

BASICS PAPER CONTINUOUS DISTILLATION

STREAMLINED EVAPORATION PROCESS

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SCALING UP MADE EASY WITH CONTINUOUS DISTILLATION

As processes scale from the lab to industrial levels, various evaporation methods are employed, including large-scale heating mantles, reactor evaporation, and rotary evaporators. Each method is integral to managing larger volumes and ensuring efficient substance separation as the operations expand. However, newer technologies offer streamlined solutions.



What is Scale-Up Evaporation?

Evaporation is a laboratory or industrial process that typically involves separation of two or more substances. As this process moves from the lab scale to the process scale, many different approaches have been attempted.

Large-scale heating mantles are one of these, applying heat to stationary flasks to remove solvent from a sample. This can scale-up to the 20 or 50 L scale, and is relatively cost effective, but is typically a slow method of evaporation due to surface area limitations.

Reactor evaporation is another common method used for large-scale evaporation. A glass jacketed vessel uses heat and stirring to facilitate evaporation into a distillation collection unit. The benefit of this equipment is also its disadvantage: you can perform the process in the same vessel as your chemistry, reducing movement of material but limiting the equipment that could otherwise be utilized.

The most common and efficient solvent removal device is the rotary evaporator. Please refer to our Basics Paper *"What is evaporation"*, where we give you details about this approach. However, the most effective solvent removal method, as the scale increases to 50 or 100 L scale, can become more cumbersome to facilitate.

However, continuous distillation combines the efficiency of a rotary evaporator, the convenience of a reactor, and the cost-effectiveness of a heating mantle.

What is Continuous Distillation?

Continuous Distillation is the automated process of removing user input from the evaporation process, while also facilitating fluid transfer in a way that can remove standard volume limits from the equipment.

What are Some Factors to Consider?

CAPACITY

When purchasing a rotary evaporator, several factors must be considered to ensure optimal performance and efficiency. Capacity is a critical factor, as it directly impacts laboratory processes. The capacity of an evaporating flask determines the amount of sample that can be processed in a single run, which can significantly affect the workflow, particularly in high-throughput environments. A larger capacity allows for the evaporation of larger volumes of solvent, reducing the need for multiple runs and saving time. However, it is crucial to match the capacity with your specific application needs: choosing an evaporator that is too large can lead to inefficient use of resources, while one that is too small might limit productivity. Therefore, selecting the right capacity ensures that the rotary evaporator is both costeffective and well suited to the requirements of the laboratory.

LABORATORY SPACE

In addition to capacity, the laboratory space is a key consideration when purchasing a rotary evaporator. Unit size can influence the layout, safety, and functionality of the workspace. Choosing a model that fits well within the available space ensures that the equipment can operate safely and efficiently. A compact evaporator might be ideal for smaller labs where space is limited, while larger models offer greater capacity and additional features but require more room. Appropriate spacing is essential for easy access to operate the equipment, perform maintenance, and ensure adequate ventilation. By carefully assessing the space in the lab, a rotary evaporator that enhances the workflow without overcrowding the workspace can be selected.

ENERGY USAGE

Energy usage is another important factor to consider as it impacts both operational costs and environmental sustainability. Rotary evaporators often run for extended periods; therefore, energyefficient models can significantly reduce electricity consumption, leading to lower utility bills. Additionally, energy efficiency supports sustainability goals by minimizing the carbon emissions associated with lab operations. By selecting a rotary evaporator with optimized energy usage, cost savings can be achieved while also contributing to a more environmentally conscious laboratory environment. Prioritizing the energy efficiency helps ensure that the laboratory operates economically and responsibly.

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