

Name of the Student: _____

Max. Marks : 17 Marks

Time : 17 Minutes

Mark Schemes

Q1.

- (a) Repeating pattern/trends (of physical or chemical properties/reactions)

Allow named property

Penalise groups

1

- (b) Bromine/Br

Not Br₂

Accept Kr or Krypton

1

- (c) Potassium /K

*If Na or Rb lose **M1** but allow access to **M2** and **M3***

If other incorrect elements 0/3

1

Smallest number of protons/smallest nuclear charge

1

Similar shielding / same number of shells (as other elements in period 4)

Allow same shielding

1

- (d) Amphoteric

1

- (e) $\text{As}_2\text{O}_3 + 6 \text{Zn} + 12 \text{HNO}_3 \rightarrow 2 \text{AsH}_3 + 6 \text{Zn}(\text{NO}_3)_2 + 3 \text{H}_2\text{O}$

Accept multiples

1

[7]

Q2.

- (a) Moles SO_2 eqbm ($= 6.08/64.1 = 0.0949$) so moles O_2 eqbm = 0.0474

1

Mass of oxygen ($= 0.0474 \times 32(.0)$) = 1.52 g

Allow 0.0475

Allow **M1** $\times 32$

1

- (b) **M1**: Mole fraction $\text{SO}_3 = 0.15$

Mole fraction $\text{SO}_2 = 0.57$

Mole fraction $\text{O}_2 = 0.28$

Accept fractions for **M1**

1

M2
$$K_p = \frac{(p\text{SO}_2)^2 \times (p\text{O}_2)}{(p\text{SO}_3)^2} \quad (= \frac{(\lambda\text{SO}_2)^2 P^2 \times (\lambda\text{O}_2) P}{(\lambda\text{SO}_3)^2 P^2})$$

Do not accept []

λ = mole fraction

1

M3
$$P = \frac{K_p \times (\lambda\text{SO}_3)^2}{(\lambda\text{SO}_2)^2 \times (\lambda\text{O}_2)} \quad \text{or} \quad \frac{K_p \times (0.15)^2}{(0.57)^2 \times (0.28)}$$

M3 is for rearrangement with or without numbers

If incorrect rearrangement allow correct **M1** and **M2** only

1

M4 $P = 1.91 \times 10^5$ (Pa) Allow range 1.88×10^5 to 1.94×10^5

1

- (c) **M1** K_p is higher at higher temperature or converse

1

M2 At higher temperature more dissociation occurs / more products are formed / equilibrium shifts to the right/forward direction

M2: Allow converse arguments

M2 dependent on **M1**

1

- (d) $(\sqrt{3.94 \times 10^4} \text{ Pa}) = 198.5$

1

$\text{Pa}^{1/2}$ or $\text{Pa}^{0.5}$

Allow 198 – 198.5 (answer is 198.49)

If $\sqrt{7.62 \times 10^5} = 873$ then lose **M1** but allow **M2**

1

[10]