

1.2. BASIC REGULARITIES AND METHODS OF CHEMICAL TECHNOLOGY

The value of thermodynamic and kinetic (micro- and macro-) laws in chemical technology. Factors determining the rate of homogeneous and heterogeneous reactions. The influence of the concentration of reagents, temperature, pressure, renewal of the contact surface of the reacting phases and other physical and chemical factors on the course of chemical-technological processes, methods of their regulation

Unlike *theoretical chemistry*, *chemical technology* takes into account the economic requirements for the production it studies. Chemical technology as a science cannot be reduced to purely theoretical chemistry, but at the same time it is based on the concepts, laws, and conclusions of theoretical chemistry.

The goal of chemical technology is a comprehensive study of common chemical, physical and technological phenomena in such a multifactor system as an industrial chemical process. Chemical technology relates such parameters as temperature, heat effect, pressure, concentration of reactants, velocity, phase surface, volume of the reaction phase, the degree of conversion of raw materials into the target product, the yield of the product, the effect of the catalyst.

A chemical approach is applied to chemical production processes and they introduce the concept of “the level of the process flow”. This approach includes several subsystems or levels of increasing complexity, which are characterized by their method of study.

The levels of chemical production are divided into:

- *molecular level*, where the mechanism and kinetics of chemical transformations are described as molecular interaction (“*microkinetics*”);

- *the level of small volume*, where the phenomena are described as the interaction of macroparticles (granules, drops, bubbles, catalyst grains, etc.) - “*macrokinetics*”. “*Macrokinetics*” studies the effect of mass transfer of starting materials and reaction products, heat transfer and catalyst state on the rate of chemical transformations;

- *flow level*, where phenomena are considered as the interaction of a set of particles, taking into account the nature of their movement in the flow (laminar, turbulent) and changes in temperature and concentration of reagents along the flow;

- *the level of the reactor*, where the phenomena are described taking into account the design of the apparatus or reactor in which the technological process is implemented;

- *the level of the system*, where for the consideration of phenomena the interrelations between the technological units of the industrial installation and production as a whole are taken into account.

Thus, the problem of the distinction between theoretical chemistry and chemical technology is essentially the problem of the difference between basic scientific research and real industrial production.