1] **ONLY**

(c) electrical conductivity [1]
sulphuric acid is a bett<u>er</u> conductor **or** ethanoic acid is a poor<u>er</u> conductor [1]
OR rate of reaction
a suitable metal or metal carbonate must be named [1]
sulphuric acid reacts fast<u>er</u> **or** ethanoic acid reacts slow<u>er</u> [1]
NOTE [1] for method explicitly stated or implied for valid comparison [1]
sulphuric acid is a bett<u>er</u> 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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Page 4	Mark Scheme	Syllabus	Paper
	IGCSE – May/June 2008	0620	32

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]
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if a bond contains a line with no electrons, no marks for atoms joined by that line
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<u>high/faster/collision rate/more collisions/fast collisions</u>
(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) <u>biological catalyst</u> [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 <u>glucose</u> used up [1]
yeast "killed/denature/damaged by ethanol/alcohol [1]

(v) filter **or** centrifuge [1]
<u>fractional distillation</u> [1]

[Total: 14]

Page 5	Mark Scheme	Syllabus	Paper
	IGCSE – May/June 2008	0620	32

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]

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        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.
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                                                       [Total: 9]

                                                [Total for paper: 80]