

Dr. L. K. Mishra
Dept. of Chemistry

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For Deg I sub chemistry (course material)
Chemical equilibrium

Le-Chatelier's Principle :-

Statement :- If the Physical condition (such as temperature, Pressure and concentration) governing the equilibrium is changed the equilibrium shifts in such a direction so as to make the change ineffective.

Change of Pressure



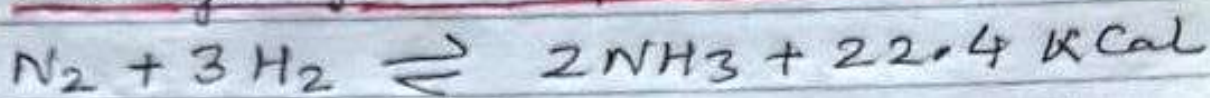
If Pressure is increased on this equilibrium, the equilibrium shifts in such a direction in which volume decreases.

In this case with increase in Pressure the equilibrium shifts in forward reaction.

If Pressure is decreased the equilibrium shifts in such a direction in which volume increases.

~~If~~ In this case with decrease in Pressure the equilibrium shifts in backward direction.

(2) change of temperature :-



This reaction is exothermic. Increase of temperature shifts the equilibrium in such a direction in which heat is absorbed. In this case the equilibrium shifts in backward direction.

Similarly decrease of temperature will favour forward reaction i.e. equilibrium will shift in forward direction.



In this case of endothermic reaction increase of temperature will shift the equilibrium in forward reaction and decrease of temperature will shift equilibrium in backward direction.

(3) Change of concentration :-



Increase of concentration of any species will shift the equilibrium in such a direction so that the

Concentration of species starts decreasing.
 If there is an increase in the concentration of a reactant, the equilibrium will shift in forward direction as a result of which the concentration of a will automatically be increased.
Application of Le-Chatelier's Principle

- 1) In the manufacture of ammonia gas by Haber's process, the knowledge of this principle helps in high production of this gas.
- 2) In the manufacture of H_2SO_4 by contact process.

Chemical Kinetics

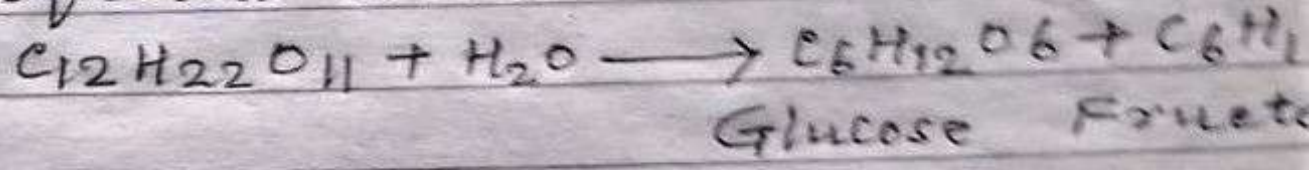
That branch of physical chemistry which deals with the velocity and mechanism (how reaction occurs) of a chemical reaction is known as chemical kinetics.

Slow & Fast reactions

The reaction which proceeds slowly

and ~~that~~ its rate can be measured by the conventional method is called slow reaction.

e.g. - Inversion of cane sugar in aqueous solution.



In slow reaction a large number of bonds have to be broken in reactant molecules and a large number of new bonds have to be formed in the product molecules.

Fast reactions :- The rate of many reactions are too fast to be measured by conventional methods. These methods cannot deal with reactions whose half lives are less than a second or so, such reactions are called fast reactions.

e.g. - Ionic reactions such as neutralisation of acids by bases and organic substitution reactions

and explosive reactions of oxygen with hydrogen and hydrocarbons