TERGITOL™ 15-S Surfactants
High Detergency, Biodegradable SAEs
TERGITOL™ 15-S Nonionic Surfactants are versatile, high performance Secondary Alcohol Ethoxylates (SAEs) that provide an unbeatable combination of performance and cost when used in place of Primary Alcohol Ethoxylates (PAEs), Nonylphenol Ethoxylates (NPEs), Octylphenol Ethoxylates (OPEs), and other general purpose surfactants in a wide range of formulating applications.

Premium Surfactants for More Highly Differentiated Products

The performance of TERGITOL™ 15-S Surfactants allows formulation of more highly differentiated products for greater competitive advantage. For example, in cleaning product formulations, TERGITOL™ 15-S Surfactants offer a unique combination of excellent detergency, rapid wetting, and fast collapsing foam for good rinseability.

What’s more, the excellent formulating and handling properties of TERGITOL™ 15-S Surfactants can provide significant efficiencies and economies during formulation and handling. TERGITOL™ 15-S products offer:

- Rapid dissolution (even in cold water)
- Narrow gel range
- Good solubility
- Compatibility with many formulation components

Environmentally Friendly

TERGITOL™ 15-S Surfactants are excellent candidates for use in “green” products, such as environmentally friendly cleaners. Most grades of TERGITOL™ 15-S Surfactants are readily biodegradable as determined by the OECD 301 test. They also are low in aquatic toxicity.

Stable and Compatible

TERGITOL™ 15-S Surfactants are chemically stable in the presence of dilute acids, bases and salts. They may be used in the presence of cationic antimicrobial agents. They are compatible with anionic, cationic, and other nonionic surfactants, providing significant formulating flexibility.

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The Line of TERGITOL™ 15-S Surfactants Includes...

TERGITOL™ 15-S-3
TERGITOL™ 15-S-3 Surfactant is an oil-soluble emulsifier that provides excellent hydrocarbon compatibility. This surfactant is used as a defoamer in a wide range of formulations. It is also used in the formulation of prewash spotters, metalworking fluids, oil field chemicals, paper and textile processing, agrochemicals, and dry cleaning.

TERGITOL™ 15-S-5
TERGITOL™ 15-S-5 Surfactant is a water-dispersible product. It is an excellent oil-soluble emulsifier and provides superior handling properties. This secondary alcohol ethoxylate can be used as a low-foam surfactant. The product meets the OECD 301 requirements for ready biodegradability. TERGITOL™ 15-S-5 enhances pigment wetting, especially during the pigment grind. It is used in formulations including hard surface cleaners, prewash spotters, paints and coatings, emulsion cleaners, defoamers, metalworking fluids, oil field chemicals, paper and textile processing, agrochemicals, and dry cleaning.

TERGITOL™ 15-S-7
TERGITOL™ 15-S-7 Surfactant provides exceptional wetting and detergency, excellent rinseability, outstanding handling properties, a narrow gel range, and low odor. It passes the OECD 301 test for ready biodegradability. TERGITOL™ 15-S-7 is used to formulate high performance cleaners and detergents, including hard surface cleaners. It is also used to formulate prewash spotters, paper and textile processing, paints and coatings, agrochemicals, and oil field chemicals.

TERGITOL™ 15-S-9
TERGITOL™ 15-S-9 Surfactant provides superior wetting and detergency. The surfactant is distinguished by its handling properties, including rapid dissolution, narrow gel range, and low odor. This product meets the OECD 301 test for ready biodegradability. TERGITOL™ 15-S-9 Surfactant is used in high performance cleaners and detergents, hard surface cleaners, prewash spotters, paper and textile processing, paints and coatings, agrochemicals, and oil field chemicals.

TERGITOL™ 15-S-12
TERGITOL™ 15-S-12 Surfactant offers superior wetting and detergency, excellent rinseability, good handling properties, a narrow gel range, and low odor. It passes the OECD 301 test for ready biodegradability. It is used in the formulation of high performance cleaners and detergents, paper and textile processing, paints and coatings, and agrochemicals.

TERGITOL™ 15-S-15
TERGITOL™ 15-S-15 Surfactant is a high HLB emulsifier and dispersant. It functions as a freeze-thaw stabilizer, provides electrolyte solubility, and improves high temperature wetting. This product passes the OECD 301 test for ready biodegradability. TERGITOL™ 15-S-15 is used in emulsion polymerization, in paper and textile processing, and in the formulation of solid cleaners.
**TERGITOL™ 15-S-20**

TERGITOL™ 15-S-20 Surfactant is a high HLB emulsifier and dispersant. It can be used as a freeze/thaw stabilizer, to provide electrolyte solubility, and for high temperature wetting. It passes the OECD 301 test for ready biodegradability. Like other TERGITOL™ 15-S Surfactants, 15-S-20 is sold in 100 percent actives form. It is also available in an 80 percent actives solution with water. TERGITOL™ 15-S-20 is used in emulsion polymerization and in the formulation of paints, coatings and solid cleaners.

**TERGITOL™ 15-S-30**

TERGITOL™ 15-S-30 Surfactant is a high HLB emulsifier and dispersant. It is used as a freeze/thaw stabilizer, to provide electrolyte solubility, and for high temperature wetting. It passes the OECD 301 test for ready biodegradability. TERGITOL™ 15-S-30 is used in emulsion polymerization and in the formulation of paints, coatings and solid cleaners.

