

Analysis of Options for the Process of Separation of Liquids into Fractions

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Annotation: At present, more and more new methods are being developed in connection with the purification of substances, fractionation, obtaining and analysis of high-purity materials with the desired properties, with many methods.

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The most common methods of separating mixed liquids into separate fractions are as follows:

- evaporation methods (driving, evaporation and distillation);
- sediment and coprecipitation;
- controlled crystallization;;
- electrochemical methods.

Mixtures of types

The mixture of the two large groups into be you can

If the components of the mixture are visible, then such mixtures are called heterogeneous. For example, a mixture of wood and iron, a mixture of water and vegetable oil, a mixture of river sand and water, and so on.

Gomogen compound types	
Combining condition / intervention he sees before	Samples
Hard / solid	Gold and silver alloy
Solid / liquid	Sugar / water,
Solid / liquid	in the air mind of steam
Liquid / solid	Swollen gelatin
Liquid / liquid	Alcohol drinks / water
Liquid / gas,	Water / air
Gas / solid	overrun by huns in hydrogen

Such compounds are called homogeneous if the components of the mixture are not visually distinguishable. Compounds such as milk, fat, sugar solution in water, etc. are classified as homogeneous compounds.

Homogeneous compounds are formed when the substances dissolve well together and mix well (Table 1). During the formation of mixtures, no chemical changes usually occur and the substances in the mixture retain their properties. Differences in the properties of substances are used to separate the mixtures.

Centrifugation

If the particles of a heterogeneous mixture are too small, it cannot be separated by sedimentation or filtration. Examples of such mixtures are milk and toothpaste swollen in water. Such compounds are separated by centrifugation. Mixtures containing such a liquid are placed in test tubes and rotated at a very high speed in special apparatus - centrifuges. As a result of centrifugation, heavier particles are "pressed" to the bottom of the vein and located at the top of the lungs. Milk is the smallest particles distributed in an aqueous solution of other substances - sugars, proteins. A special centrifuge called a separator is used to separate such a mixture.

When separating milk, fats are on the surface, making them easy to separate. Water remains with dissolved substances in the water - this is skim milk.

Adsorption

In technology, the task often arises to clean the air from unwanted or harmful components. Many substances have one interesting feature - they can “stick” to the surface of porous substances like magnets like iron. Adsorption is the ability of some solids to absorb gaseous or dissolved substances on their surface. Substances capable of adsorption are called adsorbents. Adsorbents are solids in which there are many internal channels, voids, holes, viz. they have a very large overall winning surface. Adsorbents are activated carbon, silica gel (in a new shoe box you can find a small bag with white peas - this is silica gel), filter paper. Various substances “stick” unevenly to the surface of the adsorbents: some adhere tightly to the surface, while others are weaker. Activated carbon is able to absorb not only gas but also solutes in liquids. In case of poisoning, toxic substances are obtained by adsorption.

Distillation

Two liquids that form a homogeneous mixture, such as ethyl alcohol with water, are separated by distillation or distillation. This method is based on heating the liquid to boiling point and sending it to another vessel through a steam gas pipe. Upon cooling, the vapor condenses and the precipitate remains in the distillation bottle.

Rectification

Separation of liquid mixture components by driving in rectification columns. Rectification is based on the diffusion exchange of heat and matter between unbalanced (liquid and vapor) phases. Rectification is used when it is necessary to separate liquid mixtures near boiling trays. There are many barriers in the rectification column, in which the vapors of the liquid mixture condense and a new portion of the vapor coming out from below is encountered many times. The column works on the principle of countercurrent. The rising vapor is continuously enriched by the volatile component b-n. In this case, the steam is enriched with a component with a low boiling point, and its boiling point decreases. The liquid is enriched with components with a high boiling point, which increases its boiling point. This process continues until equilibrium is established, but the equilibrium is again disturbed by the condensate separation of the vapor phase from the column through the refrigeration system, and the process continues uninterrupted until the pure components or fractions of the required components are completely separated. Rectification is used to separate liquid and liquefied gas mixtures. The t-ra range of the rectification process is very wide: 1000 ° C (for the separation of metals such as pure Zn, Pb, Cd) and 0 ° C (for the separation of gases such as air and hydrogen isotopes). The working pressure of the rectification process ranges from tens of atmospheres (for ethanpropylene mixture) to a few millimeters of mercury (high fatty acid rectification). Periodic and continuous rectification is available. In periodic rectification, all the liquid is added to the column cube at the same time. if the distillate is separated during the rectification process, the low-boiling component of the liquid will decrease. in continuous rectification, a continuously driven fluid is added to the system. The efficiency of the rectification columns is determined by their length, diameter, and contact time between the liquid and the vapor.

Freezing

Substances with different melting points are separated by the method of cooling the freezing solution. With freezing, you can get very clean water at home. To do this, pour tap water into a jar or mug and place in the fridge (or refrigerate in the winter). With about half of the water turning to ice, the unfrozen part, where contaminants accumulate, must be drained and the ice can melt.

In industrial and laboratory conditions, methods of separation of mixtures based on other properties of the components of the mixture are used. For example, iron coatings can be separated from the mixture by a magnet. When the ability of substances to dissolve in different solvents is used extraction - a method of separation of solid or liquid mixtures by treatment with different solvents. For example, iodine can be separated from an aqueous solution with some organic solvent, in which case iodine dissolves better.

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