

## Greater Environmental Protection

October 2012

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Companies are under increasing pressure to ensure their activities cause as little damage as possible to the environment. A call for change is evident from the introduction of strict governing standards and legislation designed to encourage best practice and punish the neglect of our communities.

Organisations with progressive thinking have realised that as well as helping to save the planet, they can also benefit from positive PR and cost advantages associated with using 'greener options'.

MIDEL eN is a natural ester based fluid, produced from edible food grade seed oil. This fluid is non-toxic, readily biodegradable and derived from a renewable source, and as such is an environmentally friendly alternative to mineral oil. MIDEL eN's classification as non-water hazardous by UBA further supports this assertion.

### Biodegradation

Biodegradation is the process by which organic substances degrade and become harmlessly absorbed by the environment. The biodegradation of MIDEL eN has been assessed by an accredited laboratory using a standard test method developed by the Organization for Economic Cooperation and Development (OECD), a worldwide standard-setting body.

### Method

Tests for biodegradation use micro-organisms, of the type present in wastewater treatment plants. These organisms are put into glass jars with the test compound for 28 days. Measurements are taken of the oxygen consumed, or carbon dioxide produced,

to determine the biodegradation percentage.

### Results

Figure 1 demonstrates that MIDEL eN achieved 10% degradation by day 1 and 84% by day 11. On the 28th day MIDEL eN showed an average biodegradation of >94%. One test sample had biodegraded completely (100%) well within the 28-day period. These results clearly show that MIDEL eN easily meets the criteria for classification as readily biodegradable.

MIDEL eN will not biodegrade in a transformer. This is due to the fact that the conditions within the transformer are too hot and dry to sustain microbial life.

Comparative independent studies examining the biodegradation of mineral oil show a stark contrast to the environmentally friendly MIDEL eN.

In Figure 2, the graph clearly demonstrates that mineral oil does not even achieve 10% degradation by the end of 28 day test period. Therefore MIDEL eN's excellent biodegradable

Figure 1 - Biodegradation of MIDEL eN

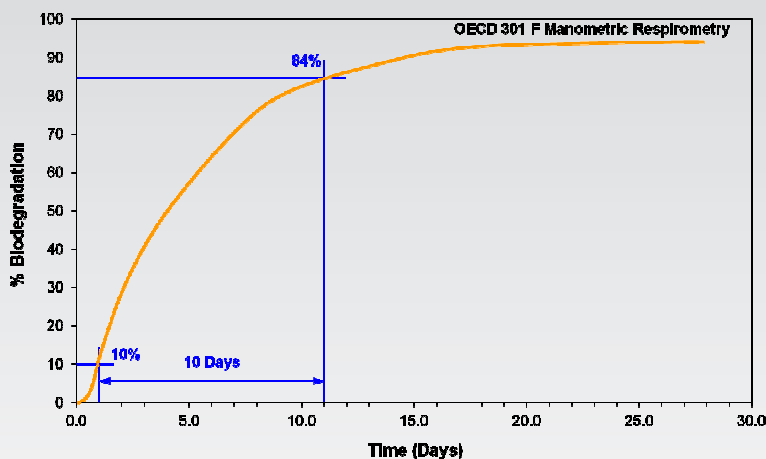
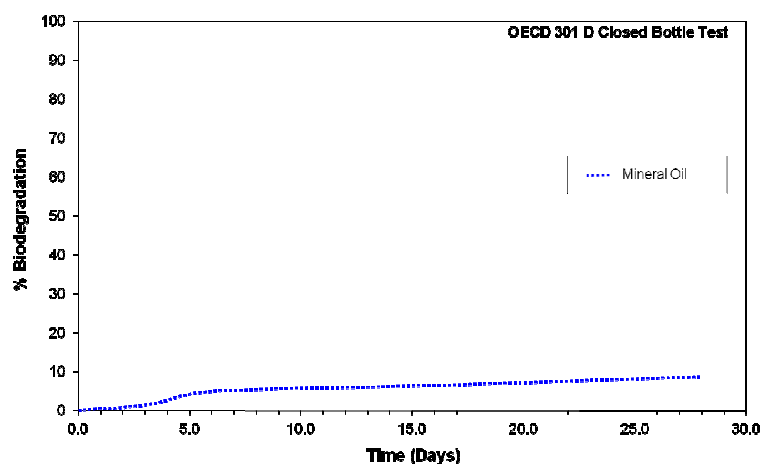


Figure 2 - Biodegradation of Mineral Oil



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properties make it the sensible solution for use in a transformer.

### UBA Water Hazard Classification

Germany's central environmental authority, Umwelt Bundes Amt (UBA), evaluates chemicals and provides them with ratings, either as non-water hazardous (nwg) or one of three hazard levels.

The UBA classification is based on the biodegradability of the chemical combined with the potential effect on aquatic life. The classification for various transformer fluids is shown in Table 1. Both MIDEL eN and MIDEL 7131 are classified as non-water hazardous, while mineral oil does present some hazard and therefore requires extra containment measures, incurring further costs.

### Effect on Living Organisms

In addition to the importance of biodegradability, it is favourable if a transformer fluid does not represent a hazard to the ecosystem. Being a natural ester based product MIDEL eN is harmless to human and animal life and does not bio-accumulate in living organisms.

In the event of a spillage, MIDEL eN rapidly biodegrades presenting no acute risk to aquatic life.

Table 1 - Common Test Parameters and Guidance Limits

Fluid	CAS Number	UBA Classification
MIDEL eN	68956-68-3	nwg
MIDEL 7131	68424-31-7	nwg
Mineral Oils	Various	1

### Advantages of Using Renewable Biodegradable MIDEL eN

Local regulations and insurance companies usually determine the containment requirements for transformers. Over the years it has become more common for insurance companies to identify reduced containment requirements for transformers containing safer alternatives to mineral oil. This presents a substantial potential cost saving for the users of MIDEL eN filled transformers.

In addition, since MIDEL eN is manufactured from renewable raw materials it can claim to have a much lower carbon footprint than mineral oil. This is becoming increasingly important and could bring further benefits with schemes such as carbon credits and carbon caps being brought into existence.

It is certain that in the near future there will be more pressure on companies to use the most environmentally sound product and MIDEL eN as a renewable, biodegradable alternative to mineral oil offers the ideal solution.