

UNDERSTANDING DESICCANTS

Active Packaging Ensures
Products are Safe and Effective
When They Get to People who
Depend on Them

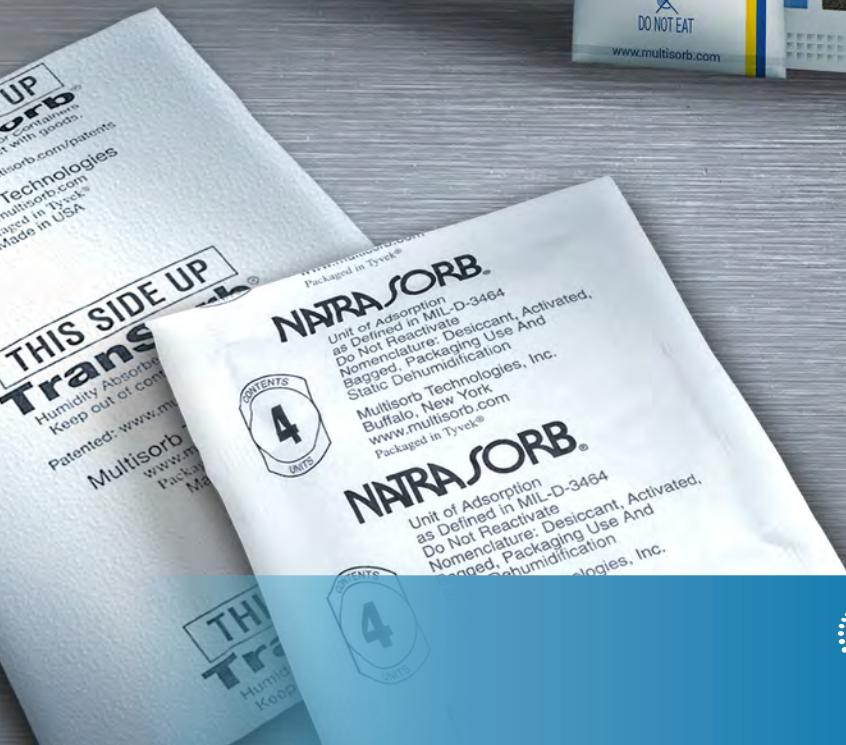


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WE ARE MULTISORB

As part of the Filtration Group, our mission is to make the world safer, healthier, and more productive. We are a global organization with a fanatical focus on our customers. For the past 50 years, Multisorb has partnered with the top pharmaceutical manufacturers to preserve the efficacy of products so they get to the end-user safely, ready to perform and treat medical conditions to improve lives. As pharmaceutical innovators push the boundaries of science to formulate life changing therapies, we have continuously advanced our sorbent technology to stabilize the most advanced drug chemistries.

BACKED BY SCIENCE

The success of our products are a result of the full-time, dedicated R&D efforts by our team of U.S. based scientists and packaging engineers. Our ground-breaking methodologies have been validated by leading pharmaceutical manufacturers.

THE MULTISORB DIFFERENCE

Multisorb does not sell off the shelf sorbents. Drug stabilization is not a general science. Multisorb engineers tailored sorbent solutions based on a specific drug formulation's unique degradation profile. With Multisorb, you are assured that the sorbent requirements for your product are met and the internal package environment is conducive to keeping your drug product safe and effective when it gets to the consumer.





Multisorb's systems approach provides lean packaging and increased reliability. As a long time supplier to the healthcare and electronics industries, our products are extensively used to solve moisture, odor, and oxygen related packaging problems.

StripPax[®] Sorbent/Desiccant Packets

StripPax are compact, durable, non-dusting packets which can be custom designed in a variety of sizes and sorbents (silica gel, indicating silica gel, molecular sieve, activated carbon and blends) to meet your specific packaging needs.

The packet occupy little space within the packaging yet have a high moisture adsorption capacity.

Superior Construction Makes StripPax the Best Choice

StripPax soft flexible packets will not damage tablets or capsules. Made with medical-grade Tyvek[®], an extremely durable, non-woven material made from 100% pure high-density polyethylene fibers. Tyvek[®] offers superior strength and has a high water vapor transmission rate, making the packets virtually puncture proof and eliminating the risk of leakage while allowing for the easy passage of moisture and gasses.

