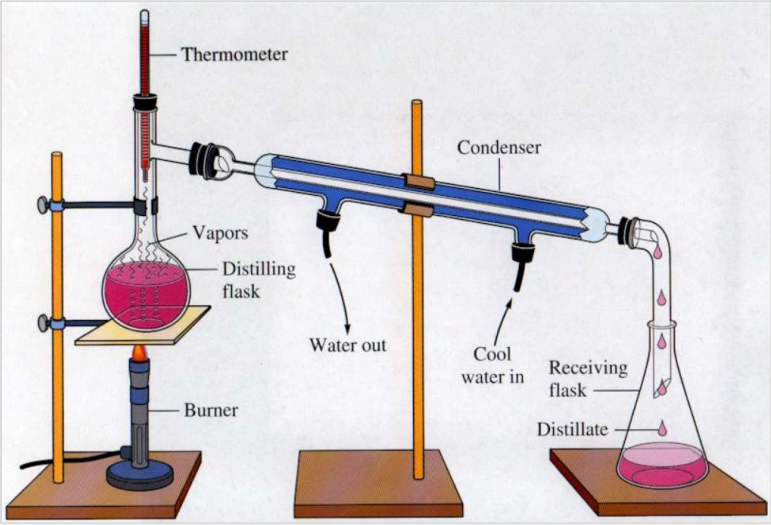
Falling Film Evaporators and The Addition of Energy Efficient Heat Pumps

-- The Helios Unit

Distillation Unit in the Cannabis Industry

Ethanol is one of the most used chemicals in the cannabis production process. The ratio of dry flowers to ethanol for both the extraction and refinement (winterization) process normally falls between 1: 10 to 1:15. It might be feasible for small batches to use new ethanol every now and then, but for a large batch with constant processes, this will require a lot of input resource. As a reference, the market price for ethanol currently sits around $8.5 per liter. To process 50kg of crude oil, minimum 500L of ethanol will be needed, which will close to $5000.

A solvent distillation unit can help with the situation though. By boiling off the ethanol and crude mixture at a certain temperature with vacuum, the high boiling point crude oil will remain in the vessel, while the low boiling point ethanol, will vaporize. With the use of a proper condenser, these vapors will condense and become collectable. A simple distillation[1] unit setup is shown below. The burner provides the required heat source for the liquid mixture to vaporize the ethanol in the cannabis case, and running water, used as a cooling agent, to condense the vapors. This way, ethanol can be reused to save the cost and be more environmentally friendly.



①: Online image from "http://jupiter.plymouth.edu/~wwf/distillation.htm"

