

## Greater Environmental Protection

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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.

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

MIDEL 7131 has been proven to be non-toxic and readily biodegradable, and as such is an environmentally friendly alternative to mineral oil and silicone liquid. MIDEL 7131's classification as non-water hazardous by UBA further supports this assertion.

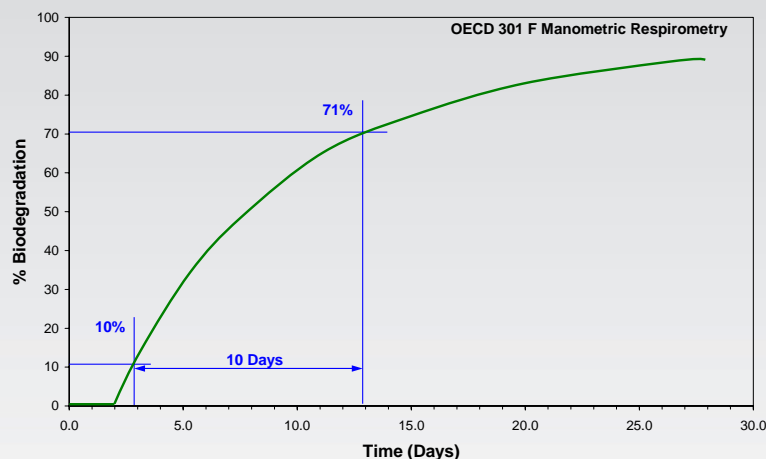
### Biodegradation

Biodegradation is the process by which organic substances degrade and become harmlessly absorbed by the environment. The biodegradation of MIDEL 7131 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.

**Figure 1 - Biodegradation of MIDEL 7131**



### Results

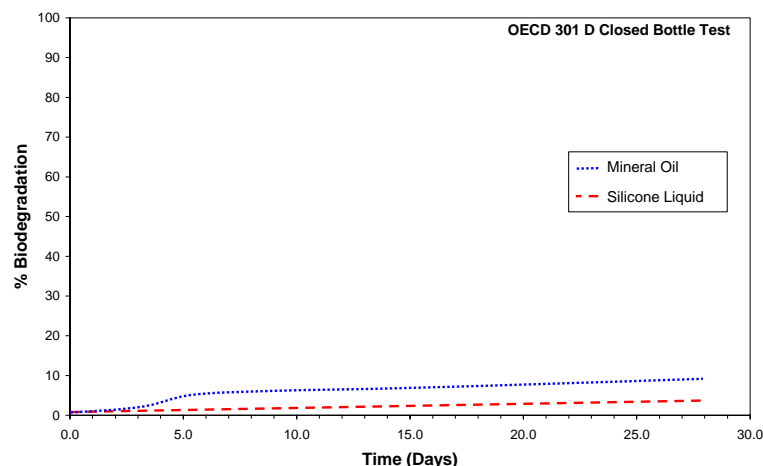
Figure 1 demonstrates that MIDEL 7131 achieved 10% degradation by day 3 and 10 days later it was 71% degraded. On the 28th day MIDEL 7131 reached 89% degradation, putting it comfortably in the Readily Biodegradable OECD and the Fully Biodegradable IEC 61039 categories.

MIDEL 7131 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 and silicone liquid show a stark contrast to the environmentally friendly MIDEL 7131.

In Figure 2, the graph clearly demonstrates that neither of MIDEL 7131's counterparts managed to achieve even a 10% level of degradation at the end of the 28 day test period. Therefore MIDEL 7131's excellent biodegradable properties make it the sensible solution for use in a transformer.

**Figure 2 - Biodegradation of Mineral Oil and Silicone Liquid**



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### 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 the Table 1. MIDEL 7131 is classified as non-water hazardous, while silicone liquid and mineral oils do present some hazard and therefore require extra containment measures incurring further costs.

### Effect on Aquatic Life

In addition to the importance of biodegradability, it is favourable if a transformer fluid does not represent a hazard to the ecosystem. In extreme concentration levels of 1000mg/l it has been demonstrated that MIDEL 7131 will have no ill effects on aquatic life in the event of a spillage into a watercourse.

**Table 1 - Common Test Parameters and Guidance Limits**

Fluid	CAS Number	UBA Classification
MIDEL 7131	68424-31-7	nwg
Silicone Liquid	63148-62-9	1
Mineral Oils	Variety	1

### Wastewater

Biological sewage treatment plants use 'activated' or microbially active sludge to break down organic matter within sewage. Contaminating chemicals can destroy these micro-organisms and a total cessation of the sewage treatment process may result. This is a very costly and time consuming problem for the sewage treatment industry.

Tests carried out by the global chemical company, BASF; demonstrate that MIDEL 7131 has no effect on the respiratory inhibition of activated sludge even at very high concentrations of up to 1000mg/l. The conclusion is that MIDEL 7131 does not represent a risk to biological treatment plants.

### Advantages of Using Biodegradable MIDEL 7131

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 oils.

FM Global® is an internationally recognised insurance company. In its loss prevention datasheets for MIDEL 7131 filled outdoor transformers, containment is not required until the fluid volume exceeds 2640 gal (10,000 litres). In contrast for mineral oil bunding is required when the fluid volume exceeds 500 gal (1900 litres).