



Focus on What Matters

5 Golden Rules of Evaporation

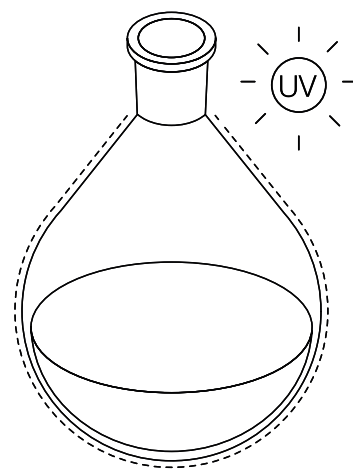
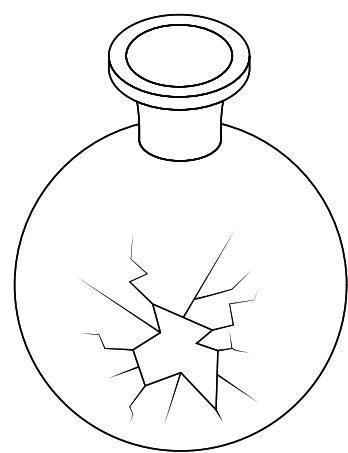
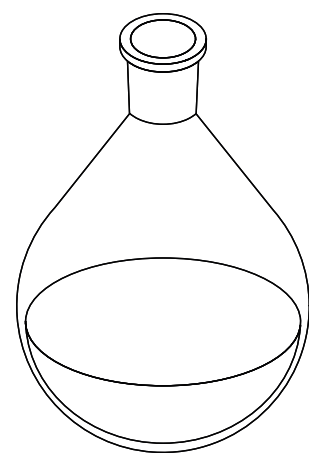
In any lab, time and consistency matter. The Rotavapor® R-180 delivers exactly what you need for reliable evaporation. With a focus on the essentials, it eliminates complexity and lets you work without distractions. Paired with the **5 Golden Rules of Evaporation**, you have the knowledge and the tools to distill with skill and focus on what matters most: accuracy, safety, and consistent results.



Don't Crack Under Pressure

1

Proper glassware selection is essential for a safe and efficient process, and with over 80 years of experience, BUCHI manufactures high-quality glassware, ensuring exceptional durability, precision, and chemical resistance. This expertise guarantees that BUCHI glassware meets the highest standards for safety, performance, and reliability in the laboratory.



Proper glassware selection and handling are essential first steps.

- **Use a larger flask:** Doubling the flask volume can improve performance by up to 50%.
- **Limit fill level:** Keep the solvent volume below half the flask's capacity.
- **Immerse correctly:** The solvent level inside the flask should be below the heating bath's water level.

Use glassware with **Safety Coating** to avoid contact with chemicals and sharp glass in case of breakage.

Standard: Available for condensers, evaporating flasks, and receiving flasks. Operating range: **30 to 60 °C**.

Low Temperature: For cold traps and receiving flasks. Operating range: **-70 to 40 °C**.

For **UV-sensitive substances**, opt for **amber glass** to preserve sample integrity.

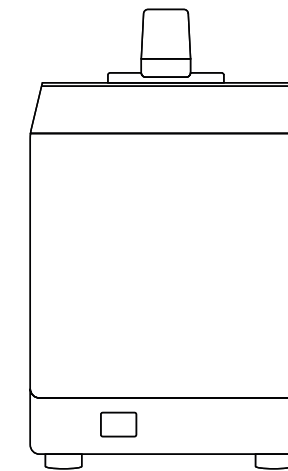
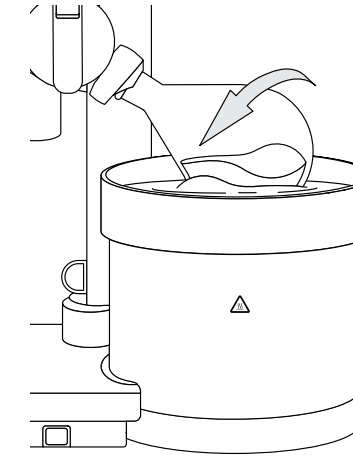
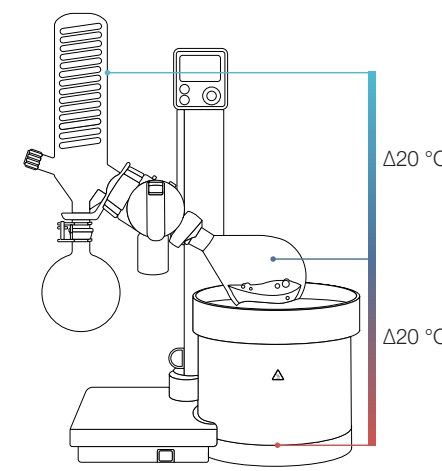
Beaker flasks with large screwcap openings facilitate easier substance retrieval and cleaning.

