

## How Many Oxygen Absorbers Do I Need? Some Recommended Amounts

Container Type	Wheat/Flour/Grains/Rice (More Dense/Less Air)	Pasta/Beans (Less Dense/More Air)
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### FOOD STORAGE BUCKETS:

1-Gallon Food Storage Bucket	100cc: 3-4	100cc: 4
	500cc: 1	500cc: 1
	1000cc: 1	1000cc: 1
	2000cc: 1	2000cc: 1
5-Gallon Food Storage Bucket	100cc: 20	100cc: 25-30
	500cc: 4	500cc: 5-6
	1000cc: 2	1000cc: 3
	2000cc: 1	2000cc: 2

### What are Oxygen Absorbers and Why Are They Used in Long-Term Food Storage?

Oxygen Absorbers are used to remove oxygen from within a sealed environment, creating a nitrogen environment for long-term food storage. They protect dry foods from insect damage and help preserve product quality. They are used when dry foods are packaged in sealed containers. When used with proper packaging and sealing, the oxygen in the packaging is greatly reduced. Our absorbers bring the oxygen level down reliably to .01% or less.

### What Are The Benefits Of Using Them?

- Extends shelf life
- Prevents growth of aerobic pathogens and spoilage organisms, including molds
- Eliminates the need for additives such as BHA, BHT, sulfur dioxide, sorbates, benzoates, etc.

### How Do Oxygen Absorbers Work?

Oxygen absorbers perform their action through a chemical reaction. They contain iron powder which reacts with the oxygen in the air causing the iron powder to rust. When all the iron powder has oxidized, the oxygen absorbers are "loaded" and the absorbing action stops. Remove the oxygen from an active absorber and the chemical reaction stops. Put them back in the air and the reaction starts again until the iron is gone.

### What Are Oxygen Absorbers Made Of? Are They Dangerous to Come in Contact with Food?

Oxygen absorbers are small packets that contain an iron powder. The packets are made of a material that allows oxygen and moisture to enter but does not allow the iron powder to leak out.

The Oxygen Absorbers are safe to place on top of the food. They will not harm the food they are in contact with as they come in a sealed pouch.

### **How Long Does it Take For the Oxygen Absorbers to Work?**

Oxygen Absorbers become warm to the touch when they are working. They take about 4 hours to achieve their rated maximum absorption.

### **Do I Need Any Other Product To Remove Moisture?**

Desiccants are used with food which has a high water content which can't be stored long-term very well anyway. Using desiccants is not required with dehydrated foods, at least those that we carry.

### **Can I Just Freeze My Food Instead To Keep It Good Long-Term?**

Many customers ask if their food will last longer if placed in a freezer. Most items will last significantly longer under cooler temperatures. While dehydrated food is relatively stable under freezing conditions, still your best solution for long-term food storage is to go with an oxygen-free environment.

### **Is The Use Of Oxygen Absorbers Equivalent To Vacuum Packaging?**

Oxygen absorbers remove oxygen more effectively than vacuum packaging. Air is about 20 percent oxygen and 80 percent nitrogen. Absorbers remove only the oxygen. The air left in the container is mostly nitrogen and will not affect the food or allow the growth of insects. Therefore, the final packaging may not have the appearance of being "vacuum-packed" because of the remaining nitrogen in the package. The only way to get a good vacuum seal inside the bag is to use a vacuum sealer.

Oxygen absorbers alone will not be able to accomplish this as they only remove oxygen, which is roughly 20% of the air inside the bag. However, the goal should be to remove the oxygen as the remaining contents of the air will not affect the long-term storage life of your food.

### **What Types of Food Products Can Be Stored Using Oxygen Absorbers?**

Products should be low in moisture and oil content. If the moisture content is not low enough (about 10 percent or less), storing products in reduced oxygen packaging may result in botulism poisoning. All of our dehydrated products meet the 10 percent or less criteria. However, some products (for example, granola) contain nuts which because of their oil content has a shorter shelf life of up to 6 months to a year. This applies to any food that has a higher oil content, eg. brown rice vs. white rice.



## How to Test the Capacity of an Oxygen Absorber

Generally, oxygen absorbers have a greater capacity than is listed on the package. This is intentional to allow for some exposure of the packet to air during your packaging process. None of this is necessary if you have a new, sealed bag of oxygen absorbers. However, if for any reason you want to check them, this is one way to get it done.

