

FRACTIONAL DISTILLATION



In Association with SVCH-Technologii, Moscow (Russia)

ISO 9001:2015 | ISO 14001:2015 | ISO 45001:2018

ABOUT US

KERONE is now renowned for serving the specialized needs of customers with the best quality and economical process of Heating /cooling and drying products, manufactured in a high-quality environment by a trained and qualified workforce (special purpose machinery)



-  48+ Years Manufacturing Excellence
-  Great Sale Support
-  Highly Customized Product
-  Adherence to Standards
-  Sound Infrastructure
-  Team of experts Delivering Quality
-  Timely Delivery
-  Cost Effective Solutions



KERONE is a pioneer in application and implementation engineering with its vast experience and team of professionals.



KERONE is devoted to serve the industry to optimize its operations both economically and environmentally with its specialized heating and drying solutions.



KERONE is having immense expertise in manufacturing and implementing various types of engineering solutions.



KERONE is possessing employee strength of more than 280+ experts continuously putting efforts for happy industrial engineering solutions.

WHY CHOOSE US

With decades of expertise, cutting-edge technology, and a customer-centric approach, Kerone Engineering offers tailor-made heating solutions that prioritize quality, flexibility, and cost-effectiveness. Benefit from our commitment to excellence, post-sales support, and innovative solutions for your unique heating needs. Choose Kerone Engineering for reliability, performance, and unmatched value.

MISSION

- ✓ To enhance the value of customer operation through our customer need centric engineering solution
- ✓ We are committed to provide our customers, unique and best in class products in Industrial heating drying and cooling segment with strategic tie-up for the technical know-how with renowned leader in the industry specific segment

VISION

- ✓ Turn into a world leader in providing specialized, top-notch quality and ecological industrial heating, cooling, and drying solutions across the globe.
- ✓ To attain global recognition as the best of quality and environment-friendly engineering solution company.

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Enhance the value of customer operation through our customer need centric engineering solution.

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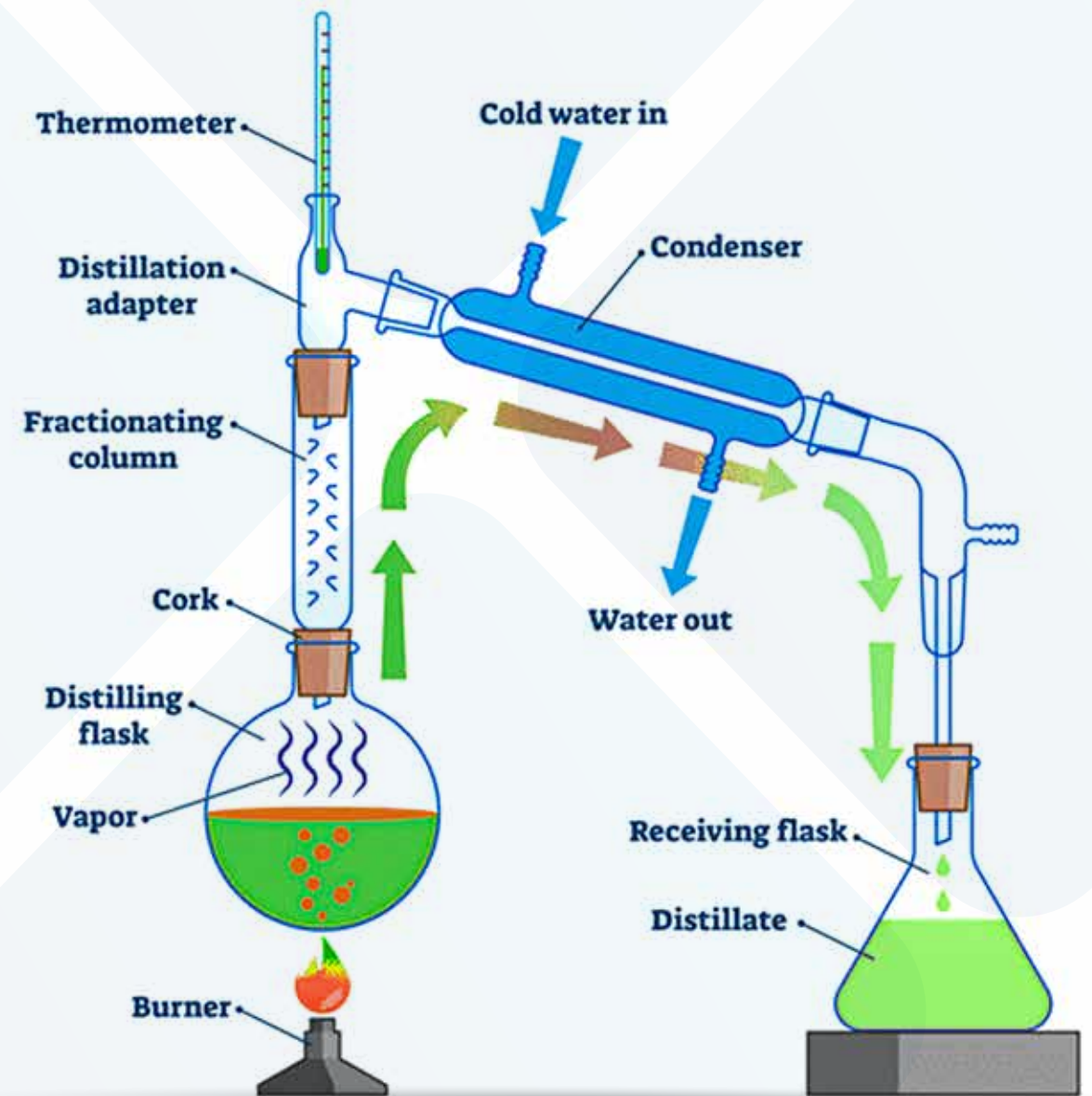
Fractional Distillation

- | Fractional distillation is a process in which vaporization of liquid mixture gives rise to a mixture of constituents from which the desired component is separated in pure form.
- | This method is also known as rectification, because a part of the vapor is condensed and returned as a liquid. This method is used to separate miscible volatile liquids, whose boiling points are close, by means of a fractionating column.
- | Fractional distillation is the separation of a mixture into its component parts, or fractions, separating chemical compounds by their boiling point by heating them to a temperature at which one or more fractions of the compound will vaporize.
- | Generally the component parts have boiling points that differ by less than 25°C from each other under a pressure of one atmosphere. If the difference in boiling points is greater than 25°C , a simple distillation is used.