StripPax Packets Data Facts

- Low-profile, compact shape
- Durable and virtually puncture proof
- Highly Permeable
- Non-dusting, lint-free
- Available in wide variety of sizes and sorbents
- FDA approved (21 CFR-compliant) materials
- Type III Drug Master File (DMF) on file
- Removes possibility of damage from hard canisters

Size Applications

1 gram
5.0 W x 10.0 L x 2.0 D
Millimeters



2 gram
8.0 W x 15.0 L x 2.5 D
Millimeters



3 gram
10.0 W x 13.0 L x 3.0 D
Millimeters

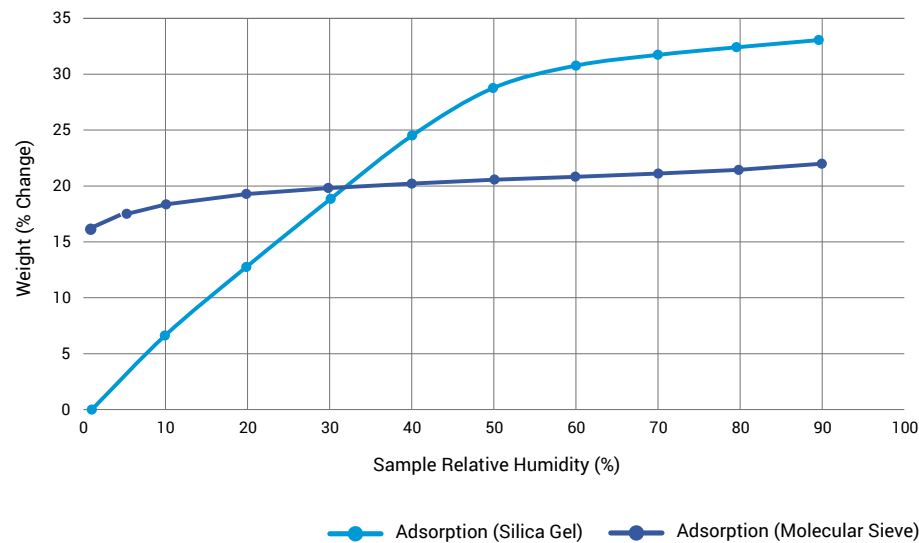


We Believe in Lean

Multisorb's systems approach provides lean packaging and increased reliability. As a long time supplier to the healthcare and electronics industries, our products are extensively used to solve moisture, odor, and oxygen related packaging problems.

Adsorption/Desorption Isotherm Comparison (25°C)

Silica Gel / Molecular Sieve 4A



StripPax is an indispensable drop-in product providing proper efficacy.



These packets are suitable for use in all regulated product packaging.



StripPax is very effective when combined with blister pack applications.



Nutraceuticals benefit greatly from StripPax ability to ward off moisture.



StripPax became a popular choice in the pharmaceutical industry.



Getting the proper package conditions is vital to production in reducing product shrinkage.



MiniPax Packets are part of a full line of our sorbent products that will solve your moisture, odor, and oxygen related packaging problems. For more information contact us today.

MiniPax[®] Sorbent Packets

MiniPax Sorbent Packets are compact, extremely durable, non-dusting sorbent packets that take up little space in packaging yet have high moisture adsorbing capacity. Individual MiniPax Packets are ideal for hand packaging operations and are offered with a variety of sorbent blends and sizes to meet specific packaging needs for a wide variety of packaging applications.

Efficient Package Design

MiniPax Packets are formed of welded, uncoated Tyvek[®], an extremely tough and durable spunbonded high-density polyethylene (HDPE) fiber material. MiniPax Packets have high tear strength in all directions and are virtually puncture proof, eliminating risk of leakage and product contamination. MiniPax Packets are unaffected by water or moisture and are as strong wet as they are dry. They will not rot or mildew.

Tyvek offers a high water vapor transmission rate (WVTR) that makes the material ideal for sorbent packets.

MiniPax Packets Data Facts

- Low-profile, compact shape
- Durable and virtually puncture proof
- Highly Permeable
- Non-dusting, lint-free
- Can be used in food & healthcare packaging applications
- FDA approved (21 CFR-compliant) materials
- Type III Drug Master File (DMF) on file
- Removes possibility of damage from hard canisters

Size Applications

0.25 gram
0.0 W x 0.0 L x 0.0 D
Millimeters

MiniPax Packets are produced in sizes from 0.25 grams to 28 grams.

28 gram
0.0 W x 0.0 L x 0.0 D
Millimeters



Larger sizes are possible with multi-packet production runs.

