

APPLICATION NOTES



Chillers for **Cannabis** **Crystallization**

Julabo.us
TEMPERATURE CONTROL

GREAT INFO:

Chillers for Cannabis Crystallization and Processing Optimization

Crystalline cannabinoid products are popular in the cannabis and hemp industries, and producing these highly valuable compounds can be a lucrative business for processors. Crystallization allows you to turn liquid cannabinoid extractions into high-purity solids for dabbing and use in cosmetic, therapeutic, or edible applications. Consumers often call these substances “diamonds” or “sugar” due to their crystal-like appearance.

Whether you create cannabinoid crystals for consumer usage or therapeutic formulation, you'll need a bit of extra processing and an understanding of how temperature control affects results. This article will examine the advantages of using temperature control equipment such as chillers and circulators to create crystalline cannabinoid products. We'll explore how chillers and other temperature control equipment can optimize cannabinoid crystallization and why gradient temperature control, process programming, and external temperature control monitoring are vital for high-yield, consistent, batch-to-batch production.


Application Overview for Cannabis Crystallization

Crystallization is a chemical process in which a liquid solution is converted into a solid crystalline state. For cannabis crystallization, the process starts with a high purity cannabis oil, one that has already gone through several processing steps, including extraction and winterization or de-waxing and/or solvent removal. The high purity extract/liquid typically comes from hydrocarbon or carbon dioxide extraction systems or an ethanol process, after the ethanol has been thoroughly removed. To better understand how to process your cannabis material to create the concentrated extract, [check out this whitepaper](#).

To achieve crystal formation once you have an extract, you'll need to reduce the solubility of the targeted cannabinoids through cooling, evaporation, or antisolvent addition. There are different methods you can use to achieve this. For example, some small-batch or novice processors place the extract in a jar at room temperature and wait weeks for the crystallization process to occur. This method, sometimes called Jar Tech, isn't ideal for a professional, larger-batch processor. For a faster, more efficient, and scalable way to achieve crystallization, laboratory equipment such as jacketed reactors and filter reactors with stirring capabilities can help. Note, if you're using a reactor, you'll also need a temperature controller such as a chiller or circulator to manage and adjust the temperatures within the reactor.

Using reactors and chillers can expedite and fine-tune the crystallization process to create high-quality, repeatable results. To use the reactor/chiller method, place the cannabis extract in a warm jacketed reactor or a warm filter reactor. Then, adjust your temperature controller to drop the temperature slowly, thereby encouraging crystal formation and growth. The exact temperature settings and timeframe will vary based on your process and materials. For instance, if you're using ethanol, you may want to drop the temperature a few degrees every few minutes until you reach as low as -40°C.

The resulting crystal product can then be washed with an appropriate solvent (like pentane) to remove unwanted by-products yielding a highly valuable crystalline cannabinoid with >99% purity.



HIGHLY VALUABLE CRYSTALLINE
CANNABINOID WITH -
>99% PURITY

Challenges and Workflow Optimization

Because temperature plays an essential role in the crystallization process, you'll want to look for a temperature control unit that enhances your process and streamlines your workflow. Here are some key factors and guidelines to consider:

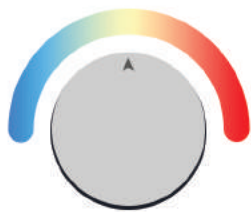


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Sizing the Chiller

The key to consistent results begins with an appropriately sized chiller for the reactor. An undersized chiller can make it difficult to achieve and maintain temperature setpoints. To accurately size a chiller for cannabis crystallization, you'll need to consider the size of the crystallization vessel/reactor, required temperature range, and the desired cooling rate.

If you aren't sure how to size a chiller, some resources can help. [JULABO USA](https://www.julabo.us), a manufacturer of temperature control units, provides personalized product recommendations for the cannabis and hemp industry to help you determine the optimal unit for your process. Additionally, the [JULABO USA app](#) allows you to find chillers based on your application, including temperature ranges, cooling rates, vessel size, and more.



Gradient Temperature Control

Having a chiller with the ability to operate with a temperature gradient (i.e., control heating or cooling by °C/min) is also important. Gradient temperature control will allow you to program and dial in your temperature settings to achieve specific parameters such as temperature reductions of ½ a degree per minute.



Programmability

Once you develop a method that works, you'll want to reproduce the process to ensure consistent batch-to-batch crystal production. A chiller that allows you to save steps and programs can be a tremendous asset, helping you create a repeatable process and workflow that guarantees consistency and quality.



External Temperature Control

Chillers with Pt100 sensor ports and compatibility add an additional level of process control by helping you monitor your temperatures directly in the reactor, allowing you to oversee your progress in real-time.

← Pt100 SENSOR!

Chillers and Products for Cannabis Crystallization

To expedite and control your crystallization process, you'll want to look for a chiller that...

- Is appropriately sized for the reactor
- Offers gradient temperature control
- Allows you to program and save your processes and steps
- Is compatible with a Pt100 sensor so you can monitor temperatures within the reactor

JULABO USA offers various chillers, circulators, and temperature control systems to optimize the crystallization process. The DYNEO DD and MAGIO MS refrigerated/heating circulators and the PRESTO Highly Dynamic Temperature Control Systems offer all the necessary features we've mentioned and come with personalized consultations to make sure you have the best unit for your process. In addition, JULABO offers temperature control units for reactors from 5 liters in size up to 100 liters. Units such as the PRESTO A45 can go as low as -30°C on a 50-liter reactor.

5 - 100 LITERS
AS LOW AS -30°C →
PERFECT FOR YOUR PROCESS!



PRESTO A45

► Visit www.JULABO.us for more information!

Conclusion

Creating crystalline cannabinoid products requires a strong understanding of chemistry and temperature control. While there are many approaches available, finding one that's scalable, efficient, and saves time can boost profitability. Manufacturers such as JULABO USA, who have an in-house application scientist and provide personalized product recommendations and sizing assistance, can go a long way in helping you streamline and dial in your crystallization process.

For personalized product recommendations and application assistance, please reach out to JULABO USA directly:

✉ sales@julabo.us

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