Drying beaker flasks have notches for efficient powder drying*.

Make Every Drop Count

2

Efficient evaporation is achieved by balancing three key parameters: speed, temperature, and pressure. When precisely adjusted, they ensure optimal performance.



Temperature

For optimal distillation, follow the **"Delta 20 Rule"**: Maintain a 20 °C temperature difference between the heating bath and vapor, and another 20 °C temperature difference between the vapor and cooling temperature.

Deviating significantly from this rule may cause solvent re-evaporation or unnecessarily increase energy consumption.

Speed

Rotation of the evaporating flask increases the surface area of the liquid and promotes even heat distribution.

- **Increasing flask rotation speed** moderately improves evaporation rates and reduces bumping.
- **Reducing flask rotation speed** helps when working with highly viscous substances or when drying powders*.

Pressure

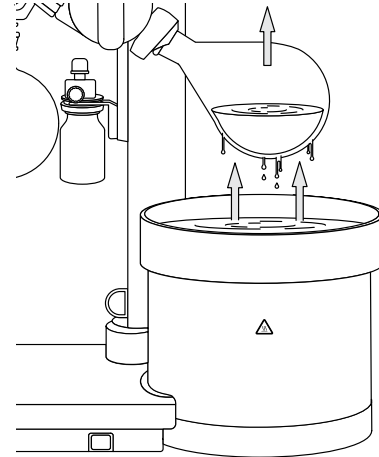
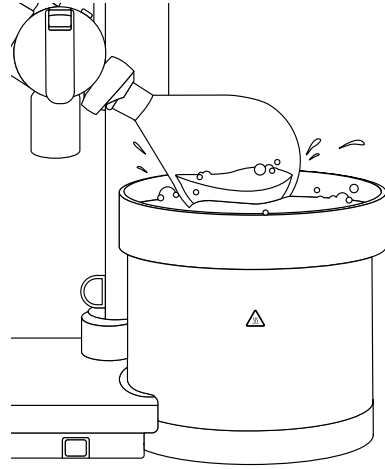
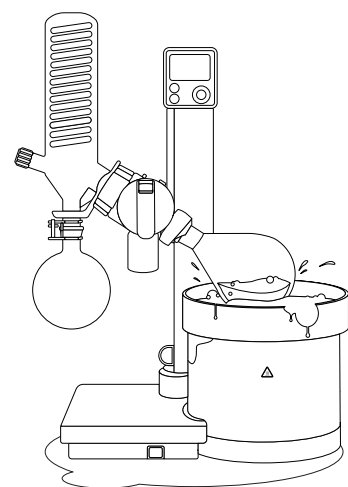
Stable vacuum control ensures safe and efficient distillation:

- **Reduce pressure gradually** to prevent bumping or foaming.
- **Use the correct pressure** based on solvent tables.
- **Maintain constant pressure** with an interface and a speed-controlled pump.

*The Rotavapor®'s **drying mode**—with alternating rotation directions—effectively dries powders and slurries.

Don't lose your cool

Even the most efficient evaporation setup can run into trouble if you're not prepared. From sudden bumping to overheating or unexpected shutdowns, small issues can quickly become big setbacks. That's where built-in safety features come in—they can be a crucial backup when the unexpected happens, helping to protect your sample and equipment without needing active intervention.



“Bumping*”—the violent, uncontrolled boiling of liquids—is a common challenge during evaporation. It can cause contamination, sample loss, and damage to equipment.

To prevent bumping,

- Use **BUCHI's speed-controlled vacuum pumps**, which smoothly regulate pressure.
- **Maintain rotation** and gradually increase heat.
- **Install a bump trap** to capture any accidental splashes.

Correct heat management protects you, your samples, and your equipment. To prevent the worst from happening, the Rotavapor® R-180 has two built-in safety features for overheating protection:

- **Electronic Overheat Protection:** Automatically shuts down heating if the temperature rises too rapidly—typical when running dry.
- **Mechanical Overheat Protection:** Automatically cuts power if the actual temperature exceeds the set limit.

The **depth-stop feature** ensures safe immersion and reduces the risk of glass breakage due to collision with the bath.

The **electric lift** automatically raises the flask out of the heating bath in the event of a power outage.