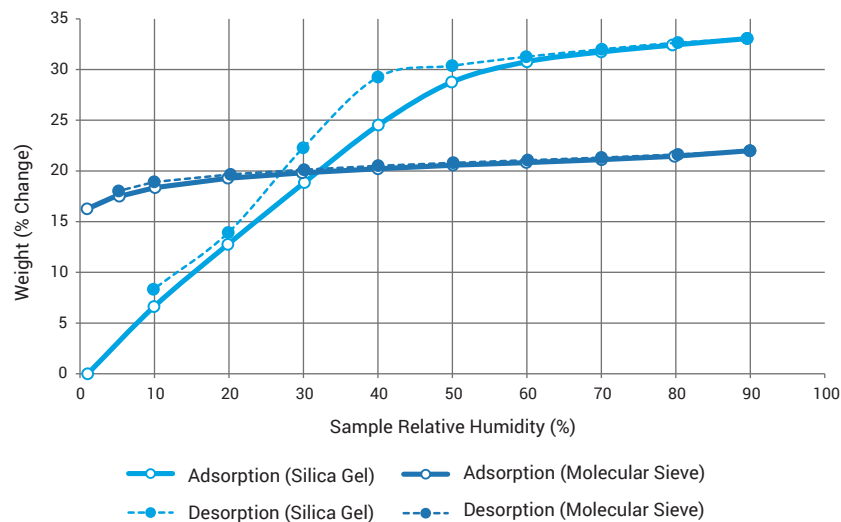
Options to Meet a Variety of Needs

MiniPax Packets are available with indicating silica gel that offer a visual indication through an integral transparent strip as to when the capacity is exhausted and the desiccant should be replaced. MiniPax Packets with indicating silica gel are not intended for use in food or pharmaceutical packaging.

MiniPax Packets can be produced with a wide choice of sorbents and sorbent blends to meet your specific needs. Blends of odor and moisture adsorbent compounds may be furnished when both odor and moisture protection is desired.

Adsorption/Desorption Isotherm Comparison (25°C)

Silica Gel / Molecular Sieve 4A



*Tyvek is a registered trademark of E.I. duPont de Nemour and



Aquiae por rerum quod eos mi, sint eum nonem quis et latium volenda.



Aquiae por rerum quod eos mi, sint eum nonem quis et latium volenda.



Aquiae por rerum quod eos mi, sint eum nonem quis et latium volenda.



Aquiae por rerum quod eos mi, sint eum nonem quis et latium volenda.



StabilOx Oxygen Absorbers effectively reduces package headspace oxygen levels while managing headspace moisture and drug product free moisture to reduce or eliminate oxidative degradation.



StabilOx[®] Specialty Oxygen Absorbers

Achieving stability in pharmaceutical formulations or medical devices requires a difficult balance between increasingly complex variables. Success is a vital prerequisite to a new drug reaching the marketplace. StabilOx Oxygen Absorber helps achieve this without toxic packaging components or expensive drug product formulation changes. Provides a simple solution that resides inside the packaging instead of the drug product.

StabilOx[®] Oxygen Absorbers Deliver a Level of Protection Not Available with Standard Oxygen Absorber

Traditional inorganic oxygen absorbers rely on the irreversible oxidation of the scavenger. Since the reaction requires moisture, the moisture must be provided in the scavenger itself, the product, or from the package environment. StabilOx provides its own moisture to initialize the oxygen removal process from the package. If oxygen and moisture continue to permeate the packaging, it then relies on package moisture ingress for continued oxygen absorption while establishing an optimal equilibrium relative humidity in the package head space. This is critical in retaining drug performance, stability, and integrity.

StabilOx Packets Data Facts

- StabilOx Oxygen Absorbers are manufactured in a variety of formats to support different packaging operations.
- StabilOx Packets offer a rugged, easily-automated product that supports a wide-range of applications.
- StabilOx Canisters are fully compatible with high-speed packaging lines providing nearly seven times the oxygen absorption capacity of competitive canisters.

