

## Environmental Fate and Effects of D<sub>5</sub>

### About D<sub>5</sub>

Decamethylcyclopentasiloxane (D<sub>5</sub>) is used mainly as an ingredient in personal care products, including roll-on deodorants and antiperspirants, shampoos and hair conditioners, bath and soap products, and moisturizers and body lotions. It is an odorless, colorless, non-oily fluid that helps personal care products spread easily and provides a silky, luxurious feel during application. Smaller volumes of D<sub>5</sub> are sold for applications in industrial cleaning and as a solvent in dry cleaning used in closed systems and recycled.

### Silicone Manufacturers' Commitment

As part of their proactive stewardship program and their commitment to voluntary testing initiatives, silicone manufacturers continue to study silicon-based materials to provide environmental fate and effects information to regulatory authorities worldwide. D<sub>5</sub> is among the materials being studied.

### D<sub>5</sub> in the Environment

The most common commercial use of D<sub>5</sub> is in personal care products. Because of its volatility, 50-90% of the D<sub>5</sub> used in these applications will evaporate after application, with only small amounts being washed off to enter wastewater. The small amount of D<sub>5</sub> entering the wastewater treatment facility or an aquatic environment will either evaporate or be bound to organic-rich particulates, thus limiting its availability to organisms. For example, in a pilot wastewater treatment plant study, 50-75% of the low concentration of D<sub>5</sub> in the influent was adsorbed to sewage sludge, 25-50% evaporated, and less than 5% was discharged with the effluent, attached to suspended solids. In the atmosphere, D<sub>5</sub> undergoes degradation within days. In the soil, degradation and volatilization occurs within a week. D<sub>5</sub> ultimately degrades to inorganic silicate, or sand, water, and carbon dioxide.

### D<sub>5</sub> in the Atmosphere

D<sub>5</sub> does not contribute to ground level ozone formation and is not considered to be a volatile organic compound (VOC). D<sub>5</sub> does not deplete stratospheric ozone because its atmospheric lifetime is too short to be transported to the stratosphere.

### Research to Assess the Impact on Aquatic Organisms

A number of acute and chronic studies have been performed with D<sub>5</sub> to assess aquatic toxicity. At the highest concentrations that could be tested in water (due to its low water solubility), there were no observable effects in both short- and long-term studies with fish, daphnids, or algae. Some effects on mortality were observed in testing with a sediment-dwelling midge larva at concentrations of D<sub>5</sub> in sediment in excess of what is expected to be found in the environment.

## Research to Understand Accumulation in Organisms

In a laboratory bioconcentration study, where particles are not present to which D<sub>5</sub> could bind and where D<sub>5</sub> is not allowed to evaporate, D<sub>5</sub> shows the potential to be taken up into fish. However, the reliability for such a laboratory study to predict the environmental fate and effects of a chemical in nature is based on the assumption that the chemical remains in the aquatic environment. Under naturally occurring conditions, D<sub>5</sub> will preferentially distribute to air or bind to the particles in the sediment, with very little D<sub>5</sub> remaining in the water. In a more environmentally realistic study, the ability to bioconcentrate was determined for a midge larva (an organism in the sediment) exposed to D<sub>5</sub> mixed into sediments. In this test, no bioconcentration of D<sub>5</sub> was observed.

## Safety of D<sub>5</sub>

Because of the chemical characteristics of D<sub>5</sub> and its ability to degrade by several pathways, D<sub>5</sub> concentrations in the environment are expected to be very low. Most of the D<sub>5</sub> that enters the environment will evaporate and degrade being converted ultimately to inorganic silicate (sand, water, and carbon dioxide). D<sub>5</sub> in the water will evaporate or will bind to suspended particles.

Based on the known characteristics of D<sub>5</sub> and years of scientific research, D<sub>5</sub> is safe when used as intended. ■

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SEHSC is a not-for-profit trade association comprised of North American silicone chemical producers and importers. For more than 25 years, SEHSC has operated to fund research and promote the safe and responsible use of silicones. The organization also is involved in legislative and regulatory issues relating to silicone materials. Originally formed in the mid-1970s as the Silicones Health Council, the organization became SEHSC in 1993.