



Rewarding Learning

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

Chemistry

Assessment Unit AS 1

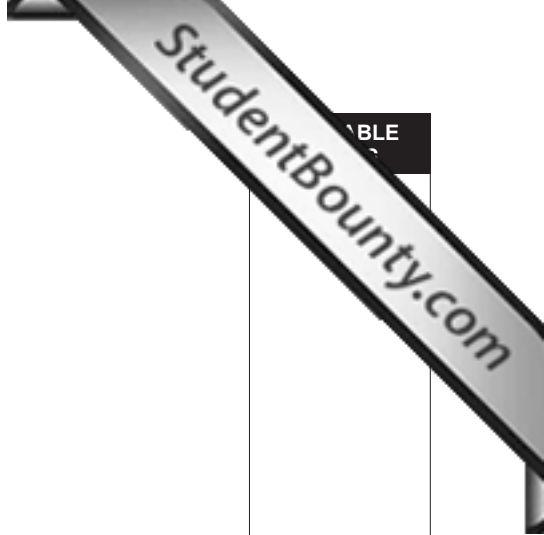
assessing

**Basic Concepts in Physical
and Inorganic Chemistry**

[AC112]

WEDNESDAY 13 JUNE, MORNING

MARK SCHEME



Section A

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

[2] for each correct answer

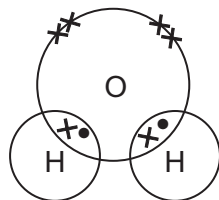
	[20]	20
Section A		20

Section B

- 11 (a) (i) number of protons [1]
 (ii) number of protons + number of neutrons [1]
 (iii) atoms with the same number of protons but a different number of neutrons [1]
- (b) (i) $\begin{matrix} 12 & 12 & 10 \\ 17 & 18 & 18 \end{matrix}$ error [-1] [2]
- (ii)
- | | 1s | 2s | 2p | 3s | 3p | |
|-----------------------|----|----|----------|----|----------|-----|
| $^{24}\text{Mg}^{2+}$ | ↓↑ | ↓↑ | ↓↑ ↓↑ ↓↑ | □ | □ □ □ | [1] |
| $^{35}\text{Cl}^-$ | ↓↑ | ↓↑ | ↓↑ ↓↑ ↓↑ | ↓↑ | ↓↑ ↓↑ ↓↑ | [1] |
- (iii)
- $$\text{Mg}^{\times} \cdot \ddot{\text{Cl}}: \cdot \ddot{\text{Cl}}: \rightarrow [\text{Mg}]^{2+} [\times \ddot{\text{Cl}}:]^{-} [\times \ddot{\text{Cl}}:]^{-}$$
- [-1] each error [4]
- (c) (i) The energy required to convert one mole of gaseous ions with a single positive charge into (gaseous) ions with a double positive charge [2]
 (ii) $\text{Mg}^+(\text{g}) \rightarrow \text{Mg}^{2+}(\text{g}) + \text{e}^-$ [2]
 (iii) electron closer to nucleus [1]
 less shielded [1]
 full shell [1] [3]
- (d) electrons promoted from ground state/lower energy level to excited state/higher energy level [1] as the electron drops back down [1] energy given out as (red) light [1] [3]
- 21
- 12 (a) number of atoms [1] present in 12.000 g of carbon-12 [1] [2]
 (b) (i) moles of X = 0.05 [1] molar mass = 46g [1] [2]
 (ii) NO_2 [1]
 (c) $3\text{N}_2\text{O}_4 + 2\text{H}_2\text{O} \rightarrow 4\text{HNO}_3 + 2\text{NO}$ [1]
 (d) (i) moles of Mg = 0.25
 moles of nitric acid = 0.50
 volume of nitric acid = 250 cm³ each error [-1] [3]
 (ii) moles of magnesium nitrate formed 0.25
 molar mass = 148
 mass (g) = 0.25 × 148 = 37g each error [-1] [2]
- 11

13 (a) (i)	solution of known concentration	[1]	
(ii)	e.g. phenolphthalein/methyl orange/colourless [1] to pink [1] or red/pink [1] to yellow/orange [1]	[3]	
(b) (i)	$0.0018/1.8 \times 10^{-3}$	[1]	
(ii)	$0.0018/1.8 \times 10^{-3}$	[1]	
(iii)	$0.018/1.8 \times 10^{-2}$	[1]	
(iv)	0.2	[1]	
(v)	$0.2 - 0.018 = 0.182$	[1]	
(vi)	0.091	[1]	
(vii)	9.1 g	[1]	
(viii)	91%	[1]	12
14 (a)	green/green-yellow/yellow-green gas red-brown liquid grey-black/black solid [-1] for each error	[3]	
(b) (i)	white precipitate for solution of NaCl [1] dissolves in dilute ammonia [1] cream precipitate for solution of NaBr [1] dissolves in concentrated ammonia [1] yellow precipitate for solution of NaI [1] does not dissolve in concentrated ammonia [1]	[6]	
	Quality of written communication	[2]	
(ii)	$\text{Ag}^+(\text{aq}) + \text{I}^-(\text{aq}) \rightarrow \text{AgI}(\text{s})$	[2]	
(c) (i)	$\text{NaCl} + \text{H}_2\text{SO}_4 \rightarrow \text{NaHSO}_4 + \text{HCl}$	[2]	
(ii)	$\text{H}_2\text{SO}_4 + 8 \text{H}^+ + 8 \text{e}^- \rightarrow \text{H}_2\text{S} + 4 \text{H}_2\text{O}$ unbalanced [-1]	[2]	
(iii)	$\text{H}_2\text{SO}_4 + 8 \text{H}^+ + 8 \text{I}^- \rightarrow 4 \text{I}_2 + \text{H}_2\text{S} + 4 \text{H}_2\text{O}$ unbalanced [-1]	[2]	
(iv)	smell of rotten eggs	[1]	
(v)	sulfur dioxide, sulfur	[2]	
(vi)	the outer electrons in the iodide ions are further from the nucleus/ more shielded [1] iodide ions lose electrons more easily (than chloride ions) [1]	[2]	
(d) (i)	$3\text{Cl}_2 + 6\text{NaOH} \rightarrow 5\text{NaCl} + \text{NaClO}_3 + 3\text{H}_2\text{O}$	[2]	
(ii)	disproportionation	[1]	27

15 (a)



[2]

(b) (i) 104–105°

[1]

(ii) V-shaped/angular/bent [1]

repulsion [1] between lone (electron) pairs and bond pairs [1]

[3]

(iii) no lone pairs in methane/only bond pairs in methane [1]

[1]

(c) water molecules held together by hydrogen bonding [1] which is stronger than the intermolecular/polar forces between hydrogen sulfide molecules [1]

[2]

9

Section B

80

Total

100