



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]

Section A

**AVAILABLE
MARKS**

20

20

Section B

AVAILABLE
MARKS

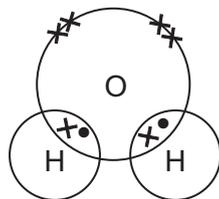
- 11 (a) (i) number of protons [1]
- (ii) number of protons + number of neutrons [1]
- (iii) atoms with the same number of protons but a different number of neutrons [1]
- (b) (i) $\begin{matrix} 12 & 12 & 10 \\ 17 & 18 & 18 \end{matrix}$ error [-1] [2]
- (ii)
- $^{24}\text{Mg}^{2+}$ $\begin{matrix} 1s & 2s & 2p & 3s & 3p \\ \boxed{\uparrow\downarrow} & \boxed{\uparrow\downarrow} & \boxed{\uparrow\downarrow} \boxed{\uparrow\downarrow} \boxed{\uparrow\downarrow} & \boxed{} & \boxed{} \boxed{} \boxed{} \end{matrix}$ [1]
- $^{35}\text{Cl}^-$ $\begin{matrix} \boxed{\uparrow\downarrow} & \boxed{\uparrow\downarrow} & \boxed{\uparrow\downarrow} \boxed{\uparrow\downarrow} \boxed{\uparrow\downarrow} & \boxed{\uparrow\downarrow} & \boxed{\uparrow\downarrow} \boxed{\uparrow\downarrow} \boxed{\uparrow\downarrow} \end{matrix}$ [1]
- (iii)
- $\text{Mg}^{\times} \cdot \ddot{\text{Cl}}: \cdot \ddot{\text{Cl}}: \rightarrow [\text{Mg}]^{2+} [\times \ddot{\text{Cl}}:]^{-} [\times \ddot{\text{Cl}}:]^{-}$ [4]
[-1] each error
- (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) $\text{Mg}^+(g) \rightarrow \text{Mg}^{2+}(g) + e^-$ [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]
- 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]

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11

			AVAILABLE MARKS
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]

Section B**80****Total****100**AVAILABLE
MARKS

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