

Sorption

Sorption is a general term used when a substance is taken up by another substance through surface adsorption, absorption into the bulk, or both processes occurring together. It is therefore broader in meaning than adsorption.

In **adsorption**, the molecules or ions of one substance become concentrated mainly at the surface of another substance. In **absorption**, the substance penetrates into the interior or bulk of the absorbing material. When it is difficult to distinguish between these two processes, or when both occur simultaneously, the process is described as **sorption**.

| Adsorption, Absorption and Sorption

Consider a solid exposed to a gas. Gas molecules may first become attached to the surface of the solid. This is adsorption. Some of the molecules may then penetrate into the pores or bulk of the material. This represents absorption. When both surface accumulation and penetration occur, the overall process is called sorption.

The distinction can be expressed as:

Adsorption = surface uptake

Absorption = bulk uptake

Sorption = adsorption and/or absorption

| Importance of Sorption

Sorption is particularly important in porous and polymeric materials, where a substance can interact with the surface and subsequently penetrate into internal pores or the bulk material.

The extent of sorption depends upon the nature of the sorbent, the nature of the sorbate, temperature, pressure, surface area, pore structure, and the strength of interaction between the two substances.

| Terminology

The material that takes up another substance is generally called the **sorbent**, while the substance being taken up is called the **sorbate**. These terms are useful when the process cannot be described exclusively as adsorption or absorption.

Difference Between Adsorption and Sorption

Adsorption	Sorption
Primarily a surface phenomenon.	May involve surface and bulk uptake.
Adsorbate accumulates at the surface.	Sorbate may accumulate at the surface or penetrate into the material.
Surface properties are particularly important.	Both surface and bulk properties may be important.
Example: gas adsorbed on activated charcoal.	Example: uptake of a substance by a porous material involving both surface and internal uptake.

Thus, sorption is a broader concept than adsorption. In the context of heterogeneous reactions, adsorption is generally the more important surface process because it brings reactant molecules to the solid surface where subsequent chemical reactions can occur.