



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]
Section A

AVAILABLE MARKS	
	20
Section A	20

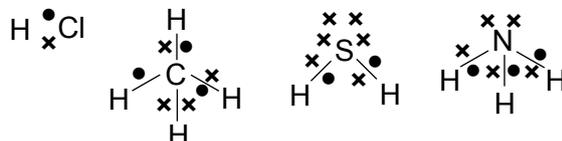
Section B

AVAILABLE
MARKS

- 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)

dot and cross
 diagram



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] [3]

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]

AVAILABLE
MARKS

16

(f) (i)	carbon dioxide	[1]	AVAILABLE MARKS
(ii)	carbon monoxide	[1]	
(iii)	yes [1] it is also carbon [1]	[2]	
(g)		[3]	23
15 (a)	$\text{Cu} + \text{Cl}_2 \rightarrow \text{CuCl}_2$	[1]	
(b)	$\text{CuO} + 2\text{HCl} \rightarrow \text{CuCl}_2 + \text{H}_2\text{O}$	[1]	
(c)	$\text{CuCl}_2 \cdot 2\text{H}_2\text{O}$	[1]	
(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]	[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]	
(f) (i)	$\text{Cu}^{2+}; \text{Cl}^-$	[2]	
(ii)		[1]	
(iii)		[1]	
(iv)	add silver nitrate (solution) [1] (add dilute nitric acid) [1] white [1] precipitate/solid [1]	[3]	23
Section B			80
Total			100