Size Applications

1 gram
0.0 W x 0.0 L x 0.0 D
Millimeters



2 gram
0.0 W x 0.0 L x 0.0 D
Millimeters



3 gram
0.0 W x 0.0 L x 0.0 D
Millimeters

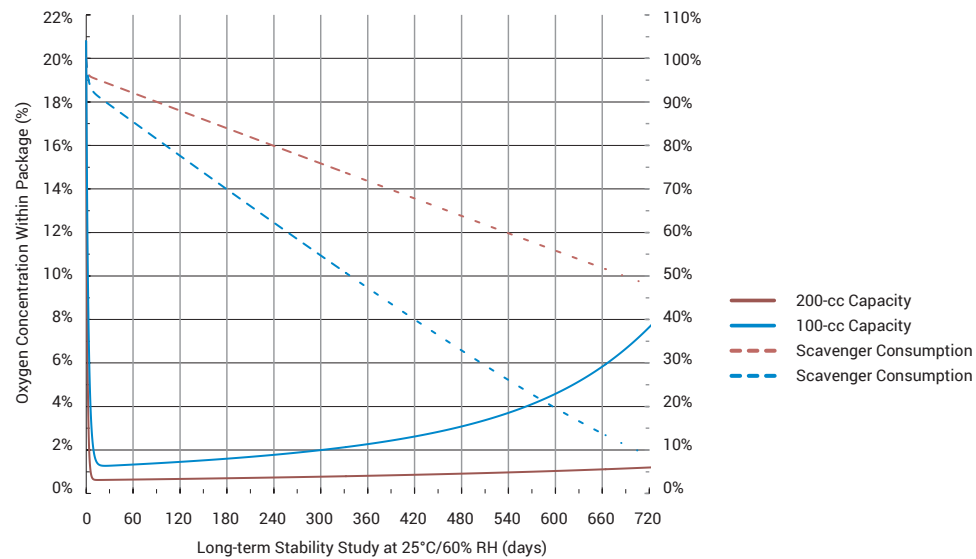


Packaging Demands the Best Oxygen and Moisture Management

Today's drug formulations and innovative packaging choices offer myriad opportunities to attract consumers. At the same time, new packaging challenges create uncertainty. StabilOx Oxygen Absorbers are a unique product that manages moisture and oxygen inside your package to respond to ever-changing conditions within the packaged environment. This ensures drug stability, as well as performance, and often allows for longer than anticipated product shelf life, increasing product quality and revenues.

Long-Term Stability SimuOx™ Simulation

75-cc Bottle with Drug Product and Oxygen Absorber



StabilOx provides efficacy to a multitude of pharmaceutical uses.



Keeping pre-filled medications safe from the harmful affects of moisture.



Allowing sensitive medications such as aerosol inhalers the proper environmental conditions.





NatraSorb Bagged Sorbents are part of a full line of sorbent products offered by Multisorb Filtration Group to solve your moisture, odor and oxygen related packaging problems.



NatraSorb® Bagged Sorbents

Protects against moisture damage such as deterioration, rust, corrosion, mold, mildew and other problems in a variety of packaging applications. A wide selection of sizes, bag constructions and desiccant types allows you to choose the right sorbent to suit your specific application.

NatraSorb Advantages

- Sized to meet specific requirements
- Choice of bag materials conforming to MIL-D-3464 standards
- High strength, non-dusting Tyvek® bags available
- Wide range of desiccant types available

Material	Description
NatraSorb® M (Montmorillonite Clay)	NatraSorb M is made by the controlled drying of magnesium aluminum silicate, a natural material. NatraSorb M has the advantage of being able to both take on and give up moisture repeatedly without substantial swelling or deterioration.
NatraSorb® S (Silica Gel)	A hard, clear, porous, amorphous form of silica gel. NatraSorb S is manufactured from sodium silicate and sulfuric acid. It contains a vast number of submicroscopic pores which attract water vapor and hold it physically through surface adsorption and capillary condensation. It will absorb as much as 40% of its weight in moisture and obtain dew points as low as -100°F.
Hi-Dry® (Molecular Sieve)	Molecular sieve desiccant is a synthetic, crystalline material composed of sodium aluminosilicate activated by a network of uniform pores and empty adsorptive cavities. Where temperatures exceed 77°F and/or the critical relative humidity is below 40%, Hi-Dry has an immense capacity for moisture adsorption.

HEALTHCARE

Size Applications

0.00 gram
0.0 W x 0.0 L x 0.0 D
Millimeters



0.00 gram
0.0 W x 0.0 L x 0.0 D
Millimeters



0.00 gram
0.0 W x 0.0 L x 0.0 D
Millimeters



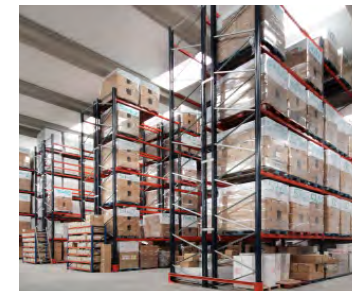
0.00 gram
0.0 W x 0.0 L x 0.0 D
Millimeters



0.00 gram
0.0 W x 0.0 L x 0.0 D
Millimeters



Natrasorb proven as an effective measure against moisture damage.



