Practice Question Set For A-Level
Subject : Chemistry
Paper-1 Topic: Physical 1

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Name of the Student:_____
Max. Marks : 17 Marks **Time : 17 Minutes**

Q1.

This question is about periodicity, the Period 4 elements and their compounds.

(a) State the meaning of the term periodicity.

_____

_____

_____

(1)

(b) Identify the element in Period 4 with the highest electronegativity value.

_____

(1)

(c) Identify the element in Period 4 with the largest atomic radius.

Explain your answer.

Element _____

Explanation _____

_____

_____

_____

(3)

(d) The equations for two reactions of arsenic(III) oxide are shown.

$$As_2O_3 + 6\ HCl \rightarrow 2\ AsCl_3 + 3\ H_2O$$

$$As_2O_3 + 6\ NaOH \rightarrow 2\ Na_3AsO_3 + 3\ H_2O$$

Name the property of arsenic(III) oxide that describes its ability to react in these two ways.

_____

(1)

(e) Complete the equation for the formation of arsenic hydride.

As_2O_3 + Zn + $HNO_3 \rightarrow$ AsH_3 + $Zn(NO_3)_2$ + H_2O

(1)

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(Total 7 marks)

Q2.

Sulfur trioxide decomposes on heating to form an equilibrium mixture containing sulfur dioxide and oxygen.

$$2\ SO_3(g) \rightleftharpoons 2\ SO_2(g) + O_2(g)$$

(a) A sample of sulfur trioxide was heated and allowed to reach equilibrium at a given temperature. The equilibrium mixture contained 6.08 g of sulfur dioxide.

Calculate the mass, in g, of oxygen gas in the equilibrium mixture.

Mass _____ g

(2)

(b) A different mass of sulfur trioxide was heated and allowed to reach equilibrium at 1050 K

$$2\ SO_3(g) \rightleftharpoons 2\ SO_2(g) + O_2(g)$$

The amounts of each substance in the equilibrium mixture are shown in the table.

Substance	**Amount at equilibrium / mol**
sulfur trioxide	0.320
sulfur dioxide	1.20
oxygen	0.600

For this reaction at 1050 K the equilibrium constant, $K_p = 7.62 \times 10^5$ Pa

Calculate the mole fraction of each substance at equilibrium.
Give the expression for the equilibrium constant, K_p
Calculate the total pressure, in Pa, of this equilibrium mixture.

Mole fraction SO_3 _____

Mole fraction SO_2 _____

Mole fraction O_2 _____

K_p

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Total pressure _____ Pa

(4)

(c) For this reaction at 1050 K the equilibrium constant, $K_p = 7.62 \times 10^5$ Pa
For this reaction at 500 K the equilibrium constant, $K_p = 3.94 \times 10^4$ Pa

Explain how this information can be used to deduce that the forward reaction is endothermic.

_____

_____

_____

_____

_____

_____

(2)

(d) Use data from part **(c)** to calculate the value of K_p, at 500 K, for the equilibrium represented by this equation.
Deduce the units of K_p

$$SO_3(g) \rightleftharpoons SO_2(g) + \tfrac{1}{2}O_2(g)$$

K_p _____

Units _____

(2)

(Total 10 marks)

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