Distillation

- Distillation is the process of separating the components or substances from a liquid mixture by selective boiling and condensation.
- Distillation is a separation process used to purify liquids or separate components from a mixture based on their different boiling points. It is a widely used technique in chemistry, industry, and various other fields to obtain purified substances from a mixture.
- The principle behind distillation is based on the fact that different substances in a liquid mixture have different boiling points.
- When the mixture is heated, the component with the lowest boiling point will vaporize first, while the other components remain in liquid form.
- The vapor is then collected and condensed back into a liquid, resulting in a more concentrated and purified form of the desired substance.



Working Principle

From the operational point of view, fractional distillation is a mass transfer process involving counter-current diffusion of the components at each equilibrium stage.

When a liquid mixture is distilled, the partial condensation of the vapor is allowed to occur in a fractionating column. In the column, ascending vapor from the still is allowed to come in contact with the condensing vapor returning to the still. This results in enrichment of the vapor with the more volatile component.

By condensing the vapor and reheating the liquid repeatedly, equilibrium between liquid and vapor is set up at each stage, which ultimately results in the separation of a more volatile component.



Mechanism

The steps of fractional distillation are as follows

- | You heat the mixture of two or more substances (liquids) with different boiling points to a high temperature. Heating is usually done with high pressure steam to temperatures of about 1112 degrees Fahrenheit/600 degrees Celsius.
- | The mixture boils, forming vapor (gases); most substances go into the vapor phase.
- | The vapor enters the bottom of a long column (fractional distillation column) that is filled with trays or plates. The trays have many holes or bubble caps (like a loosened cap on a soda bottle) in them to allow the vapor to pass through.
- | They increase the contact time between the vapor and the liquids in the column and help to collect liquids that form at various heights in the column. There is a temperature difference across the column (hot at the bottom, cool at the top).
- | As the vapor rises through the trays in the column, it cools.
- | The vapor rises in the column.
- | The trays collect the various liquid fractions.
- | The collected liquid fractions may pass to condensers, which cool them further, and then go to storage tanks, or they may go to other areas for further chemical processing.
- | When a substance in the vapor reaches a height where the temperature of the column is equal to that substance's boiling point, it will condense to form a liquid.

How Does it Work

- l The liquid mixture is heated in a distillation flask or pot. The heat causes the component with the lowest boiling point to vaporize first. The other components with higher boiling points remain in the liquid phase.
- l The vapors of the lowest boiling point component rise through a fractionating column. The column is filled with materials, such as glass beads or metal trays, that provide a large surface area for vaporization and condensation. This column facilitates multiple vaporization and condensation cycles.
- l The fractionating column plays a crucial role in fractional distillation. As the vapors rise through the column, they encounter a temperature gradient. The column is typically cooler at the top and hotter at the bottom. As the vapors move up the column, they cool down. The higher up the column, the lower the temperature.
- l As vapors rise in the fractionating column, they cool and condense on the packing materials. Higher boiling point components condense lower in the column, while lower boiling point components condense higher.
- l As condensed liquid flows down the column, it reaches hotter areas and revaporizes. The rising vapors become richer in low boiling point components, while the descending liquid concentrates the higher boiling point components.
- l Continuous vaporization and condensation cycles separate components by boiling points. The lowest boiling point component exits as distillate at the top, while higher boiling point components stay in the liquid phase and flow down.
- l The enriched vapors, which now contain a higher concentration of the lower boiling point component, are collected and further processed or cooled down to obtain the desired purified components.

Fractional VS Simple Distillation

- In Simple distillation, vapor is directly passed through the condenser whereas in fractional distillation the vapor must pass through a fractionating column in which partial condensation of vapor is allowed to occur.
- In simple distillation, condensate is collected directly into the receiver, while in fractional distillation, condensation takes place in the fractionating column, so that a part of the condensing vapor returns to the still.
- Simple distillation is suitable for mixtures with a significant difference in boiling points between the components. It is less efficient when dealing with mixtures with components that have close boiling points, as there is a risk of some overlap in the distillation of the components.
- Fractional distillation is more efficient when separating components with relatively close boiling points. The fractionating column enables repeated vaporization and condensation cycles, leading to better separation and higher purity of the individual components.

Application

- Separation of miscible liquids such as acetone and water, chloroform and benzene.
- Preparation of alcohol which is one of the most important pharmaceutical substance.
- Separation of non-volatile substance from volatile substance, for eg. Preparation of distilled water for injection.
- Purification of many organic compounds, such as ethers, amide, etc.
- Production of petrochemical products like gasoline, diesel, and kerosene.
- Production of essential oils and perfumes.

Advantages

- It is extremely easy to use.
- Readily purifies complex mixtures.
- Separates liquids with smaller boiling point separation.
- Economical for large-scale production.
- Continuous operation possible in industrial setups.
- Useful in recycling solvents and chemicals for reuse.

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