

A Guide to Oxygen Absorbers

By: Dr. Simon Cichello Ph.D.
March 2010

Contents of Paper Include

Oxygen Absorbers Introduction
Why write this document?
What Are Oxygen Absorbers?
What is inside an oxygen-absorbing satchel or Oxygen Absorber?
How do oxygen absorbers work?
What is the function of Oxygen Absorbers?
Perceived versus Real Benefits of Oxygen Absorbers
How To Use an Oxygen Absorber
How To Measure Volume of Containers
How to increase food shelf life with modern packaging?
What factors affect the freshness of food? (oxygen, moisture, UV, temperature)
What Do Oxygen Absorbers Do?
What Are The Benefits Of Using Them?
What are the Applications of Oxygen Absorbers?
Safety Concerns?

1.0 Oxygen Absorbers Introduction

An oxygen absorber is a packet filled with iron particles or Vitamin C that works by reacting with available oxygen. In the case of iron based absorbers, moisture absorbed by the package combines with iron, salt, and oxygen to rust the iron. This traps the oxygen and usually lets off a small amount of heat.

By absorbing oxygen in an enclosed package of food, this product improves the shelf-life of the food. They are used in food packaging to prevent food color change, to stop oils in foods from becoming rancid, and also inhibit the growth of oxygen-using aerobic microorganisms.

Oxygen supports the growth of microorganisms and causes changes in color and rancid odors in packaged foods. Plastic packaging is less able to exclude oxygen from packaged foods than are the older glass and metal containers. Oxygen absorbers collect oxygen that might diffuse into a food package.

1.1 Why write this document?

After some time making and distributing oxygen absorbers with expert consultancy, I seem to keep getting similar style questions. So I hope this is a one stop for most enquiries, and if I do not have some vital information, I invite anyone to email me to submit their information to this website.

The most common questions asked to me and my consultants are enclosed in this document. A common questions; **What is inside an oxygen-absorbing satchel or**

Oxygen Absorber? Some people contact us stating that they need oxygen absorbers for their products, 'they extend shelf life and keep my product fresh'. No matter how many half truths you have, they never make the entire truth. What you need is the complete solution for your product's shelf life. Oxygen absorbers are not magic pouches that keep mould away. When instituted with the correct packaging for your product (type of product, fat content, desired shelf life, and water content) they are one of many tools available, yet nothing beats the right advice. Total Scientific Solutions, a subsidiary of Wholesale Group International can assist you with product development, project management, product appraisal, or Quality Assurance issues.

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.

Oxygen absorbers are made from ferrous ([Iron II carbonate](#)), charcoal (activated carbon) and salt. Iron(II) oxide should not be confused with rust, which usually consists of hydrated iron(III) oxide (ferric oxide).

Cheaper imitations of Wholesale Group International's oxygen absorber exist, but as there exists gold and fool's gold, a major concern in the industry is the existence of sub-standard or illegal oxygen absorbers. Like anything, quality is the first factor to be compromised when the price is a concern. We at Wholesale Group International focus on strengthening long-term profitability not cutting corners on quality.

Some oxygen absorbers on the market may contain zeolite or activated carbon for moisture absorption but others agricultural lime (CaCO_3). Would you eat an agricultural chemical? Some contain metal fillings and not iron carbonate.

We have endeavored to create the highest standard through a combination of a pleasing person approach, long term relationship building and most of all technical advice. We are scientists and food technologists. Our oxygen absorbers are safe, and if eaten are non-toxic, however we cannot ensure the safety of sub-standard absorbers that may claim to have the same function or ingredients. If you want cheap prices, then you will get cheap ingredients and a large room of error with the oxygen absorber efficiency. We do not to waste time with cheap imitations and pathetic substitutes, as there is no substitute for quality.

2.0 Questions you may have about oxygen absorbers may include;

2.1 What Are Oxygen Absorbers?

Oxygen absorbers are not AgelessTM or O BusterTM, these are trademarks. Oxygen absorbers are devices that as the name suggests, absorb residual oxygen in a plastic bag or container that is impermeable to oxygen. Oxygen absorbers are made of a chemical compound, the active ingredient of which is a powdered iron oxide (in the form of Iron Carbonate – Fe^{II}). Our absorbers are completely safe. While they are not edible, they are not toxic. No harmful gases are created and the oxygen does not remove the fresh smell and taste of the product. 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

2.2 How do oxygen absorbers work?

As mentioned, oxygen absorbers absorb oxygen. WGI oxygen absorbers are made of Iron Carbonate, and activated carbon. When these components react with residual moisture in the atmospheric air or humidity from the product, the components commence to absorb oxygen.

This next part is very, very important. Oxygen absorbers absorb oxygen, it is your packaging (which should be impervious to oxygen and moisture) and, a correct seal which extend the shelf life of your product. Ask your plastic bag supplier for a product specification sheet. Do not just assume because your plastic looks thick, it will retain oxygen. Next, the quality of your heat sealer is directly proportional to the function of oxygen absorbers and your products shelf life. Why do some many manufacturers invest some much time and money in the right packaging, oxygen absorbers, consultancy and advice and then; have poor performing heat sealers?

