



Summary

Centrifugation is a process which involves the application of the centripetal force for the sedimentation of heterogeneous mixtures with a centrifuge, and is used in food industry for separation of liquids and solids from slurries, pastes, particulates or flours or clarification of liquids such as wine, beer, juices, etc. Accordingly centrifuge is a device that separates particles from suspensions or even macromolecules from solutions according to their size, shape and density by subjecting these dispersed systems to artificially induced gravitational fields.

Foods are complex mixtures of compounds and the extraction or separation of food components is fundamental for the preparation of ingredients to be used in other processes (for example cooking oils from oilseeds or gelatin from connective tissue); or for retrieval of high value compounds, such as enzymes (e.g, papain from papaya for meat tenderization or rennet from calf stomachs for cheese making) etc.

There are three main categories of separation:

1. Separation of liquids and solids from slurries, pastes, particulates or flours, where either one or both components may be valuable (for example juices, pectin, enzymes, cooking oil, cream and coffee solubles).
2. Separation of small amounts (less than 2%) of solids from liquids. Here the main purpose is purification of water or clarification of liquids such as wine, beer, juices, etc. and the solids are not valuable.



3. Extraction of small amounts of valuable materials using a solvent. Different methods are used to achieve any one of the objective mentioned above and centrifugation is one of them. Generally, centrifuges are used throughout many manufacturing industries (Table 1), to separate suspended solids from liquid utilizing the centrifugal acceleration of the suspended particles directed outward from the axis of rotation. This force initiates the particle movement to the centrifuge periphery where it is trapped or contained by the wall of the rotating body. Alternatively, a density difference between two immiscible liquids is exploited to accelerate separation of the liquids (i.e. fat separation in dairies for cream or butter manufacture). The most common application is the separation of solid from highly concentrated suspensions, which is used in the treatment of sewage sludges for dewatering where less consistent sediment is produced. In the chemical and food industries, special centrifuges can process a continuous stream of particle-laden liquid. There are two main applications of centrifugation:

1. Separation of immiscible liquids and separation of solids from liquids.
2. Separation of solid particles from air by centrifugal action is done in the 'cyclone' separator.

A specialized use involves separation of water from fresh-cut vegetables before modified atmosphere packaging.