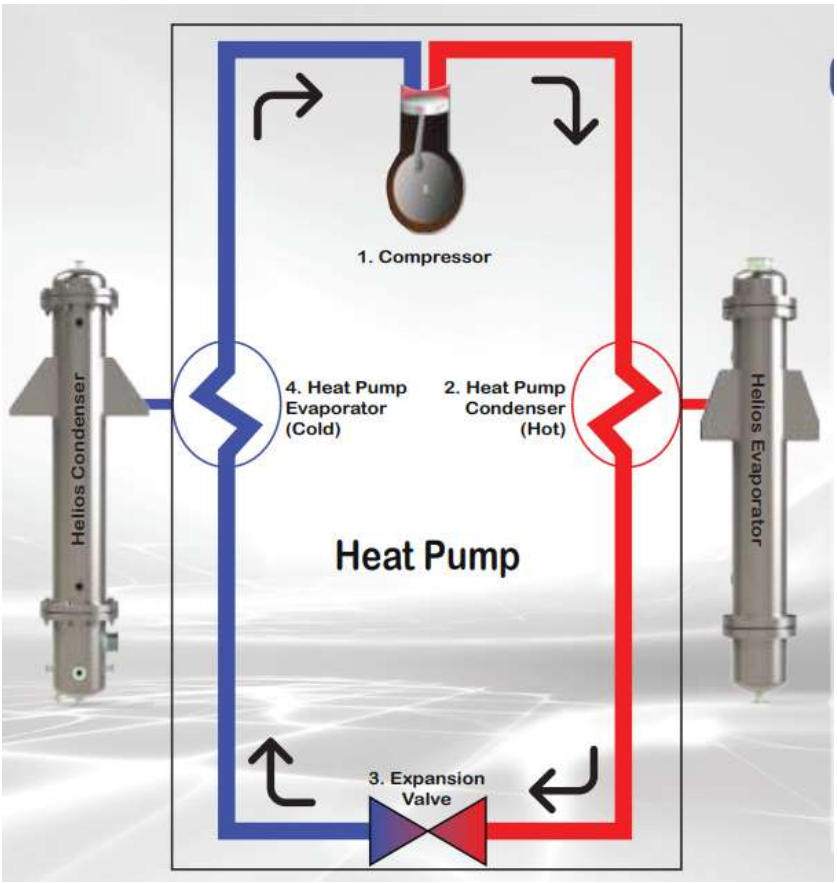
Another available option is the falling film evaporator (FFE). This unit is normally used to concentrate solutions, especially with the presence of heat sensitive components. With an evenly distributed plate layered on top of the vertically placed tube and shell heat exchanger, the liquid mixture will be distributed through the system evenly. The solvent will get boiled and vaporized in the evaporator, then the vapors get transferred to a condenser to be condensed and collected.

This conventional FFE system works in a thermal open loop, requiring an external heat source to boil the liquid mixture, in this case crude oil and ethanol, and a chiller to condense the solvent, ethanol. This system uses energy in both steps, both the heating and cooling processes.

Maratek Helios-Energy Efficient FFE

Maratek's Helios system, like other falling film systems, pumps the crude oil and ethanol mixture into the evaporator at a precise rate continuously, which can process at least 60 gallons (227 liters) per hour. Then, it gets heated rapidly to boil and vaporize the ethanol, and the high boiling point cannabis oil will be recovered. With the whole unit operating under vacuum, the Helios system only heats the crude oil and ethanol mixture up to 55°C. This reduces the possibility of the degradation of cannabinoids and helps to preserve terpenes in the final oil.

The Helios system is one of the most energy efficient falling film evaporators on the market. Instead of using two separate units to provide heating and cooling to the boiler and condenser respectively, the Helios system uses a heat pump to recycle the energy from the condenser back to the evaporator by introducing a refrigerant in the heating system. The refrigerant used in this system is a type of chemical that produces a cooling effect while expanding or vaporizing. In most cases, it undergoes a repeated phase transition from a liquid to a gas and back again. By simply compressing the refrigerant, it can provide the heating and cooling effect on its own. The picture below illustrates the process. By closing the heat loop, the Helios system dramatically reduces the energy use by up to 65% compared with a conventional falling film system.



About Maratek

Maratek is a Canadian based, award-winning, industry leader in professionally engineered solvent recycling and cannabis & hemp extraction technologies, which has proudly served industrial manufacturers globally for more than 50 years. Maratek manufactures environmentally conscious products that recycle waste for reuse from printing, coatings, automotive, aerospace, paint, cannabis, and many other related types of manufacturers to help them stay competitive in the marketplace by cutting costs and saving money. In 2011, Maratek acquired Omega Recycling Technologies, allowing the company to significantly expand its product offering. Maratek focuses its development efforts on reducing, reusing, and recycling solvents and other liquid wastes in a wide range of industries. Our company develops the latest technologies, utilizing our vast experience of supplying clients worldwide to provide the best return on investment possible.

Now, the company is using that experience to take the cannabis world by storm. Maratek's strengths lie in the ethanol extraction and related processes like winterization and looks to limit solvent waste and increase efficiency. Also, Maratek has developed in the direction of solventless extraction, like water extraction, in recent years.

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