

SUBJECT - CHEMISTRY

CLASS - BSc (Hons) PART - I

PAPER - II

GROUP - A

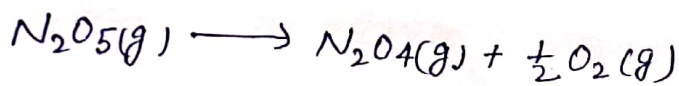
TOPIC - MOLECULARITY OF A REACTION

Dr. Hasimohan Prasad Singh

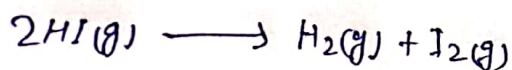
Department of Chemistry

Dr. L.K.V.D. College Tazipur Samastipur

Molecularity of a Reaction: The molecularity of a reaction should not be confused with its order as given by Eq. Molecularity of a reaction is defined as the number of molecules involved in the step leading to the chemical reaction. If only one molecule is involved, the reaction is said to be unimolecular. The example is the dissociation of nitrogen pentoxide:



If two molecules are involved, the reaction is said to be bimolecular. The example is the dissociation of hydrogen iodide:



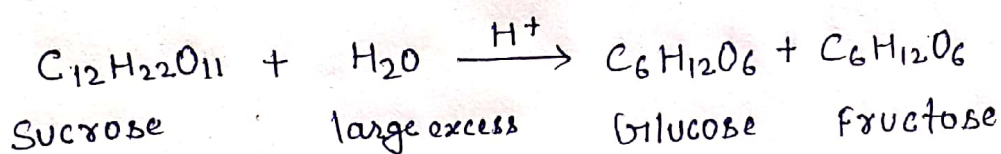
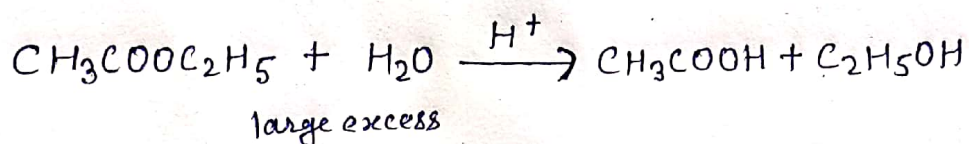
Similarly, if three molecules are involved, the reaction is said to be trimolecular. The example is the oxidation of nitric oxide:



Order and Molecularity of Simple Reactions. From a study of the kinetics of a number of simple reactions, we know that their order is the same as their molecularity. Thus the order of the reaction involving the decomposition of nitrogen pentoxide is 1, that of the reaction involving combination of nitric oxide and oxygen is 3.

But, this is not always the case. In several reactions, the order is different from molecularity. This is particularly so when one of the reactants is present in large excess.

The examples are hydrolysis of ethyl acetate and inversion of Cane Sugar in aqueous solutions.



The molecularity of each reaction is 2. The order of each reaction, however, is 1. Since we know from experiment that the rate of the reaction varies directly as the concentration of ethyl acetate in the first case and that of sucrose in the second case.

The reason is that water is present in such a large excess that its concentration (i.e., the number of moles per litre) remains almost constant in the course of the reaction in each case. The rate of the reaction, therefore, varies only with the concentration of the ester in the first case and that of sucrose in the second case. Such reactions are known as pseudo monomolecular reactions.