Rationale For Oxherphol™

All stored food products containing lipids must be preserved with antioxidants. However, increasing public concern over the safety of food additives has led a number of producers to create "preservative-free" labels. Although there is data suggesting possible toxicity of synthetic preservatives (BUT, TBHQ, BHA, Propyl Gallate), there is even more compelling data to suggest that foods left unstabilized may be even more dangerous.

OXHERPHOL™

W Y S O N G

PURPOSE:
Oxherphol™ can be added directly to fat, oil or food in need of stabilization.

INGREDIENTS:
Oil form: Beta and Gamma Epimers of Vitamin E, Fat Soluble Vitamin C, Organic Chelators and Natural Botanical Oleoresins in a base of Virgin Olive Oil.

Dry form: Beta and Gamma Epimers of Vitamin E, Fat Soluble Vitamin C, Organic Chelators and Natural Botanical Oleoresins in a base of Dried Tofu.

DIRECTIONS (General Rule of Thumb)
Dry form:
High fat foods: approximately 25% fat.
Add: 3 teaspoons per 1 pound of product. Blend in thoroughly.

Medium fat foods: approximately 10% fat.
Add: 1 1/4 teaspoons per 1 pound of product. Blend in thoroughly.

Low fat foods: approximately 2% fat.
Add: 1/4 teaspoon per 1 pound of product. Blend in thoroughly.

Oil form:
For fats and oils: add 1/2 teaspoon (15 drops) of Oxherphol to every cup of oil, butter or margarine.

For any recipe: Oxherphol required per 1 cup total recipe: high-fat food — 4 drops,
medium-fat food — 3 drops,
low-fat food — 2 drops.

An alternative is the use of natural and safe antioxidants. Not just any antioxidant will do. The nutritionally active vitamin E (alpha tocopherol) is usually degraded in heat processing and thus does not exert a significant antioxidant effect. Vitamin C, sometimes listed as a preservative, is insoluble in fats and oils, the very substances requiring stabilization. Not only is the type of antioxidant important, giving consideration to the nature of the food substrate, its mix and processing – but an improper level can actually be pro-oxidant.

Oxherphol™, a natural food product derived from botanical extracts, tocopherols, a fat-soluble vitamin C, organic sequestering acids, isoflavones, phospholipid and other natural ingredients, provides commercial food producers and home cooks the ability to stabilize foods effectively and safely without the use of synthetics.

Oxidation of Fats and Oils

During processing and storage, foods containing fats are especially susceptible to rancidity. Fats react chemically with oxygen from the air producing undesirable changes in odor and flavor. These reactions are greatly catalyzed by exposure to light.

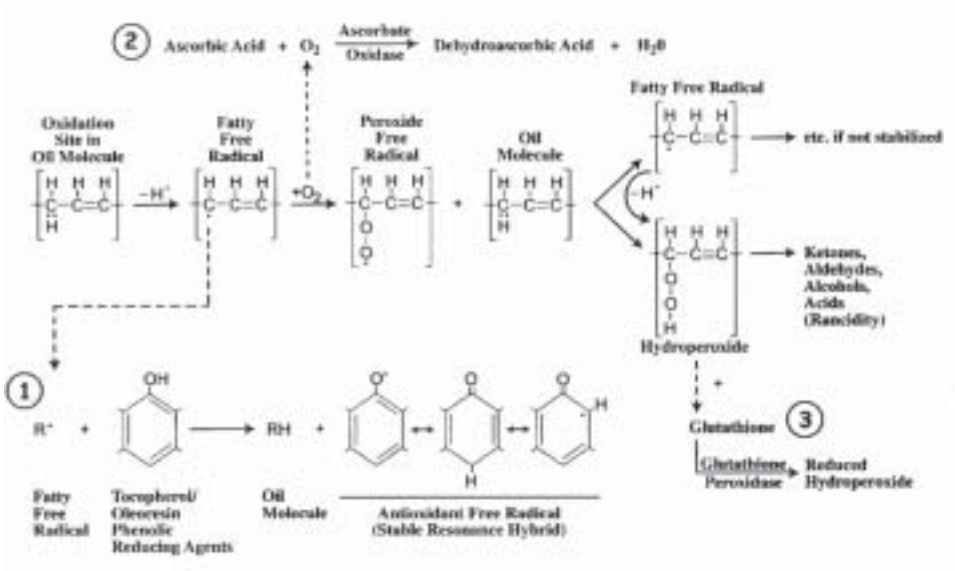
More importantly, the oxidation of fats triggers a perpetuating cycle of free radical formation. These free radicals — chemical species with an unpaired electron — are highly reactive and unstable. Once in the body, they can lead to a wide array of biochemical pathway alterations. Free radicals are formed as a result of the "splitting off" of hydrogens from a position adjacent to the double bond on a fatty acid. Unsaturated (having double bonds) fatty acids are therefore more susceptible to oxidation.

