



BIODEGRADABILITY

As federal, state and municipal environmental agencies increase mandates on the use of environmentally safer lubricant products, care must be given in selecting the right product for the application and enviro-requirement. Simply having the term “bio” or “enviro” in the product name or description does not mean that you are using the required product. Biodegradation is separate from toxicity and food grade.

Definition

Biodegradation is the process of chemical breakdown or transformation of a material caused by organisms or their enzymes back into common elements like carbon, oxygen and hydrogen.

Testing

Using tests developed by American Standard for Testing and Materials (ASTM) and Organization for Economic Cooperation and Development (OECD), the oil is inoculated with bacteria and is kept under controlled conditions for 28 days. The most commonly used terms to describe levels of biodegradability are inherently and readily.

- ☀ **Inherently Biodegradable** - Classification for a product that has a biodegradation better than 20 percent in 28 days.
- ☀ **Readily Biodegradable** - Classification for a product that has a biodegradation of more than 60 percent within 28 days.

Components

- ☀ Readily Biodegradable Base Oils
 - * **Natural Esters (Vegetable)** - canola (rapeseed), soybean, peanut, olive and sunflower.
 - * **Synthetics** - Many different types
- ☀ Inherently Biodegradable Base Oils
 - * Group II
 - * White Oils



NATURAL ESTERS *(Vegetable Oils)*

Natural Esters is a term that is used to describe base oils that are made from various types of vegetable oils. Because of their high level of biodegradability, they are the primary choice when formulating a readily biodegradable lubricant.

Pros

- ☀ **Outstanding Lubricity** - far superior to other base oils and outstanding wear protection
- ☀ **High Viscosity Index** - less change in viscosity relative to temperature

Cons

- ☀ **High Pour Points** - will be more viscous at low temperatures when compared to mineral oils.
- ☀ **Minimal Hydrolytic Stability** - not as stable as mineral oils in the presence of water
- ☀ **Poor Oxidation and Thermal Stability** - for applications below 220F
- ☀ **Higher Cost** - when compared to mineral oils

Natural Ester formulated products have made much progress over the last 10 years and with the right base oil selection and additive package, it can perform very well in most applications.

AQUATIC TOXICITY

The response of water-based organisms to chemicals or physical agents is called aquatic toxicity. The negative effects of aquatic toxicity can range from mortality to impaired reproduction or growth abnormalities.

Hydraulic fluids with “minimal or low aquatic toxicity” generally are tested against OECD standards: OECD 202 (daphnia water flea), or OECD 203 (fish) testing, where greater than 50 percent (LC50) of test subjects survive at 1,000 parts per million hydraulic fluid dosage.