

**Zaporizhzhya State Medical University**  
**Analytical Chemistry Department**

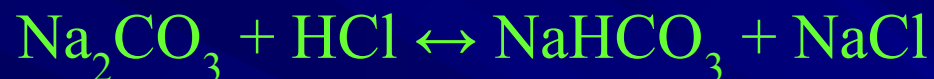
**BIOCHEMICAL REACTION**  
**KINETICS**

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**Chemical kinetics studies the rate and mechanism of chemical reactions**

*In homogeneous reactions all the reactants exist in the same phase in which the reaction itself occurs.*



*Heterogeneous reactions take place only in the interphase.*



Single-stage reactions are called simple (or elementary) reactions.

Multistage reactions include few simple reactions and are called complex (or non-elementary) reactions.

*All biochemical reactions are non-elementary.*

The dependence of the reaction rate on the concentration of reactants is described by the **law of mass action discovered by N.Beketov, C. Guldberg and P. Waage in 1967:**

*«At constant temperature the rate of chemical reaction is in direct proportion to the product of reactant concentrations in the degree of their stoichiometric coefficients».*

Mathematical expression of the law of  
mass action is called a

**kinetic equation**

or

**rate law of the reaction.**

## **Molecularity of the reaction**

**is determined by the number of molecules which interact and take part in an elementary act of the reaction.**

## Arrhenius Equation

establishes a connection between the reaction rate constant, activation energy and temperature:

$$k = A \cdot e^{-\frac{E_a}{RT}}$$

**e** is base of natural logarithm;

**R** is universal gas constant (8.314 J / mol · K);

**T** is absolute temperature, K;

**A** is pre-exponential factor.



**Catalysis** is the change of chemical reactions rate under the influence of substances, the amount and nature of which, after completion of the reaction are the same as before the reaction.

**Catalyst** is a substance that influences the rate of chemical processes without changing its own chemical composition.

**Enzymes** are catalysts of the chemical reactions in the body.

An **enzyme** is a protein that catalyses a chemical reaction by lowering the activation energy.