



Rewarding Learning

**ADVANCED SUBSIDIARY (AS)
General Certificate of Education
January 2012**

Chemistry

Assessment Unit AS 1

assessing

**Basic Concepts in Physical
and Inorganic Chemistry**

[AC111]

FRIDAY 13 JANUARY, AFTERNOON

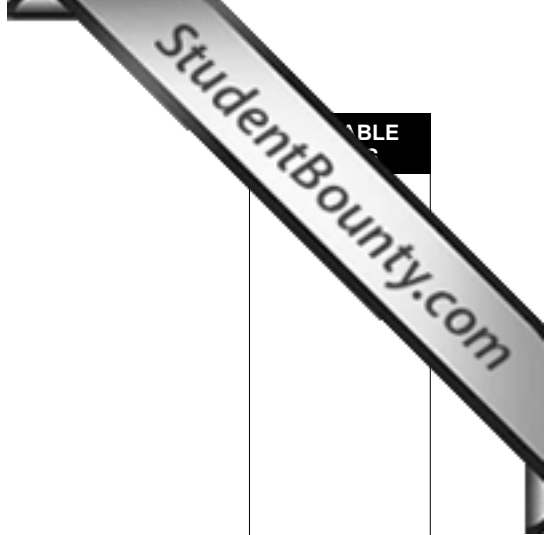
MARK SCHEME

Section A

- 1 A
- 2 D
- 3 B
- 4 C
- 5 B
- 6 A
- 7 D
- 8 D
- 9 B
- 10 C

[2] for each correct answer

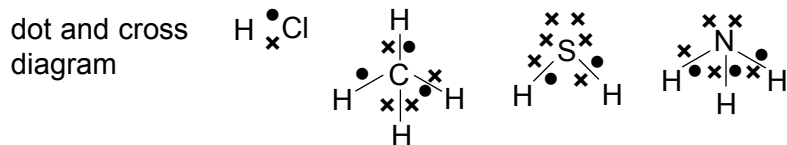
| | |
|------------------|-----------|
| [20] | 20 |
| Section A | 20 |
| | |



Section B

- 11 Depending on the response of candidates it is likely that two marking points will be needed for each mark awarded.

shapes H-Cl C S N
 angles 180° 109° 105° 107°
 (accept no angle)



apply the following to each compound
 lone pair v lone pair > lone pair v bond pair > bond pair v bond pair

the electron pairs repel to be as far apart as possible [6]

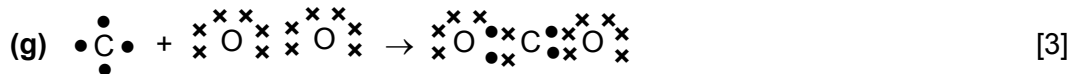
4 marking points per compound, i.e. shape, electron structure, angle, explanation, i.e. 16 marking points – count number of errors. Apply following:
 Even number of errors ÷ 2, subtract this from 6
 (Odd number of errors –1) ÷ 2, subtract this from 6

Quality of written communication [2] 8

- 12 (a) (i) $2I^- \rightarrow I_2 + 2e^-$ oxidation because electrons are lost [1]
- (ii) $O_2 \rightarrow 2H_2O$ reduction because electrons are gained [1]
- (b) $4I^- + 4H^+ + O_2 \rightarrow 2I_2 + 2H_2O$ (electrons left in [-1]) [2]
- (c) chlorine [1]
 iron(III) ions [1] [2]
- (d) (i) $I^- = -1$ $MnO_2 = +4$
 $I_2 = 0$ $MnSO_4 = +2$ [2]
- iodide/iodine is oxidised and manganese is reduced [1] [3]
- (ii) violet/purple vapour
 or grey/black solid at top of test tube [1] 10

- 13 (a)** $2P + 3Br_2 \rightarrow 2PBr_3$ or $P_4 + 6Br_2 \rightarrow 4PBr_3$ [1]
- (b)** $8.0 \times 3.1 = 24.8$ g [1]
- $24.8/160 = 0.155$ mol [1]
- $6.2/31 = 0.2$ mol [1]
- 0.155 mol [1]
- 0.103 mol [1]
- $PBr_3 = 31 + 3 \times 80 = 271$
 $0.103 \times 271 = 27.9$ g [1]
- (c)** $PBr_3 + 3H_2O \rightarrow 3HBr + H_3PO_3$ [1]
- (d) (i)** reaction could be too vigorous [1]
- (ii)** hydrogen bromide is soluble (in water) [1]
- (iii)** hydrogen bromide is heavier (than air) [1]
- (e)** dissolves (in water vapour) to form hydrobromic acid [1]
- (f) (i)** bromine [1]
- (ii)** violet/purple colour [1]
- (iii)** nothing observed/stays the same/remains colourless [1]
- (iv)** $HCl > HBr > HI$ (mark is dependent on given observations) [1]
- 14 (a)** $98.89 \times 12 = 1186.68$
 $1.11 \times 13 = 14.43$
 $= 1201.11$
 $= 12.011$ [3]
- (b) (i)** 7 electrons 7 protons 7 neutrons [2]
- (ii)** nitrogen [1]
- (c) (i)** to determine RAM and isotopic abundance/RMM [2]
- (ii)** atomic masses or RAM/mol mass/RMM are measured relative to C = 12.000 [2]
- (d)** same atomic number but different mass numbers [2]
- (e) (i)** $C_{12}H_{22}O_{11} \rightarrow 12C + 11H_2O$ [1]
- (ii)** hydrated: contains water of crystallisation/water present [1]
 water of crystallisation: water chemically bonded [1] [2]
- (iii)** not hydrated, water is formed/no water in the sugar [1]

- (f) (i) carbon dioxide [1]
 (ii) carbon monoxide [1]
 (iii) yes [1] it is also carbon [1] [2]

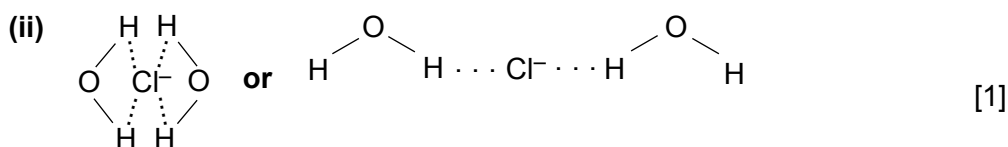


- (d) Weigh the CuO, add (known) excess (hydrochloric) acid (to CuO) [1]
 titrate excess hydrochloric acid [1]
 with (standard) alkali/sodium hydroxide [1]
 named indicator, e.g. phenolphthalein/methyl orange [1] [4]

- (e) (i) W: concentrated hydrochloric acid [1]
 X: nichrome/platinum [1]
 Y: blue [1]
 Z: green-blue [1]

- (ii) clean the wire [1]
 make the solid stick to the wire/dissolve the solid [1] [2]

- (iii) electrons (in the energy levels) raised to higher levels [1]
 fall back down [1] to give out light [1] [3]



- (iv) add silver nitrate (solution) [1]
 (add dilute nitric acid) [1]
 white [1]
 precipitate/solid [1] [3]

Section B

23

80

Total

100