

Physical Chemistry of Colloids and Surfaces 06-607
Definitions and introductory material
1-17-02

-A *colloid* is a two-phase system (dispersed and continuous phase) in which the particles in the dispersed phase are between 1 nm and 1 μm in size.

-A *lyophobic colloid* is kinetically stable, with the dispersed phase immiscible in the continuous phase. An example of a lyophobic colloid is latex paint.

-A *lyophilic colloid* is thermodynamically stable, with the dispersed phase miscible in the continuous phase. An example of a lyophilic colloid is a solution of chromosomal DNA.

-The *interparticle potential* (E) for a lyophobic colloid has a *barrier energy* $E_b \gg kT$ which maintains particles in a *secondary minimum* and prevents them from reaching their global free-energy minimum (*primary minimum*).

-*Colloidal stability* is the extent to which small particles in a lyophobic colloid remain uniformly distributed.

-*Flocculation* or *aggregation* are processes in which colloidal-sized particles cluster together to form clumps of particles larger than 1 μm or so.

-*Coalescence* occurs when two or more particles merge to form a single larger particle.

-*Association colloids* are small molecules that have aggregated to form a colloidal-sized particle.

-Colloidal systems generally have high specific surface area (A_{sp}), causing *surface forces* to dominate over *body forces* in many cases.

$$A_{sp} = \frac{3}{rR} \quad (\text{sphere})$$

-Examples of colloids involve all three states of matter (*suspension, emulsion, foam, aerosol, alloy, gel*).