

# Nothing Labs

## Electronic Cloud Chamber

<http://www.nothinglabs.com> - [support@nothinglabs.com](mailto:support@nothinglabs.com)

Cloud chambers let you see paths left by ionizing radioactive particles. Traces appear as the particles ionize super-cooled alcohol vapor - causing it to precipitate.

***Do not leave the chamber running unattended, or allow children to use it without adult supervision.***

***Never handle the chamber by the top viewing surface. This may damage it.***

***Do not remove, loosen or tighten the bolts attaching the chamber surface. Do not attempt to disassemble any portion of the cloud chamber. If you have problems contact [support@nothinglabs.com](mailto:support@nothinglabs.com).***

Due to material availability or minor design changes your chamber may appear slightly different than pictured in this manual. All versions of the cloud chamber are functionally identical.

**Please review this entire document before operating the cloud chamber!**



### **Note on the cloud chamber's surface:**

You may notice the plastic surface of the chamber includes small scratches, dimples or other minor aberrations. ***The type of plastic used in the cloud chamber contains these imperfections when delivered from the manufacturer. They do not indicate damage.***

This plastic (**acetal copolymer**) was selected for its resistance to cracking under large temperature differentials, low-glare finish and chemical resistance to isopropyl alcohol. Once the chamber is started, a fine mist of alcohol will cover the saturation area - and any aberrations will become much less visible. The chamber surface may accumulate additional minor imperfections or slight variations in color with normal use. ***Do not attempt to "buff" or "polish" the chamber surface.***

## Chamber start procedure:

1. If any excess rubbing alcohol is present on chamber surface - wipe it off with a paper towel.
2. Place your radiation source on the chamber surface.
3. Place about 1 teaspoon (one cap) of 99% isopropyl alcohol on the pad on top of the chamber glass.
4. Place the chamber glass on top of the chamber platform.
5. Rub a balloon on your shirt / hair to build up a static charge. Place this on top of the chamber glass (it should rest there).
6. Turn chamber on.
7. Place LED lamp about 2 inches from the base of the chamber glass and turn it on.
8. You should start seeing traces in 5 to 10 minutes (sometimes quicker). Good results may take a few more minutes.



## Notes:

The chamber typically runs about 45 to 90 minutes before running out of alcohol, static charge, or having too much alcohol build up on the platform. Ambient temperature, humidity, and sample type can all effect how long the chamber runs.

For the best results - turn off or dim lights in the room, and run the chamber away from any windows / natural lighting. Bright artificial or natural light may cause the chamber to take longer to reach operating temperature.

**Whenever chamber performance becomes poor - repeat steps 1-5 listed above.** By doing this - the chamber can be run indefinitely!

**You should not operate the chamber if the ambient temperature is below 50f - it may damage it.** Running the chamber with an ambient temperature greater than 75f may produce poor results.

The chamber's surface is about -30f when operating at 70f ambient.

The balloon acts as a static source to clear stray ions from the chamber surface - and can be removed after traces have been appearing for several minutes. If you have left the balloon in place for an extended period of time, you may find that removing it actually helps performance.

Some very strong Alpha sources may require the chamber be “recharged” with fresh static from the balloon periodically. When applying or removing the balloon - it often creates distorted or false trails (these will go away after a few minutes).

Viewing angle and lamp position have a large impact on how the traces appear. Experiment for best results. Try to position the lamp and sample, so that the sample doesn't create a large shadow (traces will not be visible in the shadow).

You can replace one sample with another sample at any time without turning off the chamber. You will likely need to “recharge” and re-apply the balloon.

Do not leave rubbing alcohol uncapped. Doing so will cause it to absorb water from the air.

The knob on the side of the cooling tower controls fan speed. For best results leave it turned fully clockwise.

99% isopropyl alcohol is available at most drug stores or online (check Amazon.com). 95% ethyl alcohol from the local hardware store can also work. Lower grades of alcohol may not work.

The cloud chamber includes a gasket (the foam sheet with a hole in the middle). Placing the gasket between the chamber's glass and platform helps to slightly increase the depth of the supersaturation and reduce turbulence. On the downside, it slightly decreases the total surface area which traces are visible in. Experiment to determine what provides the best results for you.



## Common Traces

### Alpha Radiation

Straight, thick trails you see in the chamber are most likely caused by Alpha radiation.

Alpha particles are composed of two protons and two neutrons. They are basically helium atoms without their electrons!

