

Steam distillation

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Like [vacuum distillation](#), **steam distillation** is a method for distilling compounds which are heat-sensitive. This process involves using bubbling steam through a heated mixture of the raw material. By Raoult's law, some of the target compound will vaporize (in accordance with its partial pressure). The vapor mixture is cooled and condensed, usually yielding a layer of oil and a layer of water.

Steam distillation of various [aromatic](#) herbs and flowers can result in two products; an [essential oil](#) as well as a watery [herbal distillate](#). The [essential oils](#) are often used in perfumery and [aromatherapy](#) while the watery distillates have many applications in [aromatherapy](#), [food processing](#) and [skin care](#).



 [Dimethylsulfoxide](#) usually boils at 189 °C. Under a vacuum, it distills off into the receiver at only 70 °C.

Vacuum distillation

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Some compounds have very high boiling points. To boil such compounds, it is often better to lower the pressure at which such compounds are boiled instead of increasing the temperature. Once the pressure is lowered to the vapor pressure of the compound (at the given temperature), boiling and the rest of the distillation process can commence. This technique is referred to as **vacuum distillation** and it is commonly found in the laboratory in the form of the [rotary evaporator](#).

This technique is also very useful for compounds which boil beyond their [decomposition temperature](#) at atmospheric pressure and which would therefore be decomposed by any attempt to boil them under atmospheric pressure.

Steam distillation is a special type of [distillation](#) (a [separation process](#)) for **temperature-sensitive** materials like natural aromatic compounds.

Many [organic compounds](#) tend to decompose at high sustained temperatures. Separation by normal distillation would then not be an option, so water or steam is introduced into the distillation apparatus. By adding water or steam the [boiling points](#) of the compounds are depressed, allowing them to evaporate at lower temperatures, preferably below the temperatures at which the deterioration of the material becomes appreciable. If the substances to be distilled are very sensitive to heat, steam distillation can also be combined with [vacuum distillation](#). After distillation the vapors are condensed as usual, usually yielding a two-[phase system](#) of water and the organic compounds, allowing for simple separation.

Applications

Steam distillation is employed in the manufacture of [essential oil](#), for instance, [perfumes](#). In this method, steam is passed through the plant material containing the desired oils. It is also employed in the synthetic procedures of complex organic compounds. [Eucalyptus oil](#) and [orange oil](#) are obtained by this method in industrial scale.

Steam distillation is also widely used in [petroleum refineries](#) and [petrochemical](#) plants where it is commonly referred to as "steam stripping".