2.3 What is the function of Oxygen Absorbers?

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

2.4 Perceived versus Real Benefits of Oxygen Absorbers

Some companies may just sell oxygen absorbers, with no technical knowledge. Why not, they already sell packaging or something else? Wrong, food technology and nutrition are expert fields not for the uninformed or technically novice. You have product integrity and most of all, people's lives (i.e. food poisoning) if the system fails. What is the price of product re-call, bad public publicity of your food product and company? I will let you ponder these thoughts. 'They' believe that oxygen absorbers just 'do' on their own. They 'extend product shelf life' and make food 'more fresh'. I have heard these statements from the ill informed, I wish my job was this easy, making random statements without evidence or technical knowledge, realistically it isn't, every food product is different and recipe different. The real benefit of oxygen absorbers are in their correct implementation.

- Oxygen Absorbers significantly improves keeping qualities of polyunsaturated fats and oils – have you ever smelt or tasted rancid fat before?
 - Helps retain fresh-roasted flavor of coffee and nuts
- Prevents oxidation of water and fat soluble vitamins (eg. Vit A, C and E)
 - Extends life of pharmaceutical products
 - Inhibits mold in natural cheeses and other fermented dairy products
- Delays non-enzymatic browning of fruits and some vegetables; also see the diabsorber and ethylene absorber as well
 - Inhibits oxidation and condensation of berries

3.0 How To Use an Oxygen Absorber

[Please click here to see a diagram of the use of oxygen absorbers and re-seal the bag.](#)

3.1 How To Measure Volume of Containers & Conversion Table

Milliliters (mL) or cubic centimeters (cc) are interchangeable units. Most people may know that liquids are measured in mL, but did you know that gases are as well? If you have a plastic box, lets say 25cm in length x 25cm in width and 2cm in height, the volume is length x width x height = 1250mL or 1.25 liters. To calculate how much oxygen you need you must understand that 20.1% of the air is oxygen. So you must absorb 20.1% of the volume calculate (1250mL x 20.1%) minus the volume occupied by the food product plus the transmission rate of oxygen through your plastic bag. For precise calculations please email our technical team at Wholesale Group International (info@wholesalegroup.com.au).

4.0 Quality, Pricing and Packaging

Wholesale Group International provides the highest level of quality in manufacturing of oxygen absorbers. We manufacture and distribute our own oxygen absorbers, we are not just re-sellers or agents. We do not seek to out-compete our competitors; there is enough room in the market for all. How Wholesale Group International differs is by employing specialized and trained scientists, food technologists and nutritionists both in Australia and also Japan. We have a competitive global standard and technical advantage. We have a technical team on call to assist you with any questions relating to the absorbers implementation and also any other aspect of packaging or food technology/ nutrition.

4.1 How to increase food shelf life with modern packaging?

The first questions to ask is, what is the specification of my plastic? What is the plastic made of, what is the transmission of oxygen or moisture (normally denoted OTR or WTR with units of cc/m²/ 24hrs). What is the void space surrounding my product? Is my product moist or dry, better known as the available water co-efficient (Aw).

What factors affect the freshness of food? (i.e. oxygen, moisture, UV, temperature) How to choose the right packaging materials to keep your product fresh. (with respect to above factors, with respect to type of food, packaging material etc.)? For specialist advice call our please email our technical team (holding Ph.D. degrees) not just another 'carpet salesmen' at Wholesale Group International (info@wholesalegroup.com.au).

4.3 What Are The Benefits Of Using Them?

- * Extends shelf life of food products
- * Prevents growth of aerobic pathogens and spoilage organisms, including molds
- * Eliminates the need for additives (i.e. Calcium propionate, sulphur dioxide, sorbates, benzoates, etc).
- * Use with gas flushing / vacuum packaging to absorb virtually all oxygen and absorb any oxygen that may permeate the package.
- *Significantly improves keeping qualities of polyunsaturated fats and oils. Fats which are prone to become rancid degrade with exposure to oxygen, heat and light. So if you have oil in your product (eg., typical tortillas contain between 6 – 10% fat) what will your product taste like in 10 days, 30 days?
 - *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 water and fat soluble vitamins (eg. Vit A, C and E
 - *Extends life of pharmaceutical products that may be susceptible to oxidation

4.4 What are the Applications of Oxygen Absorbers?

- * **Bakery Goods;** Breads, Flat Bread, Pita Bread, Tortillas, Lebanese bread, Cookies, Cakes, and Pastries
 - * **Snack Foods;** Nuts and other confectioneries
 - * **Dried Beverages;** Coffee and tea
- * **Dried Meats;** processed, smoked and cured meats (eg., beef jerky, biltong), cheeses and dairy products (skim milk powder)
 - * Dried fruits and vegetables, spices and seasonings, flour, grain, rice, pasta
 - * **Pharmaceuticals,** vitamins and herbal medicines
 - * Birdseed and dried dog/ cat food
 - * Artwork and other compounds susceptible to oxidation