Hydrophilization and hydrophobization of the surface of solids with the help of SAA

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What is hydrophobizatio n of surfaces?

Hydrophobization of surfaces By hydrophobization it is customary to call a process in which the ability of materials to be wetted by water (aqueous solutions) is sharply reduced, and the vapor and gas permeability are maintained at the same level. In practice this means that a drop of water does not pass through the pores of brick, concrete or stone.

What is hydrophilization of surfaces?

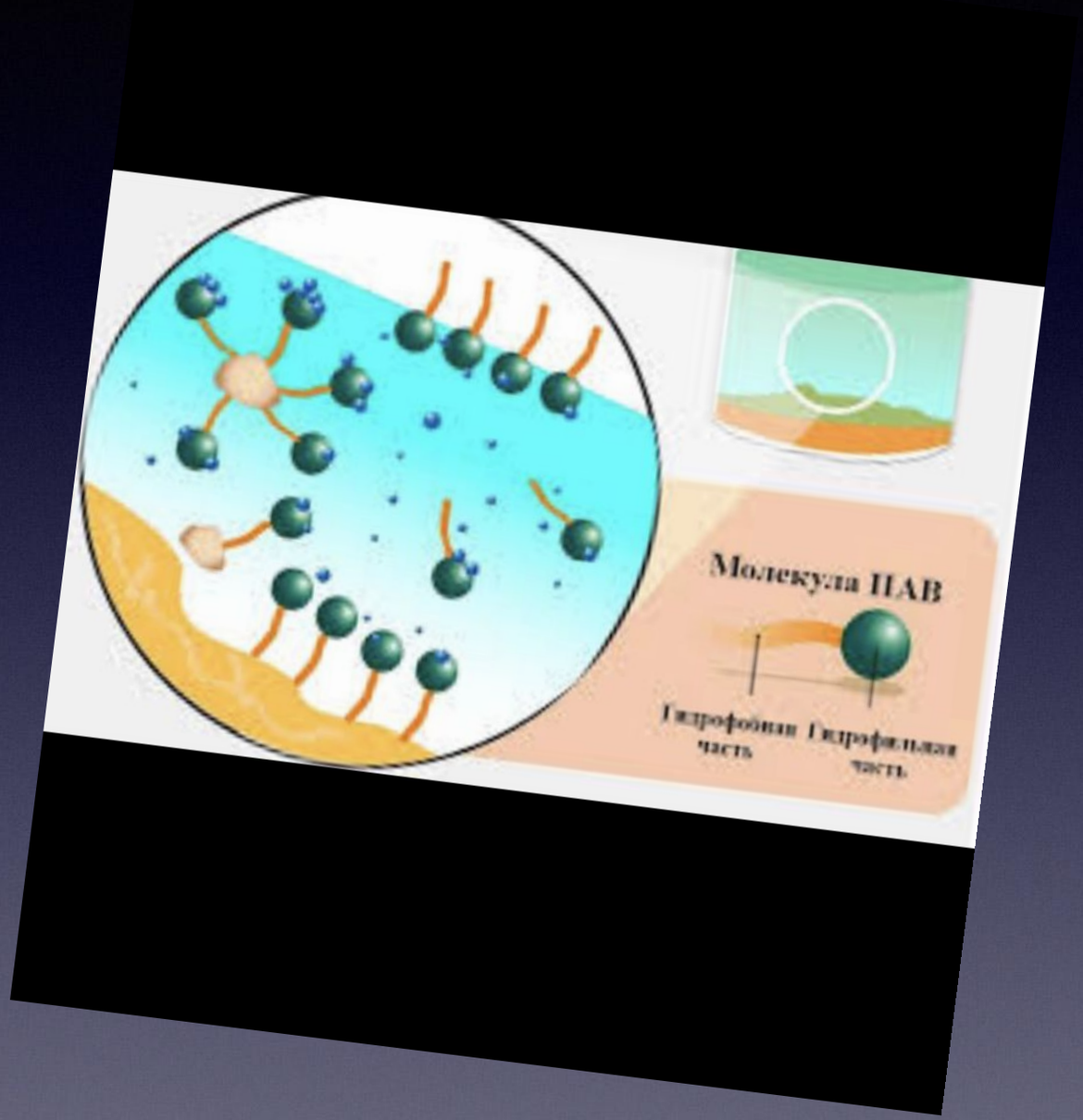
- Hydrophilization of the surface means a stable significant increase in polarity, which persists even after the evaporation of water. Such a change in polarity is achieved by a more radical interference in the nature of the surface layer when the chemical composition of the surface macromolecules changes.

- The surface hydrophilization also reduces the average adhesion force, but to a lesser extent than hydrophobization. A similar decrease in the average adhesion strength during hydrophilization is observed in the air.

Hydrophilization of surfaces by surfactants

- When the surface is hydrophilized under the influence of surfactant, the wetting work increases with increasing surfactant concentration in the solution. This indicates a decrease in the interfacial tension at the T-G interface due to adsorption and an increase in the affinity of the liquid to a given surface.