Vegetable fats, a part of natural foods, are primary polyunsaturates (many double bonds) that react with oxygen more slowly due to their content of natural antioxidants. Fish oil (omega-3 eicosapentaenoic acid and docosahexaenoic acid) as well as seed oils (omega-3, -6 and -9), which contain as many as six unsaturated bonds

per molecule, are highly susceptible to light, heat and oxidative degradation, and require stabilization not only to retain nutritive value but to ensure safety.

An important added effect of oxidative rancidity is the gradual loss of essential fatty acid activity and the destruction of fat-soluble vitamins. If oxidation is not prevented and lost nutrients are not recovered from other sources, deficiency syndromes could conceivably ensue.

Figure 1.
Oxherphol Stabilizing Antioxidant Pathways.



In the illustration here, an oil molecule releases hydrogen to form a fatty free radical. The subsequent attack of atmospheric oxygen yields a peroxide free radical. With the availability of another fatty acid and hydrogen, hydroperoxide is finally formed along with an additional free radical, hence the cycle. The hydroperoxide further breaks down into ketones, aldehydes, alcohols, and acids. Such compounds create rancidity, a deterioration of flavor and aroma.

To avoid rancidity, tocopherols and botanical oleoresin phenolic compounds are able to deactivate the free radical by donating an additional hydrogen to form a stable antioxidant free radical which will not induce oxidation.

(1). Despite the antioxidant's ability to inactivate the free radical, oxygen remains in the system. Through ascorbate oxidase, ascorbic acid (also an antioxidant) can react with oxygen to produce water and dehydroascorbic acid.

(2). To further inhibit the rancidity process, glutathione reduces hydroperoxide formation, which inhibits the progression to ketones, aldehydes, etc.

(3). Stabilization then, is accomplished by neutralizing oxygen before it can attack unsaturated bonds, stabilizing a free radical if formed, and reducing hydroperoxidism if formed.

Synthetic Antioxidants

Because this oxidative process occurs in any food containing fat, the economic impact on food manufacturers becomes apparent. The most common commercial antioxidants used today are BHA (butylated hydroxyanisole) and BHT (butuylated hydroxytoluene). These synthetic antioxidants, although effective, are far from being cleared of suspicion as a health risk. Numerous studies in rats have revealed deleterious effects including metabolic stress, liver damage, supressed growth rate and fetal abnormalities. Interestingly, the use of these compounds has been restricted in Great Britain, scratched from the food additives list in Sweden and Australia, and banned entirely in Romania.

Comparative Tests

Using the Rancimat method for measuring fat stability against oxidation, Oxherphol has been tested at various concentrations against other anti-oxidation systems. For example, in a test of 11 antioxidants in chicken fat, the samples below were ranked from greatest to least:

Antioxidant	Usage level
1. Oxherphol™	.08%
2. Oxherphol™	.06%
3. Oxherphol™	.07%
4. Oxherphol™	.05%
5. Oxherphol™	.04%
6. BHA	.05%
7. Oxherphol™	.03%
8. Herbal Antioxidant	.06%
9. Enzyme Antioxidant	.05%
10. Control — no antioxidant—	

Applications

The oxidative-susceptible essential fatty acids are necessary nutrients and are found in a wide variety of foods. Foods eaten "fresh from the garden" contain nutritious fats that are naturally stable. However, once harvested, processed, cooked and stored, fats degrade from oxidation producing off flavors (rancidity) and chemical compounds damaging to health.

Fats derived from animal sources are low in natural antioxidants. After processing, vegetable oils are unstable and thus vulnerable to oxidizing minerals, oxygen and light. Oxherphol is therefore a super stabilizer for both meats and vegetable oil-containing foods. Oxherphol not only provides protection equal or superior to synthetic antioxidants, it maintains natural flavor and aroma, and protects fat-soluble vitamins.

Oxherphol can be used to protect most any fat or oil used in food preparation. Examples include butter oil, salad oils, or mayonnaise. Oxherphol can also be added to any recipe, since fat is a part of the natural composition of all foods. Such applications include: casseroles, stews, chili, soups, cream sauces, gravies, pancakes, muffins, cakes, breads, rolls, etc., all of which contain fats from vegetable, fruit, grain, dairy and meal sources. Adding Oxherphol to the ground meats, like hamburger and sausage, is also appropriate since the meat grinding process increases the fat's susceptibility to oxidation. Oxherphol is particularly important for foods stored or used as leftovers. Oxherphol is heat-stable, therefore, high temperatures which normally deplete many synthetic antioxidants do not significantly affect Oxherphol.