It's impossible to see how much life is left in an absorber by looking at it or feeling it. The only sure way is to actually see how much oxygen it will absorb. One way to do this is to tape the absorber to the bottom of a bottle. The larger the bottle the better. In my tests I used a gallon pickle bottle. Put the bottle upside down inside a pan of water being careful to set it straight down so no water enters the bottle. As the days pass and the absorber takes in oxygen, the water level will rise in the bottle. When it stops rising, use a magic marker and mark the water level, then take the bottle out of the water and fill it with fresh, new air. I did this by blowing 5 or 6 full breaths of air into the bottle. Then sit it back down into the water. When the water level stops rising again, mark the level again then fill it with new air and repeat the process until the absorber won't pull any more water up into the bottle.

In my tests it took 3 1/2 cycles for the D750cc absorber to get loaded using a 1 gallon bottle.

The next step is to see how much air was absorbed. Pour some water into the bottle, put on the lid, and turn the bottle over. Add/remove water until the level lines up even with the top line you made with the magic marker. Turn the bottle right side up, remove the lid, and pour it into a container. Now, repeat the process for each of the other water level marks and add this water to the first water in the container. After you have finished, measure the amount of the total water you poured into the container and this will give you a pretty good estimate of the cubic volume of oxygen your absorber absorbed.

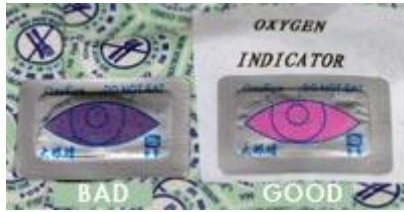
Realize this is not 100% accurate if you take the atmospheric pressure and air temperature into account. As the barometer or room temperature fluctuate, they will make the water level go up or down in your bottle independent of how much oxygen has been absorbed. If you have a barometer, you may also wish to record the barometer reading each time you finish a cycle. You can correct for temperature by making sure the room temperature where you are doing your test is the same temperature each time you complete a cycle. Altitude will also have an effect on how much water gets into the jar. The higher the altitude the higher the water will rise for the same amount of oxygen being absorbed. This is because the air is thinner the higher you go in elevation. If you wish to remedy this, use the following table to correct your reading for sea level.

Your Multiply absorbed Altitude volume by... Sea Level 0.0000 1,000 ft. 0.9706 2,000 ft. 0.9411 3,000 ft. 0.9160 4,000 ft. 0.8866 5,000 ft. 0.8613 10,000 ft. 0.7395 15,000 ft. 0.6203

In one of my tests a 750cc absorber displaced 2425cc water at 2,000 feet. Corrected to sea level, that's 2,282cc water displacement. For that particular absorber, there was an actual capacity of 304% of it's advertised rating, more than I expected.

And thanks to LDS Welfare Services who gave us this idea in the first place.

## Testing Whether an Oxygen Absorber is Used Up



The first indication that an absorber may be used up is that it does not heat up when left out in air. Most oxygen absorbers will get warm to the touch within a few minutes and reach their maximum potential about 30 minutes after being left out. You can test a bag of absorbers by doing this, taking one of the absorbers out of the bag and leaving it on a table top, a cutting board, or even the carpet to see how quickly it warms up. If you hold it in your hand the whole time it may get warm from the heat of your skin so it's best to just let it set and see how it's doing every 5 minutes or so. Another great method that our absorber packs have is an oxygen indicator in each bag. Although this won't tell you if a specific absorber is effective or not, it can generally give some indication of how the bag as a whole is doing. The one drawback with these is that the dye that the manufacturer uses is not always consistent and I've had really light pink to dark pink ones and have done just fine with them - as long as they aren't dark purple you're good to proceed. The final method that was discussed in the section called "Packing Your Food With Oxygen Absorbers" is to let the mylar bags set for a couple of days at least after pushing out as much residual air as possible and after the final seal is created. If they are working you'll notice a definitely reduction in the air inside the bag and you'll get a more "vacuum-packed" look to the bag. In the end the goal is to remove the oxygen and not to get a perfectly vacuum-sealed container, but actually seeing some vacuum-seal to the bag is an excellent indicator and probably the best, assuming that you have used enough for the size of your container as well as the food type (eg. beans have more residual air in the spaces than flour).

*Information taken from USA Emergency Supply*