Gel Encyclopedia Article

Gel

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Colloidal systems are intimate mixtures of two or more substances, in which a dispersed phase is uniformly distributed though a dispersion medium. It is conventional to refer to a **colloid** system that resembles a liquid as a sol, and one that resembles a solid, jelly-like substance, a *gel*. When **water** is one component of the colloid, the system may be referred to as a hydrosol or hydrogel. The reversible transformations of a sol into a gel, and a gel into a sol, are called solation and gelation, respectively. It is difficult to make clear distinctions between gels, sols, and colloids.

The materials ordinarily called gels include silica gels (usually prepared from a **sodium** metalsilicate solution), agar (a carbohydrate polymer derived from seaweed), **gelatin** (closely related to proteins), soft soaps (potassium salts of higher fatty acids), oleates and stearates, polyvinyl **alcohol**, and various hydroxides in water.

The formation of gels from suspensions or solutions is accompanied by the formation of three-dimensional cross-linkages between molecules of one component. The second component, meanwhile, permeates the first as a continuous phase. Thus the gel resembles a loosely interlinked polymer.

Gelation can be brought about in a number of ways; these include cooling a sol, initiaing a chemical reaction, or by adding a precipitating agent or incompatible solvent. Gelatin is an example of a material that is readily soluble in hot water, but that gels upon cooling. Gelation may require from minutes to days to complete, depending on the material, its history, and the **temperature**.