Oxygen Absorbers

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What are Oxygen Absorbers?

Oxygen Absorbers are added to enclosed packaging to help remove or decrease the available oxygen in the package. They are used to help maintain product safety and extend **shelf life**[1]. There are many types of Oxygen Absorbers available to cover a wide array of applications[2][3].

The components of an Oxygen Absorber vary greatly, depending on what it is being used for, the water activity of the product being preserved, and many other factors. Often the oxygen absorber or scavenger is enclosed in a porous sachet or packet, but it can also be part of packaging films and structures. For most products, an admixture of iron powder, sodium and activated carbon (charcoal) has proven quite effective. Iron powder is the primary component, while sodium acts as an activator, causing the iron particles to rust, effectively reducing the oxygen level in the surrounding atmosphere to approximately 0.01% when used appropriately. Activated carbon acts as a gas absorbent, further preserving products and removing unsavory odors.

How Oxygen Absorbers Work

When an oxygen absorber is removed from its protective packaging, the moisture in the surrounding atmosphere begins to mingle with the iron particles inside of the Oxygen Absorber sachet. As the oxygen molecules from the moisture interact with the iron (Fe) particles, rust begins to develop. Typically, there must be at least 65% relative humidity in the surrounding atmosphere before the rusting process can begin. To remedy this dilemma, sodium is added to the mixture. The sodium acts as a catalyst, or activator, causing the iron powder to rust even with low relative humidity. With the conversion of iron and oxygen into a single iron oxide substance, the presence of oxygen in the surrounding atmosphere is dramatically reduced.

The performance of oxygen absorbers is affected by the ambient temperature and relative humidity[4].

Activated Carbon (C), also called activated charcoal or activated coal, is a highly porous substance that allows gases to pass through and interact with the exposed carbon. As the gases interact with the carbon, most impurities and contaminants are adsorbed and neutralized. As a result, the presence of undesirable odors is greatly reduced.

Why Do I Need Oxygen Absorbers?

More than any other atmospheric element, oxygen supports the growth of aerobic microorganisms such as fungi and mold. With the growth of these microorganisms, the integrity of a package is drastically compromised. In food products, discoloration takes place, rancidity and putrefaction set in, and the possibility of food poisoning is ever present. With historical documents, art and other artifacts, the presence of oxygen contributes to rapid deterioration, mildew, mold and a wide array of other contaminants. Oxygen Absorbers were designed to protect against such problems.

When packaged properly (i.e., an appropriately sized oxygen absorber inside of a high oxygen barrier can or bag), the oxygen level in the surrounding atmosphere is effectively reduced to approximately 0.01%.

Benefits of Oxygen Absorbers

- Helps retain fresh-roasted flavor of coffee and nuts
- Prevents oxidation of spice oleoresins present in spices themselves and in seasoned foods
- Prevents oxidation of vitamins A, C and E
- Extends life of pharmaceuticals
- Inhibits mold in natural cheeses and other fermented dairy products
- Delays non-enzymatic browning of fruits and some vegetables
- Inhibits oxidation and condensation of red pigment of most berries and sauces
- Oxygen deprivation contributes to a pest-free environment in museums

Typical Applications

- Breads, cookies, cakes, pastries
- Nuts and snacks
- Candies and confectioneries
- Coffee and tea
- Whole fat dry foods
- Processed, smoked and cured meats Cheeses and dairy products
- Dried fruits and vegetable
- Spices and seasonings
- Flour and grain items
- Fresh and precooked pasta and noodles

- Pharmaceuticals and vitamins
- Medical diagnostic kits and devices
- Birdseed and pet food
- Artwork preservation

What Size Oxygen Absorber Should I Use?

Bag Size	Type of Product	Oxygen Absorber
6" x 6"	Fine Grains (sugar, flour, etc.)	20 CC
	Pasta and Thicker, less Dense Foods	50 CC
8" x 8"	Fine Grains (sugar, flour, etc.)	50 CC
	Pasta and Thicker, less Dense Foods	100 CC
10" x 14"	Fine Grains (sugar, flour, etc.)	100 CC
	Pasta and Thicker, less Dense Foods	200 CC
10" x 16"	Fine Grains (sugar, flour, etc.)	150 CC
	Pasta and Thicker, less Dense Foods	300 CC
16" x 18"	Fine Grains (sugar, flour, etc.)	500 CC
	Pasta and Thicker, less Dense Foods	1000 CC
18" x 28"	Fine Grains (sugar, flour, etc.)	750 CC
	Pasta and Thicker, less Dense Foods	1500 CC
20" x 24"	Fine Grains (sugar, flour, etc.)	750 CC
	Pasta and Thicker, less Dense Foods	1500 CC
20" x 30"	Fine Grains (sugar, flour, etc.)	1000 CC
	Pasta and Thicker, less Dense Foods	2000 CC

This Chart represents approximate cc sizes and should not be taken as a final authority

Why Purchase Them From IMPAK?