Alpha particles can easily be stopped by a sheet of paper.

### Beta Radiation

Thinner, jagged trails you see in the cloud chamber are most commonly the result of Beta radiation.

Beta particles are electrons moving at very high speed. They can penetrate objects much better than Alpha particles can - and can even pass through a thin sheet of aluminum.

### Cosmic Rays and Background Radiation

If you run the cloud chamber without a sample - you'll still periodically see traces!

These traces are from naturally occurring background radiation such as radon and cosmic rays from outer space. Small amounts of radiation are all around us! Your body even contains radioactive isotopes of carbon and potassium!

## Fiestaware Sample Source

A small piece of "Radioactive Red" Fiestaware is included with the product. This is a fragment of dinnerware manufactured in the mid-20th century that used Uranium Oxide in their glaze. It is an excellent source of Alpha and Beta radiation while being relatively safe.



While the level of radiation produced by Fiestaware is low:

- **Do not let children handle the Fiestaware.**
- **Wash your hands after handling the Fiestaware.**
- **Do not put the Fiestaware in your mouth.**

## Other Samples

Minerals containing Uranium such as Autunite or Uraninite can be purchased on eBay inexpensively. Check [www.nothinglabs.com](http://www.nothinglabs.com) for links to other sample sources.

### Common Issues:

Misting is visible at bottom of chamber, but traces are faint / not visible	Try waiting longer. The chamber may require more time to reach operating temperature in environments that are warm or have bright lighting. Humidity may also play a role.
Ice crystals are forming on top of platform	Turn the chamber off, wait for them to melt - and then wipe the water off with a paper towel. This can be caused by high humidity, your rubbing alcohol containing too much water, or leaving the chamber running after it's run out of alcohol. Using two caps of rubbing alcohol instead of one may help.
Drops of water / liquid have appeared under the chamber platform	After running the chamber for a long duration, a small amount of ice may form under the platform - which will melt after turning it off. This does not present a reliability or safety issue.
Alpha trails not visible from alpha source	Your sample may have become covered with alcohol (which can block Alphas) - remove it from the chamber and let it dry. Some strong Alpha sources (like Americium) benefit from recharging the balloon frequently.
Rubbing alcohol has pooled on bottom of platform	<p>This is part of normal chamber operation. Alcohol evaporates from the top of the chamber, and collects at the bottom after it precipitates. It should be wiped away with a paper towel whenever adding more alcohol to the top of the chamber.</p> <p>If the pool seems to develop quickly - or seems to be hurting performance - using less rubbing alcohol in the future may help.</p>
Large "poofy" streams appearing from side of chamber	This is caused by excess alcohol building up around the edge of the chamber and creating an intermittent seal (normally the chamber is not actually "sealed").



	<p>Wipe the chamber surface dry with a paper towel. Put the glass back on and recharge the balloon. Once this problem has occurred - it usually does not re-occur unless additional alcohol is added.</p> <p>You may want to try using less rubbing alcohol next time you setup the chamber.</p>
Trails seem distorted, strange patterns on surface of chamber	This is usually caused by a change in static field (from adding / removing the balloon) - or temperature change (from removing / replacing the chamber glass). Waiting a few minutes will likely resolve the issue.
Power supply is making a slight whining noise	This is normal.
Chamber glass doesn't fit perfectly flat on the platform / the platform itself seems slightly warped	This is normal. With use, the chamber surface may deviate from being completely flat due to the extreme temperature differential. Since the chamber isn't actually sealed, this doesn't pose a problem.
Can't build up static charge on balloon	This is often caused by a highly humid environment. A cat can help with this.

## Warranty and Support

If you are having problems with your cloud chamber (and have reviewed the “Common Issues” section) - contact [support@nothinglabs.com](mailto:support@nothinglabs.com).

The unit is fully warrantied for 180-days after purchase (excluding abuse / accidental damage).

## Disclaimer / Liability

By using this assembled kit - you understand and agree that:

1. While the creator of this assembled kit believes it to be safe, it has not been tested to the same degree a consumer-oriented product would typically be.
2. Use of this assembled kit is entirely at your own risk. You will not hold its creator liable for any damages that may result from its use.
3. You will not leave this assembled kit operating unattended and will not allow children to use it without supervision.
4. Some radioactive sources may be dangerous. It is up to you to determine proper handling procedures and follow them.