$$W_{liquid\text{-}solid} = \sigma_{liquid\text{-}gas} + \sigma_{solid\text{-}gas} + \sigma_{liquid\text{-}solid}$$

where: $\sigma_{liquid\text{-}gas}$, $\sigma_{solid\text{-}gas}$, $\sigma_{liquid\text{-}solid}$ are specific free surface energies at the interface of the corresponding phases.

The specific surface energy is proportional to the phase interface, that is, $\sigma = f(F)$, therefore the smaller the particles of the material being floated, the greater the ratio of their surface to the volume (*s/v*) or mass (*s/m*) and the stronger the wettability phenomenon. Therefore, the floatable raw material is ground to a size of 0.05-0.3 mm.

An indicator of wettability of the material is the "*edge wetting angle*" at the interface of the phases "*solid - liquid – air*" between perpendicular to the surface of the liquid and tangent to the meniscus of its particles due to the fact that the surface tension forces tend to align the level of the liquid, particles of non-wettable or hydrophobic materials (0>90°) are pushed out of the liquid (float), and particles of wetted or hydrophilic materials (0<90°) are immersed in the liquid.

To speed up the flotation process, the system is foamed by intensive mixing (mechanical flotation machines) or air bubbling through the system (pneumatic flotation machines).

The result of flotation depends on the difference in the hydrophobicity (hydrophilicity) of the components of the enriched raw material. Therefore, in the event that the useful component and the waste rock are close in wettability, special reagents belonging to the group of surfactants are introduced into the system, which increase the hydrophobicity of the useful component (collectors).

Their nature depends on the composition of the particular floatable raw material. To create a stable foam and improve the separation of components of the floated raw materials, in addition to the collectors, other flotation reagents are introduced into the system: activators, suppressors, frothers and pH regulators of the medium.

The value of water in chemical technology. Industrial and sanitary water requirements. Industrial water treatment. Chemical, mechanical, physico-chemical and biological methods of water purification from impurities. Desalting and desalination of water. Ways of water circulation in industry

Water is one of the main and popular raw materials of chemical and technological production. Water resources are natural surface and underground waters, waste waters of technological productions demand careful preliminary special preparation and cleaning.

The most common methods of water treatment are:

- *primary sedimentation* (reagent or reagentless, depending on its composition);

- *coagulation by introducing salts of aluminum, iron or polyelectrolytes into the water* to be purified in order to enlarge suspended and colloidal particles and transfer them to a filterable form;

- *mechanical water purification by filtration*;

- *special wastewater treatment of enterprises using chemical, physico-chemical and biochemical methods*.

Industrial water treatment is carried out using mechanical, physical, chemical and physicochemical methods, such as clarification, softening, ion exchange, desiliconization, degassing, etc.

For the clarification of water, methods based on the sedimentation of impurities released from water in the form of sediment are used. They are also called *reagent methods,* since special reagents are introduced into the water to separate them.

Industrial deposition processes include coagulation, liming, and magnesia desiliconization, which are used to clarify water.

Requirements for water, depending on its purpose, are established by State Standards. If water coming from a water source does not meet the requirements of the relevant State Standard, it is sent for water treatment.