- Surface-active substances are chemical compounds, which, concentrating on the interface of thermodynamic phases, cause a decrease in surface tension

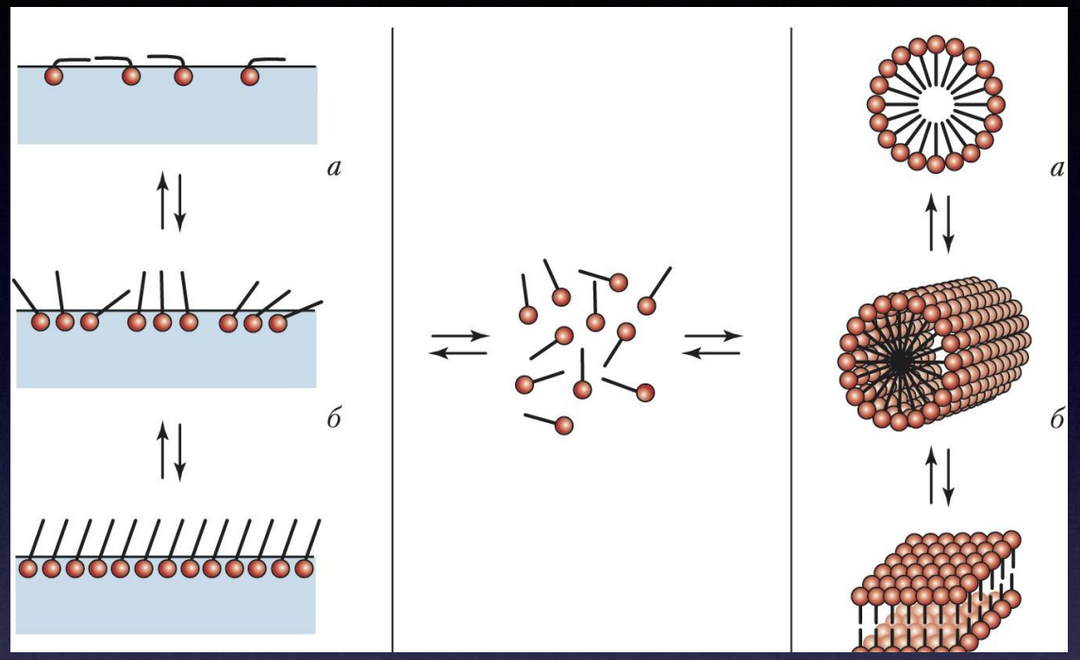


Hydrophobization of surface by surfactant

The effect of hydrophobization is based on the adsorption of surfactants on the surface of the rock, improving the wettability of its oil and, consequently, increasing the phase permeability for oil. This contributes to an increase in the flow rate of oil and a reduction in the water cut of the extracted products.

Adsorption of SAA on solid surface

SAA- surface active agents. e adsorption of these molecules at the solid-liquid interface depends on several factors such as the nature of the substrate, solvent, adsorbate species, the presence of secondary competing-cooperative species, temperature and even mode of mixing.



Adsorption phenomena in the case of solids are usually studied on powders, S specific surface area which is determined independently (usually by adsorptiongases'.) In this case, as a rule, determine the number of substances Γ* absorbed by the unit of mass of powder, $\Gamma^* = \Delta c V / M1$

where Δc –the change of concentration in volume of solution V, M1- mass of powder. Here value of absorption equals to

$\Gamma = \Gamma^* / S$

In accordance with the rule of the greatest adsorption polarity equalizationability to have a surfactant with an intermediate (between solid and liquid)polarity. An essential feature of adsorption on solids is the possibility ofthe formation of chemical bonds between surfactant molecules and a solid.

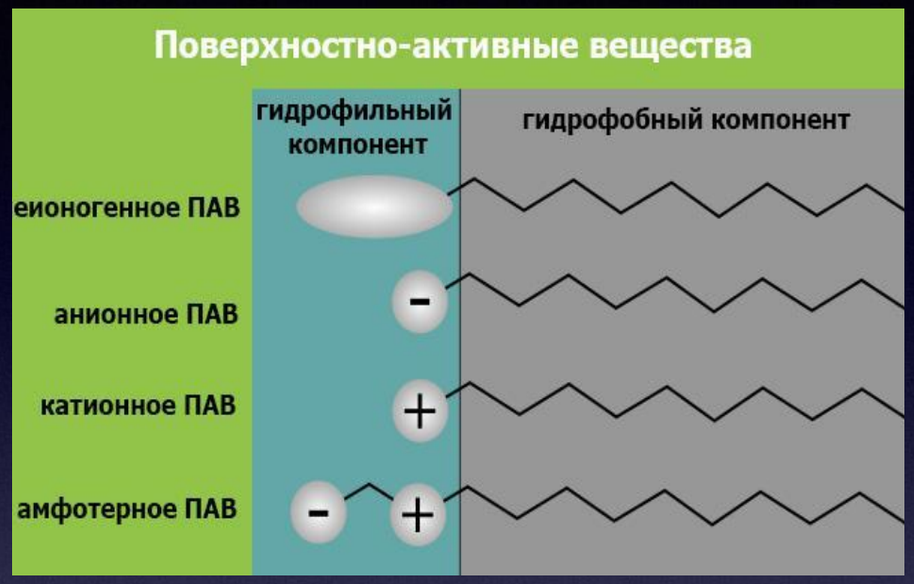
We use SAA for:

1) for hydrophilization and hydrophobication solid surfaces.
2) process control wetting and selective wettings.

Adsorption of surfactants on solid particles from solutions, gives the adsorption at the interface of the air / liquid environment, that is, radically changes the size of the edge angle.

$$\cos\theta = \frac{\sigma_{тг} - \sigma_{тж}}{\sigma_{жг}}$$

Surfactants are divided into two main groups – ionogenic and nonionic. Towards the group ionogenic include surfactants, polar groups of which dissociate in the aquatic environment. Ionogenic surfactant, in turn, are subdivided into anionic and cationic surfactants. Cationic surfactants are the polar group of which receives a positive charge, and anionic-negative. There is also a group of amphoteric surfactants, in molecules which contain both cationic and anionic groups.



Thank you for your attention!