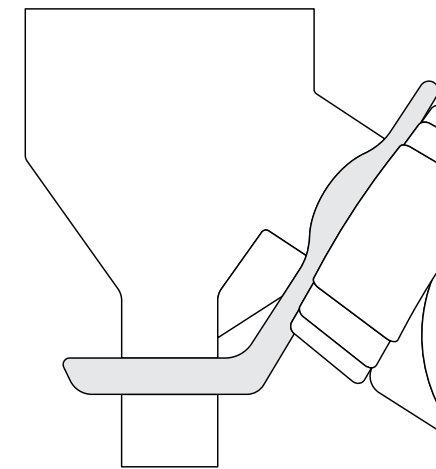
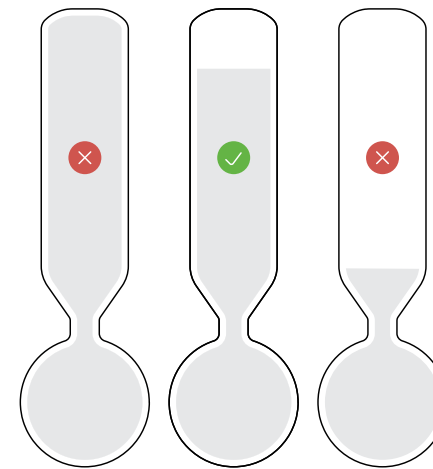
These safety features help prevent **overheating, sample loss, and glassware breakage**.

*Bumping occurs when liquids become superheated due to insufficient nucleation sites for bubbles, causing sudden eruptions (e.g., due to a sudden pressure drop).

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Stay in the Zone

Proper condensate control is essential for increasing solvent recovery and maximizing instrument life span. By keeping condensation levels in check and managing moisture from the surrounding environment, you ensure smooth operation and a safer, cleaner workspace.



Effective condensation control significantly enhances evaporation efficiency. To optimize your distillation:

- About **75% of the condenser height** should be covered with visible condensation.
- If the **condensation level is too high**, vapors are escaping due to a coolant temperature that's too warm or a vacuum that is too strong.
- If the **condensation level is too low**, the vacuum is insufficient, causing the evaporation process to proceed more slowly than necessary.

Condensation from humid air can cause **ice buildup**, creating liquid that can drip onto laboratory benches.

To counteract this:

- **Use the condensate trap*** to collect and drain condensation via a tube, ensuring the workspace remains clean and safe.
- The condensate trap is compatible with the V condenser, and additional insulation options are available for cooling hoses.

*Apply a small amount of ethanol on the condensate trap during installation for easier attachment.

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Handle With Care

Some compounds don't play well with air. Oxygen and moisture can degrade sensitive samples, especially when working with volatile substances like ethers. Inert distillation offers a controlled, oxygen-free environment to protect both you and your compounds. With the right setup and precautions, you can carry out safe, effective distillations—even when the atmosphere isn't on your side.



Some compounds are **sensitive to oxygen and moisture**, risking degradation during distillation. The Rotavapor® R-180 enables distillation under an inert atmosphere (e.g., nitrogen or argon) to ensure sample integrity.

To perform inert distillation:

1. Connect the inert gas to Interface I-80 or I-180.
2. Attach the evaporating flask and start the vacuum.
3. Once full vacuum is reached, introduce inert gas to purge the air.
4. Repeat the vacuum–inert gas cycle several times for thorough purging.

This creates a **stable, oxygen-free environment** for safe distillation.

Ethers can form unstable peroxides during storage, which poses an **explosion risk** upon heating or agitation. These risks increase significantly during evaporation.

Safety steps for ether distillation:

1. Always test for the presence of peroxides.
2. Do not distill if peroxides are present.
3. Check expiration dates and follow lab disposal protocols.
4. Never distill ethers to dryness — always leave a small residual volume.

Storage tips:

1. Store in tightly sealed containers.
2. Keep away from light and air to reduce peroxide formation.

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Congratulations! You're Ready to Distill with Skill

The Rotavapor® R-180 takes the complexity and guesswork out of evaporation so you can achieve safe, consistent results without the stress. By applying the **5 Golden Rules**, you will avoid common pitfalls, protect your samples and equipment, and ensure that every drop counts.

With the Rotavapor® R-180 and the 5 Golden Rules, evaporation doesn't need to be complicated. It's time to leave frustrations behind and **focus on what matters most—consistent, reliable distillation with minimal hassle**.

For more expert guidance and our handy solvent library, explore the full Rotary Evaporation guide: [Mastering Rotary Evaporation](#)

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Master Rotary Evaporation

Master the essentials of rotary evaporation with our beginner's guide. Optimize performance, protect your samples, and reduce environmental impact with key techniques in evaporation and distillation.

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Get the most from your instrument with our practical poster. Packed with tips on rotation speed, pressure optimization, condenser loading, and more to help you streamline your evaporation process.

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