

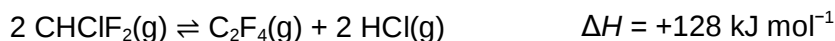
Name of the Student: _____

Max. Marks : 20 Marks

Time : 20 Minutes

Q1.

Tetrafluoroethene is made from chlorodifluoromethane in this reversible reaction.



A 2.00 mol sample of CHClF_2 is placed in a container of volume 23.2 dm^3 and heated. When equilibrium is reached, the mixture contains 0.270 mol of CHClF_2

(a) Calculate the amount, in moles, of C_2F_4 and of HCl in the equilibrium mixture.

Amount of C_2F_4 _____ mol

Amount of HCl _____ mol

(2)

(b) Give an expression for K_c for this equilibrium.

K_c

(1)

(c) Calculate a value for K_c

Give its units.

- (d) State and explain the effect of using a higher temperature on the equilibrium yield of tetrafluoroethene.

Effect on yield _____

Explanation _____

(3)

- (e) Chemists provided evidence that was used to support a ban on the use of chlorodifluoromethane as a refrigerant.

Many refrigerators now use pentane as a refrigerant.

State the environmental problem that chlorodifluoromethane can cause.

Give **one** reason why pentane does not cause this problem.

Environmental problem _____

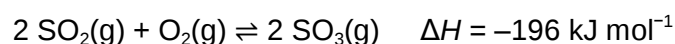
Reason why pentane does not cause this problem _____

(2)

(Total 11 marks)

Q2.

Sulfur dioxide reacts with oxygen to form sulfur trioxide.



- (a) Give an expression for the equilibrium constant (K_c) for this reaction.

K_c

(1)

- (b) A mixture of sulfur dioxide and oxygen is allowed to reach equilibrium in a container of volume 1800 cm^3 at temperature T .

At equilibrium, the mixture contains 0.176 mol of sulfur dioxide and 0.461 mol of sulfur trioxide.

At temperature T the equilibrium constant, $K_c = 15.0 \text{ mol}^{-1} \text{ dm}^3$

Calculate the amount, in moles, of oxygen at equilibrium.

Amount of oxygen _____ mol

(3)

- (c) At a different temperature, a mixture contains
0.025 mol of sulfur dioxide
0.049 mol of oxygen
0.034 mol of sulfur trioxide.

The total pressure of the mixture in a 3500 cm^3 reaction vessel is 255 kPa

Use the data to calculate the temperature, in $^{\circ}\text{C}$, of the mixture.

The ideal gas constant, $R = 8.31 \text{ J K}^{-1} \text{ mol}^{-1}$

Temperature _____ °C
(5)
(Total 9 marks)