

why surfaces hold onto things, and what happens when a dispersed particle is too big for a solution and too small to see

Adsorption: the Idea

- surface molecules have unsatisfied bonds, unlike the bulk, so surfaces pull in touching gas or solute
- adsorbent: the bulk solid whose surface holds a substance. adsorbate: the substance held there
- physisorption comes from London / van der Waals forces, driven by minimising surface energy
- desorption: removing an already-adsorbed substance from its surface

Adsorption vs Absorption

Adsorption

- a SURFACE phenomenon: matter concentrates only at the surface
- depends on temperature, pressure, and surface area
- releases heat (heat of adsorption)
- e.g. a gas held on activated charcoal

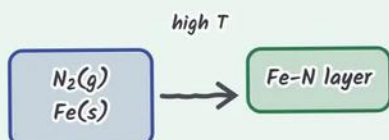
Absorption

- a BULK phenomenon: matter spreads uniformly through the whole substance
- independent of pressure and surface area
- no accompanying heat change
- e.g. water soaking into cotton

both together, like ink colouring and soaking into chalk, is called sorption

Physisorption vs Chemisorption

- physisorption: weak van der Waals forces, reversible, multilayered, favoured at LOW temperature
- chemisorption: genuine covalent or ionic bonds, specific pairs only, usually exothermic, one layer
- chemisorption first RISES with temperature, then FALLS once the bonds start breaking
- not exclusive: physisorption at low T can convert to chemisorption as T rises



the same N_2 -on-iron pair tells both stories: physically adsorbed at low temperature, but chemisorbed into an iron-nitride layer once heated