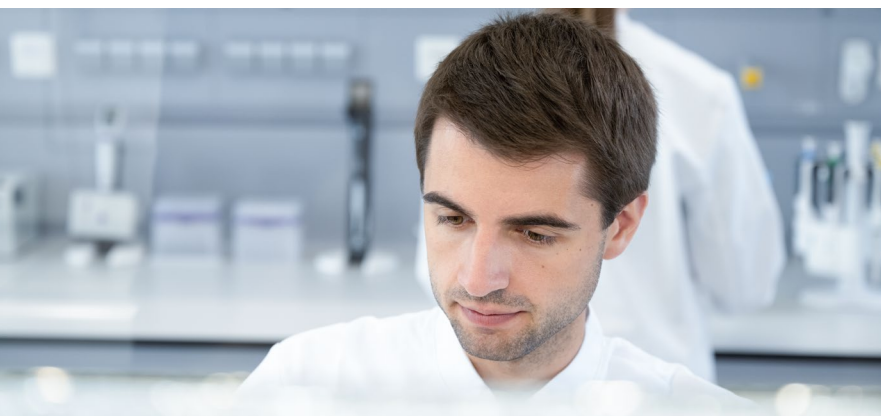




# 10 tips for optimal rotary evaporation

Expert knowledge from chemist Dr. Florian Heinrich

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# 10 tips for optimal rotary evaporation



Dr. Florian Heinrich shares his practical knowledge of rotary evaporation and optimum vacuum control.

As a PhD chemist with many years of laboratory experience, Dr. Florian Heinrich has spent numerous hours working with rotary evaporators. One thing has become clear:

the right vacuum is crucial for a successful process. In this article, he shares his practical insights for efficient and safe work with the rotary evaporator.

# 10 tips for optimal rotary evaporation



## 1. Regular leak testing: fixing imperfections

A frequently neglected but crucial measure: regularly check the tightness of your system. To do this, evacuate the empty and dry rotary evaporator, close the vacuum supply, and monitor the pressure rise. A rapid increase indicates leakage that needs to be fixed.

## 2. Delta-20 rule: achieving efficient evaporation

The temperature of the heating bath should be about 20°C higher than the desired evaporation temperature in the evaporating flask. At the same time, the cooling temperature should be at least 20°C lower than the evaporation temperature. For example, for an evaporation temperature of 40°C, a heating bath setting at 60°C and cooling at a maximum of 20°C is recommended.

## 3. Optimal flask fill level: ensuring maximum yield

The evaporating flask should be filled not more than 50% of its capacity. A fill level that is too high increases the risk of bumping and conclusive contamination.

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## 4. Adjusted rotation speed: managing viscosity

For better efficiency, the rotation speed can be adapted to the properties of the material being evaporated. For low-viscosity liquids, a higher speed promotes evaporation by increasing the surface area. For highly viscous solutions, lower speeds are recommended to avoid liquid accumulation on the flask walls and to ensure effective heat transfer.

## 5. Application of vacuum before immersing the flask: reducing vapor

A common mistake: The flask is lowered into the heating bath before applying vacuum. This causes volatile solvents to distribute throughout the entire system before the vacuum pump is active. The consequence: The pump has to work against these vapors, leading to longer process times and potentially straining the vacuum pump.

## 6. Optimal process pressure: avoiding bumping and foaming

The ideal process pressure corresponds to the vapor pressure of the solvent, where evaporation and condensation are in equilibrium. Important to understand: Lower pressure is not necessarily better! A vacuum that is too low can lead to bumping and foaming, which can contaminate the sample.

## 7. Ratio of evaporation and condensation: achieving perfect balance

A simple visual indicator: Observe the condensation on the cooling coil. When about two-thirds of the coil is covered with condensate and the upper third remains dry, a good balance is established.



Find the right vacuum pump with the Vacuum Pump Selection Guide!

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## 8. Correct hysteresis in two-point control: promoting valve longevity

When working with a manual two-point control system, the hysteresis (pressure fluctuations between minimum and maximum) should be about 10% of the set pressure. A hysteresis that is set too narrow leads to frequent switching of the valve, which can cause wear and be acoustically disturbing.

## 9. Automatic vacuum control: saving time and energy

Modern speed-controlled VARIO® vacuum pumps from VACUUBRAND can manage the process fully automatically. They independently detect the boiling point and continuously adjust the pressure to changing conditions. This not only saves time but also results in gentler distillation processes and lower energy consumption. For more demanding solvents, which tend to bump due to their high surface tension, the automatic mode offers additional sensitivity adjustment options for optimal distillation results.

## 10. Regular fill level monitoring: preventing contamination

Monitor the fill levels in all receiving flasks throughout the entire process. An overfilled receiving flask can lead to backflow and contaminate the sample. When using a pumping unit by VACUUBRAND, regularly check the separator at the pump inlet (AK) as well as the exhaust vapor condenser (EK).



## Conclusion

The rotary evaporator and the associated vacuum control are not rocket science, but they do require attention to detail. With these practical tips, you will not only improve the efficiency of your distillation processes but also take care of your equipment and, most importantly, your valuable samples.

Remember: Demand-oriented vacuum control is crucial. When selecting a new vacuum pump, utilize available selection aids such as the "Vacuum Pump Selection Guide" to find the optimal solution for your application.

# Product recommendations for the rotary evaporator

Vacuum is the key parameter for successful evaporation, as the temperature cannot be increased at will. Precise vacuum control enables optimum evaporation rates and the shortest process times without bumping or foaming.

Aggressive media are often used. In addition, high levels of vapor can occur. The vacuum pump should therefore have good chemical resistance, high condensate compatibility

and sufficient pumping speed. We generally recommend the use of a separator (AK) on the inlet side and an emission condenser (EK) on the outlet side.

VARIO chemistry diaphragm pumps with precise vacuum control and automatic evaporation mode offer the best conditions for processes on rotary evaporators.

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for evaporation flasks  
up to 5 L and boiling points  
up to 150 °C



**PC 3003 VARIO select**  
1.5 mbar | 4.6 m<sup>3</sup>/h  
for evaporation flasks larger  
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**PC 3004 VARIO select**  
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for evaporation flasks larger  
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**PC 620 select**  
1.5 mbar | 3.4 m<sup>3</sup>/h  
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up to 150 °C



**MZ 2C NT +AK +EK**  
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up to 100 °C



**MD 4C NT +AK +EK**  
1.5 mbar | 3.4 m<sup>3</sup>/h  
for evaporation flasks  
over 5 L and boiling points  
up to 150 °C

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