Natrasorb keeps your surplus safe prior to market delivery.

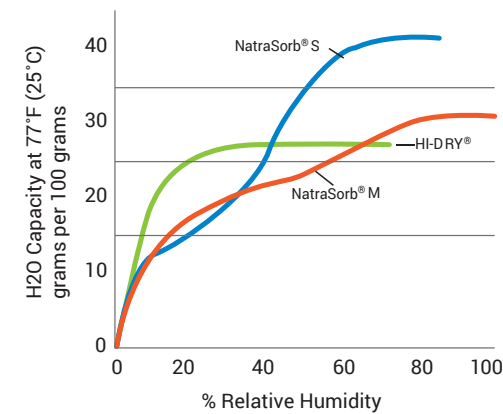


Moisture is detrimental to electronics. Natrasorb keeps components dry and stable.

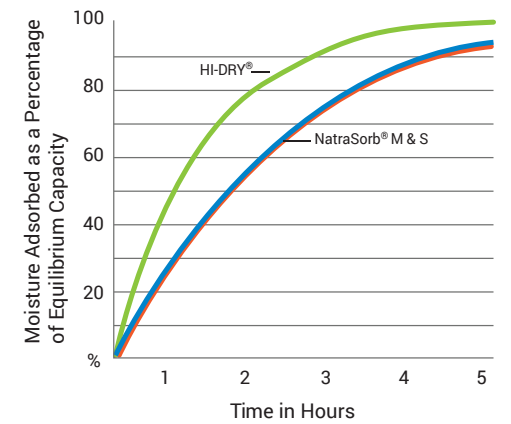
Multisorb Technologies offers even more for your packaging applications.

Natrasorb Bagged Sorbents are part of a full line of sorbent products offered by Multisorb Filtration Group to solve your moisture, odor and oxygen related packaging problems.

Equilibrium Adsorption Capacity



Adsorption Rates – 21°C (70°F) @ 80% RH





The patented TranSorb product absorbs "container rain" and/or "cargo sweat" that occurs when freight is being stored or shipped. Available in single packs, strip format, in nets, or with adhesive backing.

TranSorb® Sorbent Packs

Designed for use in freight containers and warehouse storage to protect products against moisture damage. Capable of absorbing large quantities of moisture to safeguard items such as machinery, canned goods, and steel products against rust and corrosion. Excellent prevention against mold, mildew and contamination found on food packages.

Protect Valuable Goods Against Condensation

Transporting products during a trip of several days exposes shipments to varying temperatures and humidity levels, the perfect condition for condensation, "container rain," or "cargo sweat" to form. TranSorb packs absorb condensation to protect goods which eliminates costly returns on damaged freight. When using TranSorb for warehouse storage packs can be easily placed inside of the packaged goods for additional moisture protection.

TranSorb Data Facts

- TranSorb's formula is effective in lowering dewpoint inside shipping and storage containers
- Easy-to-use – Simply place in containers with the number of bags dependent upon container size
- Long-lasting design provides protection against mold, mildew, rust and corrosion up to 45 days or more
- Durable, heat-sealed Tyvek® and film construction

Multisorb Can Help You Determine How Many Packs You Require

We will customize a solution to your needs depending on variables such as the product, conditions that will be encountered, mode of transportation or storage, and any other factors affecting your goods.

Size Applications

TranSorb is available in single packs, strip format or with adhesive strips which can be applied to the outer box packaging, or pallet facing, of the goods.

TranSorb Moisture Control Packs protect your cargo from moisture by absorbing condensation inside containers for up to 90 days. TranSorb contains patented materials that hold moisture, unlike other products that wick, drip or leak when capacity is reached.



