

## BioSolve Activator

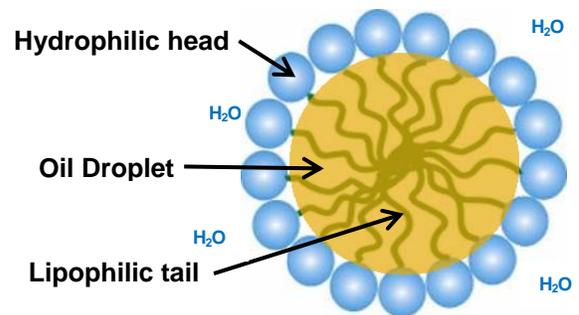
BioSolve® Activator™ is a proprietary, water-based blend of non-ionic *surfactants* and other ingredients specifically formulated to provide unique benefits for the mitigation of hydrocarbons. When applied as a 2% – 10% solution, Activator mobilizes and emulsifies a wide range of crude oil and hydrocarbon products. *Activator has been formulated to meet standards for US EPA's "Safer Choice" designation.*

Activator Performance Benefits	
<b>Mobilizes</b>	Reduces oil-solid interfacial tension releasing oil from solid surfaces (e.g., soil, pavement, tanks, pipelines) to facilitate cleaning and removal of contaminants.
<b>Emulsifies</b>	Reduces oil-water interfacial tension allowing surfactants to form a micellar emulsion, effectively "solubilizing" oil for hydraulic removal.
<b>Reduces Volatility</b>	Emulsification of hydrocarbons suppresses VOCs making fuel spills non-flammable and reducing LELs in enclosed spaces.

### SURFACTANTS

Surfactants (a contraction of "surface active agents") are compounds that 1) lower the surface tension of liquids, and 2) lower interfacial tension between two liquids (such as oil and water) or between a liquid and a solid (such as oil and soil). These functional characteristics are attributable to the structure of surfactant molecules. The surfactant molecule has a hydrophilic "head" and a lipophilic "tail" (see Figure 1), giving the molecule both an oil soluble component (lipophilic) and a water soluble component (hydrophilic).

When oil and water are mixed, the hydrophilic "head" of each surfactant molecule will migrate to be in full contact with water, while the lipophilic "tail" of the same molecule will seek immersion into the oil phase. This causes alignment and aggregation of surfactant molecules at the oil/water or oil/solid interface.



**Figure 1.** Surfactant molecules align on the surface of an oil droplet to form a micelle.

### SURFACTANTS AND HYDROCARBONS

Where hydrocarbon contamination is present, the spilled oil/fuel becomes adsorbed onto solid surfaces (steel, concrete, sand, stone, or soil). Water is not effective for removing the contaminants because it cannot penetrate the interface between the oil and solid surface.

The surfactant's strong affinity for BOTH oil and water causes it to be inserted between the solid surface and oil droplet, allowing the oil droplet to be released ("*mobilized*"). The surfactants will then aggregate on the surface of the mobilized oil droplet, effectively isolating the oil from solid surfaces. Under the right conditions, surfactant molecules will create micelles – spherical structures that completely encapsulate an oil droplet (see Figure 1 above) so as to be miscible in an aqueous solution ("*emulsified*").

On a remediation site in Quebec, BioSolve Activator *doubled* mass removal from a site following multiple treatments with another surfactant



The Activator formula has been optimized to balance *mobilization* and *emulsification* for effective control and removal of light crude oil, fuel range hydrocarbons and related petrochemicals.



**Figure 2.** BioSolve Activator solution ready for injection. *Courtesy of Akifer*

**APPLICATIONS**

When applied to **oil spills**, Activator encapsulates hydrocarbons, reducing vapor pressure and, when properly agitated, will make the spill non-flammable. The same principle makes Activator an excellent choice for controlling hazardous or nuisance VOCs at **constructions sites** when excavating impacted soil.

A dilute solution of Activator sprayed into **storage tanks** or other enclosed spaces will reduce LEL readings in preparation for removal, or manned entry and maintenance.

At in-situ and ex-situ **soil remediation** projects, Activator mobilizes NAPL trapped in the soil matrix and then solubilizes the released NAPL in an **aqueous emulsion**. This allows for efficient removal of effluent containing NAPL from the subsurface for appropriate treatment.

**TREATMENT**

Waste collected at remediation projects can be treated in activated sludge ponds or POTWs, subject to local regulations. Tests have shown that Activator will not harm aerobic or anaerobic bacteria in activated sludge systems.

Activator meets the criteria for “*Ready Biodegradability*” according to OECD 301B testing.

Please contact The BioSolve Company for additional information.

BioSolve Activator Physical Data	
<b>Freeze Temperature:</b> 28°F/-2°C	<b>Odor:</b> Pleasant Fragrance
<b>Freeze Harm:</b> None (may require stirring)	<b>Flammability:</b> None
<b>Boiling Point:</b> 240°F/115°C	<b>Health:</b> Minor Skin Irritant (NCIS Rated 1)
<b>Specific Gravity:</b> 1.0	<b>Density:</b> 8.34 pounds per U.S. gallon
<b>Surface Tension:</b> 22 dyne/cm @ 25°C	<b>Viscosity (Concentrate):</b> 12 centipoise
<b>pH:</b> 7 (concentrate)	<b>Viscosity (5% Solution):</b> 1.2 centipoise
<b>Solvent for Cleanup:</b> Water	<b>Color:</b> Clear Liquid or Dyed Deep Blue
<b>Shelf Life:</b> 10 years (unopened, out of direct sunlight)	<b>DOT Class:</b> 55



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BioSolve Activator is listed on the EPA NCP Product Schedule. This listing indicates only that data has been submitted to EPA as required by Subpart J of the National Contingency Plan 300.915. For professional use at the user's discretion and risk. Instructions provided herein are not intended for site specific applications. Do not use BioSolve Activator without proper permits, approvals and authorization by appropriate regulatory agencies. Use in compliance with all federal, state, and local rules and regulations. For SDS, application protocols or additional information contact The BioSolve Company.