# Biodiesel Spills

## Definition

Biodiesel is an alternative fuel similar to conventional or 'petro' diesel. Biodiesel can be produced from straight vegetable oil, animal oil/fats, tallow, and waste cooking oil. The process used to convert these oils to biodiesel is called transesterification. Most U.S. biodiesel is made from soybean oil.

Pure biodiesel (B100) is transported by rail and truck to facilities where they are blended with petroleum diesel at 5 to 20% (B5/B20) and then transported by truck to retailers who store them in both above- and below-ground tanks.

## Properties

- Most biodiesels are composed of fatty acid monoalkyl esters.
- Biodiesels have a very low vapor pressure, thus have a low fire risk.
- Biodiesel is much lighter than water (specific gravity is 0.84-0.90).

## Environmental Behavior

- Spills of biodiesel blends typically behave similar to petrodiesel at first, i.e., they remain on the surface and spread very quickly to a thin film.
- Biodiesels contain mild surfactants, and blends as low as B10 to B20 will naturally disperse much more than petrodiesels. The rate of natural dispersion can increase droplet formation and slow the rate of droplet resurfacing. They form a white, milky emulsion.
- Biodiesel is slightly more viscous than petrodiesel, especially at lower temperatures. As a result, expect higher recovery rates with skimmers than petrodiesel.
- For most sorbent types, the recovery rate is similar to that of fuels of the same viscosity.
- Biodiesels are slightly soluble in water, with a water-soluble fraction of B100 typically 13-60 milligrams per liter (mg/L), but as high as 110 mg/L; whereas B5 and B20 have a water-soluble fraction of 20-30 mg/L. Petrodiesels have water-soluble fraction of 20-40 mg/L. However, the water-soluble fraction of B100 lacks the acutely toxic aromatic components and volatiles that drive the toxicity of petrodiesels.
- For water-column toxicity, biodiesel blends of up to B20 have a toxicity that is similar to petrodiesel; however, toxicity varies widely by biodiesels, possibly due to differences in feedstock or additives.
- Laboratory toxicity tests with filtered water-soluble fraction of biodiesel can be 1-2 orders of magnitude less toxic than the same tests with unfiltered water, indicating that small droplets can have a smothering effect on small organisms.
- Biodiesels biodegrade at 2-2.5 times faster than petrodiesels (days to weeks under aerobic conditions and weeks to months under anaerobic conditions). Thus, natural attenuation may be appropriate after removal of free product, if there is sufficient oxygen to support microbial degradation.
- Aquatic life can suffocate due to oxygen depletion for releases to shallow or isolated water bodies.
- Biodiesel can foul fur and feathers; bird eggs coated with biodiesel can have complete hatching failure.
- There is little fate, environmental, and toxicological information regarding biodiesel spills.

## Key References

Hollebone, B., B. Fieldhouse, T. Lumley, M. Landriault, K. Doe and P. Jackman. 2007. Aqueous solubility, dispersibility and toxicity of biodiesels. 30th AMOP Technical Seminar. Environment Canada, pp. 227-243.

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