



Oxalic Acid Vaporization – Questions and Answers:

What is Oxalic Acid?

Specifically: Oxalic acid is an **organic compound** with the **formula** $\text{H}_2\text{C}_2\text{O}_4$. It is a colorless crystalline solid that forms a colorless solution in water. In terms of acid strength, it is much stronger than **acetic acid**. Typically, oxalic acid occurs as a **dihydrate** (containing 2 molecules of water) with the formula $\text{H}_2\text{C}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$.

Where is Oxalic Acid found?

OA is found in peanuts, pecans, wheat bran, spinach, rhubarb, beets, beet greens and chocolate. Some others include soy foods, sweet potatoes, black tea, berries and other dark leafy greens, like Swiss chard and collards. It is what gives food that “bitter” taste.

What happens to Oxalic Acid when heated (vaporized)?

When OA reaches 215 degrees (f) the water boils off leaving anhydrous (water free) OA crystals. At 315 degrees the OA crystals start to sublime (go from a solid to a gas). At 372 degrees, OA which has not sublimed decomposes to form formic acid and carbon monoxide. However, the decomposition of OA to formic and carbon monoxide can only occur under laboratory conditions, not in the apiary.

How does Oxalic Acid kill mites?

The jury is still out. It is thought that OA vapors enter through the soft pads of the mite’s feet and travels to the blood stream, killing the mite. It is also thought that it destroys parts of the mite’s mouth. However it works, it decimates mites.

Is Oxalic Acid Safe for my bees and will it contaminate my comb?

When used as directed, OAV does not harm the queen, bees or the brood! And it does not contaminate the comb as poisons do. There are naturally occurring levels of oxalic acid in a hive. While OAV elevates that level, the hive returns to pre-treated levels shortly after treatment. Within days of vaporization, the bees will remove the residual OA crystals from the hive.

How much Oxalic Acid is used in the OAV process?

The recommended dosage is one gram per brood chamber. Most have two brood chambers, so use two grams (which is very close to ½ a teaspoonful. You could use a ½ teaspoon measure in lieu of two one gram (¼ teaspoons). More is not better!

How is Oxalic Acid Heated for use in beehives?

Mostly, a 12 volt, 15 amp vaporizer is used. The OA is placed in the vaporizer’s pan which is then inserted into the beehive and connected to the battery. When the current is connected to the vaporizer, it heats the pan thus vaporizing the OA.

How long does it take to vaporize OA?

Vaporizers take 2.5 minutes to vaporize OA. The current is disconnected after the time limit and the vaporizer remains in the hive another two minutes to finish vaporizing. One should “test fire” their vaporizer prior to using as batteries in various states of age may take longer. Also, if one were to vaporize several hives (using a vaporizer not connected to continuous charger (such as in a running vehicle)), vaporization will start to take longer and longer as the battery degrades. Mites will begin to die immediately but you’ll show the largest mite drop the day AFTER treatment.

Do I have to seal the hive when vaporizing?

Yes, although a “perfect” seal is not necessary. During the vaporization period, the hive is sealed and once the vaporizer is removed, the hive resealed for an additional 10 minutes.

Is Oxalic Acid safe for the beekeeper?

Yes, if the beekeeper takes adequate safety precautions. Keep a smoker lit in the beeyard and stand up-wind. Do not BREATHE the vapors! The EPA is stating that an acid gas respirator is sufficient, use a model 6211 which filters both vapors and particulates. In Europe a mask with an N95 particulate rating is the standard. OA vapors very quickly re-crystallize to cover all the surfaces in the hive making the breathing of the vapors unlikely. However, there is always the chance, error on the side of safety!

What is the outside temperature range to perform OAV?

You need an outside temperature of 37 (f). There is no top temperature. The temperature of 37 f is only needed at time of treatment and 1-2 hours thereafter.

Will the mites grow resistance to OA?

