

$$W_{het} = \pm \frac{1}{v} \frac{dn_A}{dc}$$

E)

**88. Heterogeneous processes are processes in which:**

- A) the components involved in the reaction are in different phases;
- B) reagents and products are in the same phase;
- C) the starting reagents are in one phase and the products are in another;
- D) the process is carried out on a solid catalyst;
- E) the components involved in the reaction are in the same phase.

**89. A method for increasing the driving force of a heterogeneous process:**

- A) increasing the concentration of reagents;
- B) grinding solids;
- C) intensive mixing;
- D) temperature increase;
- E) increase in selectivity.

**90. The exothermic reactions are those for which  $\Delta H$  and  $Q_p$  correspond to the values:**

- A)  $\Delta H < 0$ ,  $Q_p > 0$ ;
- B)  $\Delta H > 0$ ,  $Q_p < 0$ ;
- C)  $\Delta H < 0$ ,  $Q_p < 0$ ;
- D)  $\Delta H > 0$ ,  $Q_p > 0$ ;
- E)  $\Delta H = 0$ ,  $Q_p < 0$ .

### 1.3. RAW MATERIALS, WATER, ENERGY IN CHEMICAL INDUSTRY

***Raw materials of chemical production. Characteristics and stocks of raw materials. Principles of enrichment of raw materials. Complex use of raw materials. Secondary raw materials and its processing***

*Raw materials* are natural materials (initial substances) which are used in industrial production. The profitability of production, the choice of technology and the equipment and quality of the made products substantially depend on raw materials.

The scheme of modern chemical production includes the following components at various stages of processing: raw materials (initial reagents), semi-products (intermediate products), by-products, the target product and waste.

*The semi-product* is a raw material that has been processed at one or several stages of production, but not processed into the target product. The semi-product obtained at the previous stage of production can be a raw material for the subsequent stage.

*A by-product* is a substance that is formed during the processing of raw materials along with the target product, but is not the goal of this production. By-products resulting from the production or enrichment of raw materials, are called co-products (passing products).

*Production wastes* are residues of raw materials, materials and semi-products formed in production and which have completely or partially lost their qualities. Semi-products, by-products and production wastes after or without additional processing can be used as raw materials for other processes.

The raw materials for chemical production are the products of the oil, gas, coal, coke-chemical, pulp and paper, mining industries, ferrous and non-ferrous metallurgy, etc.