



Antioxidants

Background

Consumption of antioxidants has become a major health topic in the past several years. Several foods are consumed primarily because they are rich in antioxidants and offer numerous health benefits. An antioxidant is a substance either naturally present in a food, or synthetically made and added to a food to protect it against the effects of oxygen (air). Under the Canadian *Food and Drug Act and Regulations*, antioxidants added to food products are considered food additives and are regulated under Division 16 along with other food additives.

Antioxidants are used to extend the shelf life of a product and prevent rancidity in products such as cooking oils. Foods containing fats or oils will likely contain antioxidants because fat is very prone to oxidation. Natural antioxidants include Vitamin C (ascorbic acid) and Vitamin E (tocopherols). The most commonly used synthetic antioxidants are butylated hydroxyanisole (BHA) and butylated hydroxytoluene (BHT). Other antioxidants approved for use in Canada include L-cysteine, guaiac gum, lecithin, propyl gallate, and tertiary butyl hydroquinone (TBHQ).

Types

Butylated Hydroxyanisole (BHA) & Butylated Hydroxytoluene (BHT)

Oxygen preferentially reacts with BHA or BHT rather than oxidizing the fat or oil within a food, preventing the food from spoiling or becoming rancid. BHA and BHT are both fat soluble, meaning they dissolve easily in a product containing fat or oil and they are added to many foods, cosmetics and pharmaceuticals. Both compounds prevent the oxidation and subsequent rancidity of fats and oils. BHA specifically can be found in chewing gum, butter, meats, cereals, baked goods, snack foods, dehydrated potatoes, beer, animal feed, food packaging, cosmetics, rubber products and petroleum products. BHT, in addition to preventing oxidation, is used to preserve food odour, colour and flavour. It can be found in many types of packaging materials and “BHT added to maintain freshness” is often seen on pre-packed food products.

There have been concerns in the public about the consumption of these additives stemming from a potential link between BHA, BHT and cancer. The results of scientific studies are controversial since several studies have shown no link, and even a protective effect, between BHA, BHT and cancer. Scientific studies that have been carried out on rats have required very high levels of BHA and BHT to trigger cancer, levels that are not relevant to normal human consumption. The type of cancer found in rats and mice was also not relevant to any digestion mechanism in

humans. For example, scientific studies have demonstrated that rats fed a diet high in BHA and BHT developed forestomach tumours. The forestomach in rats is a unique part of their digestive system and is not present in humans, leading many scientists to conclude that these findings are not relevant to humans.

Health Canada has reviewed the current scientific information regarding these additives and BHA and BHT continue to be approved for use in Canadian products.

Tert-Butyl Hydroquinone (TBHQ)

TBHQ is used primarily as an antioxidant in animal-derived food products, and in fats and oils. TBHQ provides a greater stability to highly unsaturated vegetable oils and animal fats when compared to other permitted antioxidants and extends the storage and shelf life of many fats and oils. It can be used on its own, but is most often used together with butylated hydroxyanisole (BHA) and butylated hydroxytoluene (BHT) as these compounds work well together and provide better antioxidant properties when added to food in combination.

Approved for use as a food additive in Canada in 1999, TBHQ has a maximum level use of 0.02%, meaning that TBHQ can make up a maximum of only 0.02% of a food product when added as an antioxidant. In addition, if TBHQ is used in combination with other antioxidants such as BHA and BHT, the maximum total combined level is still 0.02%. No antioxidant, either singly or combined, may exceed 0.02% of the product it is added to. At this approved level, no health concerns have been associated with the use of TBHQ.

Lecithin

Lecithin is a tan to amber liquid or solid that was originally derived from egg yolks. The lecithin used today is primarily derived from the soybean. It is made up of a complex mixture of different lipids, triglycerides and fatty acids, which vary depending on the intended use. No limitation has been set on the use of lecithin in food.

Guaiaic Gum

Also known as Gum Guaiac, or E314 in Europe, this natural antioxidant is derived from the wood of the *Guajacum officinale* L. or *G. sanctum*. It was widely used in the 1940s as an antioxidant for fats and oils, particularly for the stabilization of lard. Guaiaic gum is primarily used today as an antioxidant in chewing gum. The ADI (acceptable daily intake) for Guaiaic gum is set at 2.5mg/kg bodyweight per day.

Propyl Gallate

Also known as E310 in the European Community, propyl gallate is a white synthetic powder that can be used on its own or combined with BHT and BHA to prevent rancidity in fat or oil containing foods. Propyl gallate decomposes when heated above 148°C and is therefore not suitable for addition to foods that will be heated. There has been no health concerns related to the use and consumption of propyl gallate.

L-Cysteine

In Canada, L-cysteine is permitted to be added to fruit-flavoured nutritional supplements to prevent the oxidation of ascorbic acid and the polyunsaturated fatty acids. The safety of L-cysteine was studied and results indicated that it poses no health concern to humans, while being effective at preventing oxidation. L-cysteine is a natural component of protein and is already a part of a consumer's normal diet. No ADI (acceptable daily intake) has been set for L-cysteine; use must follow Good Manufacturing Principles.

Information Sources:

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