Single Bag



3 Bag Strip with Hook

TranSorb Sorbent Pack Specifications

Directions for use:

1. Place TranSorb Sorbent Pack in the shipping container or inside the packaged goods immediately prior to distribution or storage
2. Insert the sorbent pack with the printed (Tyvek®) side face-up
3. Space the TranSorb packs evenly throughout the shipping container or storage unit
4. Keep sorbent packs away from sharp objects



Hooks onto standard container rings

Use 1 Case for a 20' Container, or 2 Cases for a 40' Container

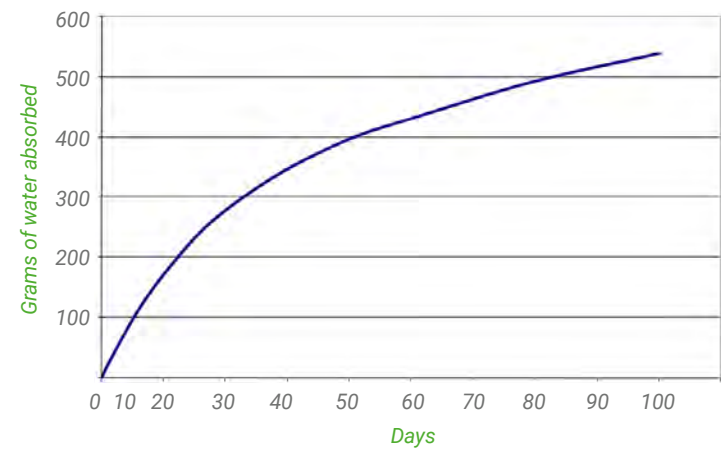
	Dimensions	Units per Case
Single Bag (196g)	7.5in x 11.5in	32
Three Bag Strip in Net (588g)	7.5in x 34.5in	11



Packaging Demands the Best Oxygen and Moisture Management

Today's drug formulations and innovative packaging choices offer myriad opportunities to attract consumers. At the same time, new packaging challenges create uncertainty. StabilOx Oxygen Absorbers are a unique product that manages moisture and oxygen inside your package to respond to ever-changing conditions within the packaged environment. This ensures drug stability, as well as performance, and often allows for longer than anticipated product shelf life, increasing product quality and revenues.

TranSorb Adsorption Curve at 90% RH 29.5°C





FreshPax[®] Oxygen Absorbing Packets and Strips

FreshPax Oxygen Absorbing packets and strips are oxygen absorbers designed to protect packaged foods and other products against spoilage, mold growth, color change, rancidity, loss of nutritive values, and loss of quality. FreshPax Packets irreversibly absorb oxygen inside sealed packaging to less than 0.01% and maintain this level.

FreshPax Packets are Effective in Protecting Foods and Extending Shelf Life

A study conducted by the Department of Food Science at Cornell University concluded that FreshPax Packets are effective in extending the shelf life of oxygen-sensitive foods and other products. Even under extreme testing conditions, the use of an oxygen scavenger packet in commercial cheese and bread resulted in a decrease in mold spoilage and a considerable shelf-life extension. The study also indicated that packets can reduce the formation of n-hexanal and other volatile compounds in high-fat snack foods susceptible to oxidative rancidity*.

*Sunflower seeds were used in the study

FreshPax Data Facts

- Extends shelf life
- Prevents growth of aerobic and spoilage organisms, including molds
- Minimizes the need for additives
- Manufactured using food grade materials
- Absorbs virtually all oxygen in packaging as well as any oxygen that permeates through the barrier packaging material

FOOD & BEVERAGE

Size Applications

30cc
0.0 W x 0.0 L x 0.0 D
Millimeters



100cc
0.0 W x 0.0 L x 0.0 D
Millimeters



1000cc
0.0 W x 0.0 L x 0.0 D
Millimeters



Oxygen Scavengers Complements Current Packaging Technologies

FreshPax Packets when used in combination with your current packaging methods, including gas flushing and vacuum packaging, decrease time to deoxygenate the environment. Gas flushing and vacuum packaging merely serve to dilute oxygen, which can lead to food spoilage, odors, and microbial growth. FreshPax Packets modify the package atmosphere by reducing oxygen levels below those possible with vacuum packaging and gas flushing.

Requirements for Optimal Use of FreshPax Packets

- Adequate barrier – plastic film must be checked for its oxygen permeability. A good target is to use a barrier material transmitting <1 cc of oxygen/100 in²/24 hours or less (<15 cc of oxygen/m²/24 hours or less).
- Hermetic seals – 3/8in seal width provides the best barrier.
- Package geometry – designed to allow free circulation of air around the product, as opposed to vacuum packaging.
- Food water activity – should be determined as closely as possible.
- Product packaging storage and distribution conditions.