At normal usage levels, Oxherphol imparts a pleasant (if any) flavor and aroma, without changing the color of the food or food product. The botanical oleoresins, which also contain natural antioxidants, add flavor and depth to certain foods.

Usage and Incorporation Techniques

Oxherphol can be added directly to fat or oil in need of stabilization. Since rancidity increases over time, the addition of antioxidants should be made as soon as possible to maintain optimum food value. Recommended usage levels range from 0.01% to 0.10%, based on fat content. Higher levels of Oxherphol™ may be required for fats which are highly unsaturated or which contain unusually large amounts of trace minerals, pigments, or enzymes.

The following specifications apply to the concentrated industrial form of Oxherphol. The less concentrated form of Oxherphol, designed for home use, should be used in accordance with label directions.

1. **Low-fat foods:** For foods such as breads, rolls, yogurt, tofu and cottage cheese, *0.01%-0.05%*.
2. **Snack Foods:** For foods such as potato chips, extruded grains and nuts, *0.02%-0. 10%*.
3. **Mayonnaise and Salad Dressings:** *0.01%-0.05%*.
4. **Unsaturated Oils:** Highly unsaturated oils, such as fish oils, *0.10%*.
5. **Dehydrated Foods:** *0.10%-0.15%*.
6. **Meat and Poultry:** *0.l0%-0.15%*.

Oxherphol has a wide margin of safety, as do most natural ingredients. Please see Oxherphol Material Safety Data Sheet.

Advantages of Oxherphol

- Protection equal or superior to synthetic antioxidants
- Heat-stable
- Maintains aroma and flavor of the food product
- Protects fat-soluble vitamins and essential fatty acids
- Easily used and incorporated
- Compatible with any food product containing fat
- Is natural and therefore compatible with labels emphasizing natural additive-free merits.

These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure, or prevent any disease.

Appendix

PRESERVING FOOD WITH NATURAL ANTIOXIDANTS

By Betty Kamen, Ph.D.

Yes, I want preservatives in my food. Well, not in all food, but at least in a select group of processed foods — especially those containing lots of fats and oils. Unfortunately, many of these foods are being packaged and promoted as "preservative-free," particularly by large companies that sell to the supermarkets.

Madison Avenue is currently capitalizing on the increasing concern over the safety of food additives. Public unrest over additives stems from data validating the toxicity of synthetic preservatives such as BHT, BHA, and propyl gallate, the anti-rancidity additives.

However, certain food items, if left unstabilized, may be just as dangerous. Some nutrition- and health-oriented companies attempt to solve the problem by using natural food ingredients. For example, vitamin E may be added as a food antioxidant. But nutritionally, active alpha tocopherol (the active form of vitamin E) may be degraded during the heating process. If this happens, vitamin E exerts little antioxidant effect in a stored, processed product. Vitamin C, also frequently used as a preservative, is insoluble in fats and oils, and these substances require ample stabilization.

During processing and storage, foods containing fats are especially susceptible to rancidity. Fats react chemically with oxygen in the air, producing undesirable changes in odor and flavor. Such reactions are increased by exposure to light.

More important, when fats oxidize they trigger free radical formation. These free radicals - molecules or elements with unpaired electrons - are unstable and highly reactive. Once in your body, they can lead to a host of biochemical alterations. The most widely accepted theory on premature aging is the free-radical theory: An accumulation of free radicals prematurely ages our tissues. Anything that increases our bodies' free-radical content will contribute to accelerated aging.

Free radicals are formed as a result of the "splitting off" of hydrogen atoms from a position adjacent to the double bond of a fatty acid. An oil molecule releases hydrogen to form a fatty free radical. Exposure to atmospheric oxygen yields a peroxide free radical. With the availability of another fatty acid and hydrogen, hydroperoxide is finally formed, together with an additional free radical; hence, a cycle. The hydroperoxide further breaks down into ketones, aldehydes, alcohols, and acids. Such compounds cause rancidity.

The higher the fat and oil content of any product, the more likely it is to turn rancid quickly. It has been suggested that virtually every bottle of salad dressing sitting on supermarket shelves has at least some rancidity, but it eludes taste and smell.

Living cells are in an ecological balance. Nutrients and antioxidants continually participate in the survival of each cell. Although oxidative processes are dangerous, they are essential to life. These processes take place under tightly controlled circumstances. Your cell has the ability to take the hand of an oxygen molecule and guide it to where it is supposed to go, and allow it to do whatever it is supposed to do. Oxidative damage occurs because at the wrong time antioxidants control that reactivity.

