

Surface chemistry :-

Surface chemistry is the branch of chemistry which deals with the study of the phenomenon occurring at the boundary separating two bulk phase. The boundary is also known as surface or interface.

Adsorption :-

The phenomenon of attracting and retaining any substance on the surface of another substance is called adsorption. It is a surface phenomenon.

Adsorbate :-

The substance which adsorbed is called adsorbate. Gases, liquids and substances in solution can be adsorbed by suitable substances. Thus an adsorbate may be a gas, liquid or a ~~solid~~ substance in solution.

Adsorbent :-

The substance on which adsorption takes place is called adsorbent. Silica gel, CaCO_3 , charcoal, MgO , activated alumina, Zeolites etc. are important adsorbent.

Desorption :-

Removal of adsorbed material from the surface of the adsorbent is called desorption.

Desorption is reverse of adsorption.

Types of Adsorption :-

(1) Physical adsorption or physisorption :-

In this type of adsorption, the adsorbate is held on the surface by weak van der Waals force. No chemical bond is formed between the adsorbent and adsorbate. Therefore, heat of adsorption is low (about 40 kJ/mol). The process has low activation energy. Physical adsorption takes place between every gas and a solid. It is not specific in nature. It is reversible and fast process. Physical adsorption of gas on the solids increases with the increase in pressure & decrease in temperature. Reverse conditions i.e. low pressure and high temperature favours desorption.

physical adsorption results in the formation of multimolecular layers. This type of adsorption is also called Van der Waals adsorption.

from Thermodynamics -

$$\Delta G = \Delta H - T \Delta S$$

for spontaneous process, ΔG must be -ve. When adsorption occurs, the translational freedom of adsorption is decreases. Therefore ΔS is -ve for adsorption. To keep the value of $\Delta G = -ve$, ΔH should be -ve. Hence, adsorption is an exothermic process.

from,
Dr. A.K. Gumber,
chemistry (L.S. College).