

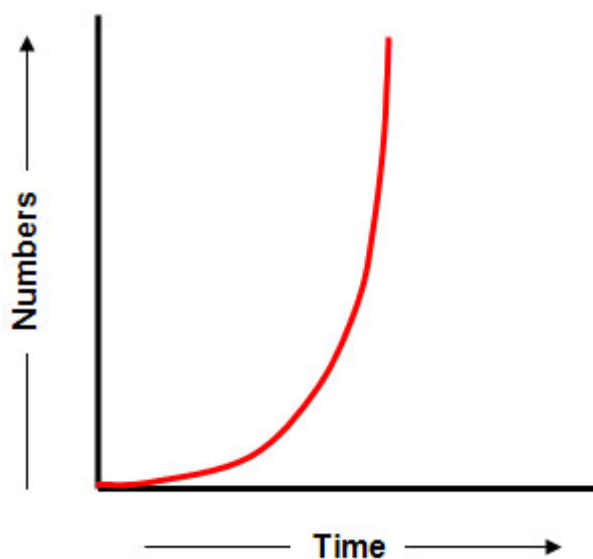


Food Processing and Lipid Oxidation

Food lipids are principally triacylglycerides, phospholipids and sterols found naturally in most biological materials consumed as food and added as functional ingredients in many processed foods. As nutrients, lipids, especially triglycerides, are a concentrated caloric source, provide essential fatty acids and are a solvent and absorption vehicle for fat-soluble vitamins and other nutrients. The presence of fat significantly enhances the organoleptic perception of foods, which partly explains the strong preference and market advantage of fat-rich foods. As a class, lipids contribute many desirable qualities to foods, including texture, structure, mouthfeel, flavor and color. However, lipids are also one of the most chemically unstable food components and will readily undergo free-radical chain reactions that not only deteriorate the lipids but also:

- **Produce oxidative fragments, some of which are volatile and are perceived as the off-flavours of rancidity reducing the shelf life.**
- **Degrade proteins, vitamins and pigments reducing the nutrient value and visual appeal of the food.**
- **Cross-link lipids and other macromolecules into non-nutritive polymers, causing gumming and degradation of the food.**

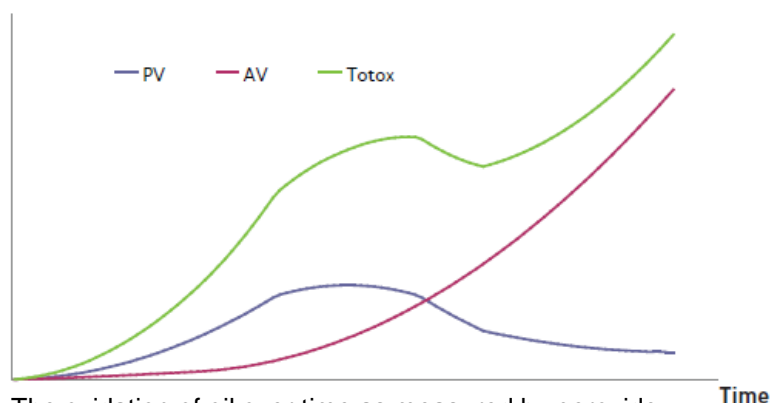
Fig. 1 Graphical representation of rate of free radical formation in oils over time



- **Chain reaction of free radical propagation process begins slowly**
- **As presence of free radical increases, the level of the PV increases rapidly**
- **It is important to keep the initial PV low and to have an antioxidant present to quench the process**

Once oxidation starts, the process is autocatalytic and proceeds at an ever increasing rate. This process, unless quenched, will completely denature fats and oils leading to the destruction of the essential fatty acids and of other fat soluble nutrients such as Vitamins A & E. This process not only lends an offensive odour to the fat but results in toxic compounds being formed.

Fig. 2 Graphical representation of oil oxidation as measured with PV, AV and Totox Values



The oxidation of oil over time as measured by peroxide value (PV), anisidine value (AV) and Totox value.

Note: PV can decrease over time so AV and/or Totox calculation is needed to appreciate the whole oxidation story.

Dadex[®] Can Prevent Costly Oxidation

It is important to add the proper amount of the correct Dadex[®] antioxidant as early as possible in supply chain. Each oil type and processing environment can require a different type or combination of antioxidants. The choice of Dadex[®] will depend on the fatty acid profile, natural antioxidants present and the plant's process conditions. Adding Dadex early on will:

- **Help prevent the initiation step toward oxidation**
- **Provide proper dispersion**
- **Help set the foundation for shelf life protection**

Monitoring oxidation parameters throughout the transit and storage of ingredients will ensure adequate level of Dadex[®] is present in ingredients upon formulation. If the level is too low, supplementation with additional antioxidants may be required.

Strategically adding Dadex[®] throughout the process will help achieve the optimal level in finished product to achieve desired shelf life and prevent costly oxidation in the final product.

Our technical experts can help determine the correct antioxidant for each application and identify the optimal points of addition in order to minimize costs while meeting shelf life objectives.

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