Vegetable fats react with oxygen more slowly than fat from other foods due to their content of naturally occurring antioxidants. Once processed, however, vegetable oils become unstable and vulnerable to oxidizing minerals, oxygen, and light. Most fats derived from animal sources are low in natural antioxidants. Fish-oil and seed-oil extracts are highly susceptible to light, heat, and oxidative degradation, and require stabilization not only to retain nutritive value, but to keep them from turning rancid.

Oxidative rancidity results in the gradual loss of essential fatty acid activity and destroys the fat-soluble vitamins A, D, E, and K. This is due to the powerful oxidizing capacity of peroxides. If harmful oxidation is not prevented and the lost nutrients are not supplied from other sources, deficiency syndromes will result.

Antioxidants deactivate free radicals by supplying additional hydrogen, thus forming a stable antioxidant free radical. That's the function of the preservative. In the human body, vitamin E is one substance that protects essential fatty acids and other important highly unsaturated fatty acids from unwanted and dangerous reactions.

Because the oxidative process occurs in any food containing fat, the economic impact on food manufacturers becomes apparent. The most common commercial antioxidants used today are BHA and BHT (butylated hycroxyanisole and butylated hydroxytoluene). These synthetic antioxidants, although effective, are under suspicion as potential health risks. Numerous studies have revealed deleterious effects, including metabolic stress, liver damage, depressed growth rate, and fetal abnormalities. Although these antioxidants provide some degree of protection, they potentiate the toxicity and carcinogenity of other substances.

BHT or BHA may be found in:
Animal fats
Bacon
Baked goods of all kinds, including candies, crackers, and cookies
Breakfast foods
Butter
Cheese wrappers
Chicken fat
Cream
Cookies
Doughnuts
Drugs
Extracts
Food-packaging paper
Imitation fruit drinks
Milk
Nutmeats
Pet foods
Processed meats and fish
Raisins
Salad oils and salad dressing
Shortenings
Waxed paper

BHT has also been indicted as a behavioral teratogen. (A teratogen causes developmental malformations and monstrosities affecting the next generation.) Chronic ingestion by test animals results in decreased sleep, increased social aggression, and severe learning disabilities. These substances have been restricted in Great Britain, banned as food additives in Sweden and Australia, and totally banned in Romania.

The Food and Nutrition Board of the National Academy of Sciences and the National Cancer Institute recommend a reduction in dietary fat for most Americans. However, fat, particularly the oxidative-susceptible essential fatty acids, is a necessary nutrient and is found in a wide variety of foods. (Your brain is composed of more fat than protein.) Foods eaten "fresh from the garden" contain nutritious fats that are naturally stable. Once harvested, processed, cooked, and stored, fats degrade from oxidation.

Examples of foods requiring protection from oxidation include oils used for salad dressings, mayonnaise, and for cooking. The fats found in ground meats such as hamburgers, hot dogs, and sausages have an increased susceptibility to oxidation. The grinding process, the addition of fat, and many other processing techniques create the problem. When potatoes are slivered and french-fried, their oil content increases about 13 percent. Potato chips contain about 40 times more oil than the original potatoes did. The potato, a naturally low-fat vegetable, becomes a high-fat food requiring stabilization.

Because rancidity increases over time, antioxidants should be added to processed foods as soon as possible. The antioxidant acts as the stronghold against attack. Electrons are like glue, which hold molecules together. Oxidants grab electrons interfering with the glue. When enough electrons are "stolen," the molecule falls apart. This is a general interpretation of the peroxidation, or rancidity, process. Well, I don't want my molecules falling apart. Do you?

It is possible to provide protection, equal to or superior to that of synthetic antioxidants, to maintain the natural flavor and aroma of food products while protecting fat-soluble vitamins. Your body knows how to metabolize and break down natural antioxidants. Additionally, chemical antioxidants often shut down the natural oxidative functions.

Some vitamins, a few minerals, and many spices, herbs, and flavorings such as cloves, oregano, sage, rosemary, and vanilla are excellent antioxidants. At least one major health-oriented company has developed a natural antioxidant derived from vitamin E and botanicals. This antioxidant has proved to be more effective than synthetic preservatives, and more stable than other natural antioxidants. It appears to be capable of maintaining antioxidant properties, and even protecting fat-soluble vitamins.

Unfortunately, labeling regulations make it difficult for us to decipher the truth. Products labeled "no artificial flavors," for example, may still contain artificial colors and preservatives. And products that boast "no preservatives" may still contain preservatives. Known as secondary ingredients, preservatives may be present in substances the manufacturer buys to make the product.

If we lived on farms, and picked and pulled our daily supply of foods, preservatives would not be necessary. Since that is not my lifestyle, I want preservatives — the safe and effective kind — in my fat-containing processed foods.

I would like to thank Dr. Randy Wysong of Wysong Corporation, in Midland, Michigan, for supplying information and sparking my interest in natural preservatives.

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