- Quality: Every single production run is put through a series of tests to ensure the Oxygen Absorbers can successfully perform their job. Stock is routinely rotated to ensure that our Oxygen Absorbers are sold in a timely manner.
- Price: The ability to produce high volume production runs allows us to be flexible in our pricing. Substantially discounted pricing is available for larger orders.

- Availability & Selection: IMPAK maintains a regularly stocked supply of all sized Oxygen Absorbers. Whether you need a single pack of 100cc Oxygen Absorbers, or 50 full cases of 2000cc Oxygen Absorbers, we have them on hand.
- Technical Support: Realizing how important your product storage and preservation is, IMPAK has in-house technical staff to assist you.

Common Misinformation About Oxygen Absorbers

Over the years, many documents and articles have been published about Oxygen Absorbers. Outside of the majority of scholarly articles and patents produced on actual Oxygen Absorber products, much of what has been published is unfortunately rife with misinformation and half-truths. The fact is, the vast majority of Oxygen Absorber distributors in the United States are simply reselling Oxygen Absorbers that they buy elsewhere, having only rudimentary knowledge of the product and attempting to pass themselves off as manufacturers. Sadly, these same individuals produce tons of "informative" pdf files, web pages, and articles on Oxygen Absorbers, which tend to rank high in the search engine results. While there are certainly many Oxygen Absorber fallacies circulating online, I will only cover the most glaring misinformation here.

1. **"*Oxygen absorbers are made of a chemical compound, the active ingredient of which is a powdered iron oxide…*" (Taken from a "scholarly" article produced by Wholesale Group International at http://www.oxygenabsorber.net/Oxygen%20Absorbers%20Introduction.pdf):** The truth is, "iron oxide" is NOT a component of an Oxygen Absorber. Iron Oxide is CREATED as the Oxygen Absorber does its job. The "active ingredient" of an Oxygen Absorber is simply iron. After the iron begins to rust, the combination of iron and oxygen create a new substance: iron oxide.
2. ***"…hand warmers are the same as oxygen absorbers."* (From a forum post at http://www.prepperforums.net/forum/general-prepper-survival-talk/216-hand-warmers-place-oxygen-absorbers.html):** While certainly no Oxygen Absorber distributor would tell you this, there are literally hundreds of videos, articles and forum posts online that make this claim. While hand warmers may indeed have an oxygen absorption effect, they also contain inedible substances such as vermiculite, which by itself is not necessarily harmful, but often contains impurities such as asbestos.

3. ***"Oxygen Absorbers are manufactured to different compositions to match the water activity of the foods they are intended for. Simply tell the consultant the water activity of your food and we will match the right absorber for the job…"* (From the aforementioned article in Number 1 http://www.oxygenabsorber.net/Oxygen%20Absorbers%20Introduction.pdf):** While it is certainly true that there are many different types of Oxygen Absorbers, made from many different chemical compounds and compositions, the ONLY difference between one Oxygen Absorber and the next in the food packaging industry is the size of the oxygen absorber. Many Oxygen Absorber distributors attempt to present themselves as manufacturers and "experts" in the field, with scientists and engineers on staff; they make silly claims that their Oxygen Absorbers are chemically engineered to address a variety of different water activity levels, but the truth is, the only thing that changes is the CC (cubic centimeter) absorption

capacity of the Oxygen Absorber, and this is determined by the size, not chemical structure or composition of the Oxygen Absorber.

Sources

1. Miltz, J; Perry,M (Jan 2005). "Evaluation of the performance of iron-based oxygen scavengers, with comments on their optimal applications". *Packaging Technology and Science* **18** (1): 21=27.

2. Gaurav, T; Digvir S. Jayas, Lester E. Jeremiah, Richard A. Holley (Feb 2002). "Absorption kinetics of oxygen scavengers". *J Food Science and Technology* **37** (2): 209–217.

3. Ferrari, M C; S. Carranzaa, R.T. Bonnecazea, K.K. Tunga, B.D. Freemana, D.R. Paula,∗ (2009). "Modeling of oxygen scavenging for improved barrier behavior: Blend films". *J Membrane Science* **329**: 183–192.

4. Braga, Lilian; Claire I.G.L. Sarantópoulos, Leila Peres, Jez W.B. Braga (October 2010). "Evaluation of absorption kinetics of oxygen scavenger sachets using response surface methodology". *Packaging Technology and Science* **23** (6): 351–361.