ATOMIC ENERGY CENTRAL SCHOOL, No – 4

RAWATBHATA

HANDOUT-MODULE-1/6

SUBJECT – CHEMISTRY CLASS – XI

UNIT – VII, EQUILIBRIUM

(CHEMICAL EQUILIBRIUM)

**Introduction:** Equilibrium is a state at which a system has no tendency to change in any direction. This state is maintained until no any change is made in the reaction parameters such as temperature, pressure, concentration etc. Equilibrium is dynamic process at which both forward and backward process are continued.

In chemical equilibrium the concentration of reactants and products do not change with time. This state is basically achieved in a close container when all the reaction parameters are kept constant.

This state is indicated by double arrow ($⇌$)

In physical changes equilibrium includes:

Solid-Liquid equilibrium: In this physical state of reactants and products are solid and liquid respectively and kept in a close container. An example is- H2O(s) $⇌$ H2O(l) at 273K and 1 atm pressure

Liquid- Gas equilibrium: This equilibrium arise when a volatile liquid is kept in close container at constant temperature. In this system rate of evaporation and rate of condensation are same. An example is: H2O(l) $⇌$ H2O(vap)

Solid-Gas equilibrium: This equilibrium also known as sublimation equilibrium. When a sublime substance is kept in a close container at constant temperature equilibrium state arise. An example is: I2(s) $⇌$ I2(vap)

 Solid- in Liquid equilibrium: Those solids which are soluble in a liquid attain equilibrium after getting their saturated solution at a certain temperature. An example is: NaCl(s) $⇌$ NaCl(aq) in aqueous medium

 Gas - in Liquid equilibrium: This equilibrium arise when a gas is soluble in a liquid like water. Mass of the gas dissolved in a given volume of liquid at certain temperature is proportional to the pressure of the gas. This is known as **Henry’s law**.

Equilibrium in Chemical system

The chemical reaction should be reversible. At equilibrium state both forward and backward reactions are continued. Reaction parameters are kept constant. In this reaction may be homogeneous or heterogeneous. Examples are: N2(g) + 3H2(g) $⇌ $ 2NH3(g) Homogeneous

CaCO3(s) + Heat $⇌$ CaO(s) + CO2(g) Heterogeneous