FreshPax Packets Benefits

- Prevents degradation and rancidity of polyunsaturated fats and oils
- Prevents oxidation of oleoresins in spices and seasoned foods
- Prevents oxidation of vitamins A, C & E
- Inhibits mold in natural cheeses and other fermented dairy products
- Delays non-enzymatic browning of fruits and some vegetables
- Inhibits condensation

*Sunflower seeds were used in the study



FreshPax keeps baked goods fresher while improving tasting.



FreshPax provides an effective solution to nutraceutical products.



Pet food and jerky meat products benefit from FreshPax preventing early spoilage.

FreshPax Packet Chemistry	Ideal Applications	Water Activity (estimated)	Packet Sizes Available (cc of O ₂ Absorbed)
Type B	Moist or semi-moist foods	>0.70	Various sizes 10 - 3000
Type D	Dehydrated or dry foods	<0.70	Various sizes 10 - 3000
Type R	Refrigerated or where rapid deoxygenation is required	ALL	Various sizes 10 - 3000



Shelf life can be increased significantly with the FreshPax CR process. Stretched wrapped case-ready meat trays are inserted in a barrier master bag along with FreshPax CR packets. Then gas flushed with a low oxygen gas mixture and hermetically sealed.

FreshPax® CR Oxygen Absorbing Packet for Case-Ready Meats

Oxygen is the main cause of reduced shelf life. After a few days of exposure to the oxygen content of air, meat loses its freshness, taste, and visual appeal – it becomes unsaleable. The whole premise of case-ready meats – extending distribution while also reducing revenue loss due to shrink – depends on the extended shelf life of fresh cuts of meat. The advantages of case-ready meat is to use low-oxygen modified atmosphere packaging combined with the removal of residual oxygen.

FreshPax® CR Oxygen Absorbing Packet Reliably Preserves the Taste and Visual Appeal of Fresh Meat

The FreshPax CR Packets are part of our MAPLOX™ Program, which provides a low-cost, low-oxygen packaging system that maintains refrigerated meat in pristine condition for up to 21 days when packaged and stored in ideal conditions. FreshPax CR Packets are designed to extend the sale able life of the product before it is presented in the retail display case. They provide consumers with fresh and visually appealing beef, pork, lamb, veal, and value-added meat products.

Advantages

- Preserves taste & visual appeal of refrigerated meats
- Extends the life of fresh meat well beyond that of other systems

Size Applications: FreshPax CR-D

0.00 gram
0.0 W x 0.0 L x 0.0 D
Millimeters

0.00 gram
0.0 W x 0.0 L x 0.0 D
Millimeters

0.00 gram
0.0 W x 0.0 L x 0.0 D
Millimeters

1 Cold chain management, protein cleanliness, plant hygiene, and cut of protein can all impact number of days protein remains fresh.

Applications



Low Oxygen Modified Atmosphere Packaging Method

When using low-oxygen modified packaging, a number of fresh meat trays are over-wrapped and placed into a master bag. Vacuum and back-flush systems remove air from the master bag and replace it with an oxygen-free gas mixture. With a FreshPax CR Oxygen Absorbing Packet inserted into the bag, the bag is hermetically sealed. The remaining oxygen in the master bag and oxygen that permeates from the primary meat package is absorbed by the FreshPax CR Packet. Once the master bag is opened, there is a natural rebloom to the protein.

With use of FreshPax CR Packets, shelf life can be extended well beyond that which is typical with high-oxygen packaging. Using FreshPax CR Packets as part of a

low oxygen active modified atmosphere packaging system can enhance vacuum and back-flush modified atmosphere packaging. We provide an optimum-sized FreshPax CR Packet for each of our customer's case-ready meat applications. If needed, we also offer an automated method of dispensing spooled absorbers into the master bag, and our dispensers are easily integrated into most production lines. FreshPax CR Packets are available pre-cut for manual insertion or in spooled form with one of our MAPLOX® Dispensers for automated insertion.

FreshPax CR Packets are manufactured in the USA in a cGMP compliant plant, using GRAS and FDA compliant raw materials, inks, and films.



FreshPax CR and a flow wrap process using luncheon meats.



FreshPax CR used in conjunction with gas flushing procedure.



FreshPax CR used to remove residual oxygen during shipment.



FreshPax is FSSC 22000 Certified for food safety practices recognized by the Global Food Safety Initiative (GFSI).





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MULTISORB
Filtration Group®