Since OA is an acid vs a poison, highly doubtful. OA has been used in Europe for 20+years and there is no reported resistance.

When is the best time to utilize OAV?

The very best time to use OAV is when the hive is broodless. Why? OA only kills phoretic mites - those on the bees, not in the brood. At that time OAV will kill an amazing greater than 95% of the mites in the hive! So when is the hive broodless or almost so?

1. At the beginning of winter (for many, somewhere between Thanksgiving and Christmas).
2. When you've hived a swarm. (wait till you see eggs before you vaporize).
3. When you've completed a split and removed most of the capped brood.
4. When you purchased a package and placed it in a hive (wait till you see eggs before you vaporize.)
5. If the bees are "flying," the best time to treat is early morning or late evening when most are in the hive.

Another great time to use OAV is in late August/early September when the mites are out-breeding the bees. What you are doing at that time is killing the mites that are emerging with brood and before they enter another brood cell about to be capped. During this time, you need to vaporize 3 times at 5 day intervals.

If you have high mite loads going into spring you can do a series of treatments before you add your supers, however other treatments are better suited to treat hives that are heavily rearing brood.

Can I perform OAV with supers in place?

No, you must remove them or place a barrier between the brood nest and the supers. Cardboard or coroplast serve well as a barrier. You can replace the supers or remove the barrier after all the vapors have subsided and new crystals formed. To be safe, wait approximately 15 minutes after you've removed all the seals to the hive.

Can you use an extension cord on your OA vaporizer?

Yes, after you've made the necessary electrical connections. However, you should use a 12 gauge wire on your extension cord to keep the current from dissipating thus making vaporization take longer. You can also use several vaporizers together for faster treatment of multiple hives.

Is Oxalic Acid legal to use in the US in beehives?

Yes, as of March 10th 2015! The EPA approved it for use in beehives as of that date! The individual States must approve also. You'll need to check your own State as to status. Many have already approved.

How long will my battery last during OAV?

With a new, fresh battery, I've completed 20 vaporizations. Your results will vary with your battery. Basically, you won't know until you tried.

Can you do OAV from the top of the hive? OR my bottom hive opening isn't large enough for the vaporizer to enter.

Yes! Make a one or two inch "shim or rim" the same dimensions as your brood chamber. Cut a slot on the bottom of the shim/rim slightly larger than the rod that connects to the vaporizer. Place a piece of aluminum sheeting (you can cut this from an old pie plate) on top of the frames. Fill the vaporizer with the OA, place it on the sheeting, and then place the rim/shim over it all. Make sure you've closed off all openings. Replace the top cover, connect the vaporizer to the battery, don your respirator and kill some mites!

Does it make any difference to what battery terminal I connect the vaporizer battery during OAV?

No. All that is needed is a completed electrical circuit. Which wire from the vaporizer connected to what terminal on the battery is of no consequence.

Does Oxalic Acid kill tracheal mites?

It is thought to do so as those who have used OAV have no reported incidences of tracheal mites. However, there are no studies that conclusively prove that OA does so.

Another great use of an OA Vaporizer:

Want to avoid the chore of the sugar roll or alcohol wash to count mites? Or just want to see what phoretic mites are in your hive. Try using your vaporizer. Just vaporize as normal then afterwards insert your sticky board. The drop on the second day will show you about 95% of the phoretic mites you have killed. You can then imagine what's still in your brood ready to emerge as 80-85% of all mites reside in the brood. You can then decide whether you need follow up with a treatment regimen.

I have 8 frame hives or use mediums for brood chambers, how much OA should I use?

You always use one gram of OA per brood chamber to vaporize no matter the number of frames or size of the brood chamber. The only exception to this is when vaporizing a nucleus colony, and then it is 1/2 gram.

How does OA compare to other treatments?

After the initial cost of the vaporizer, OA treatments are mere pennies per treatment! With other treatments you could easily spend in one year what the vaporizer costs and you would need to do so year after year.