**TERGITOL™ 15-S-40**

TERGITOL™ 15-S-40 is a high HLB emulsifier and dispersant that provides freeze/thaw stability and electrolyte solubility. It passes the OECD 301 test for ready biodegradability. In addition to the 100 percent actives form, the product is also available in a 70 percent actives solution with water. TERGITOL™ 15-S-40 is used in emulsion polymerization and in the formulation of paints and coatings and solid cleaners.

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### Table 1 – Typical Properties of TERGITOL™ 15-S Surfactants

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<td>Actives Content, wt%</td>
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<tr>
<td>Appearance</td>
<td>Transparent, Colorless Liquid</td>
<td>Transparent, Colorless Liquid</td>
<td>Transparent, Colorless Liquid</td>
<td>Transparent, Colorless Liquid</td>
<td>White, Semi-Solid</td>
<td>White</td>
<td>White</td>
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<td>Cloud Point, 1% aqueous solution, °C (°F)</td>
<td>Insoluble</td>
<td>Dispersible</td>
<td>37 (99)</td>
<td>60 (140)</td>
<td>89 (192)</td>
<td>&gt;100 (212)</td>
<td>&gt;100 (212)</td>
<td>&gt;100 (212)</td>
<td>&gt;100 (212)</td>
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<td>HLB</td>
<td>8.0</td>
<td>10.5</td>
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<td>15.4</td>
<td>16.3</td>
<td>17.4</td>
<td>18.0</td>
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<td>Viscosity at 20°C (77°F), cP</td>
<td>26</td>
<td>35</td>
<td>51</td>
<td>80</td>
<td>93</td>
<td>104</td>
<td>123</td>
<td>145</td>
<td>160</td>
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<tr>
<td>Density at 20°C (68°F), g/mL</td>
<td>0.918</td>
<td>0.963</td>
<td>0.991</td>
<td>1.006</td>
<td>1.026</td>
<td>1.056</td>
<td>1.038**</td>
<td>1.070**</td>
<td>1.099**</td>
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<td>Flash Point, Closed Cup, ASTM D93, °C (°F)</td>
<td>173 (344)</td>
<td>178 (352)</td>
<td>188 (371)</td>
<td>193 (379)</td>
<td>227 (441)</td>
<td>232 (452)</td>
<td>235 (455)</td>
<td>249 (480)</td>
<td>252 (488)</td>
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<tr>
<td>Pour Point, °C (°F)</td>
<td>-46 (-51)</td>
<td>-24 (-11)</td>
<td>-2 (28)</td>
<td>9 (48)</td>
<td>20 (68)</td>
<td>28 (82)</td>
<td>32 (89)</td>
<td>38 (100)</td>
<td>-44 (111)</td>
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*Typical properties, not to be construed as specifications.

**Viscosity at 50°C (122°F), cP

++Density at 40°C (104°F), g/mL

++Density at 55°C (131°F), g/mL

Trademark of The Dow Chemical Company (“Dow”) or an affiliated company of Dow
TERGITOL™ 15-S Surfactants provide performance superior to PAE, NPE, OPE and other general purpose surfactants, enabling formulation of highly differentiated, high performance products, and improved formulation economy and efficiency.

TERGITOL™ 15-S Surfactants offer superior wetting compared to most ethoxylated surfactants. They exhibit rapid aqueous dissolution profiles, and provide outstanding dispersion and emulsification profiles, fast foam collapse rates for good rinseability, and superior detergency for excellent cleaning performance.

TERGITOL™ 15-S Surfactants provide excellent cold temperature performance and freeze/thaw stability, for outstanding formulating flexibility and ease of handling. The surfactants have pour points ranging from -40°C to 44°C and narrow or non-existent gel ranges. The flexibility of TERGITOL™ 15-S Surfactants is also enhanced by their solubility in water and common solvents and their compatibility with anionic, cationic, and other nonionic surfactants.

### Table 2 – Performance Properties of TERGITOL™ 15-S Surfactants

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<td>Equilibrium Surface Tension, dynes/cm</td>
<td>Insoluble</td>
<td>Dispersible</td>
<td>26</td>
<td>30</td>
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<td>Dynamic Surface Tension, dynes/cm</td>
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<td>50</td>
<td>52</td>
<td>53</td>
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<td>Critical Micelle Concentration (CMC) in distilled water at 25°C (77°F), ppm</td>
<td>Insoluble</td>
<td>Dispersible</td>
<td>30</td>
<td>58</td>
<td>110</td>
<td>180</td>
<td>200</td>
<td>710</td>
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<td>Ross-Miles Foam Test, Initial 5 sec, A, wt% at 25°C (77°F)</td>
<td>Insoluble</td>
<td>Dispersible</td>
<td>0.05</td>
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<td>0.11</td>
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<td>37.7°C (100°F)</td>
<td>92/45</td>
<td>55/20</td>
<td>123/84</td>
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<td>120/55</td>
<td>118/28</td>
<td>57/10</td>
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<tr>
<td>50°C (122°F)</td>
<td>77/18</td>
<td>59/70</td>
<td>98/7</td>
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<td>122/22</td>
<td>100/35</td>
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1Typical properties, not to be construed as specifications.
2 Measured at 0.1% wt% and 25°C (77°F).
3 Measured at 0.1 wt% and 25°C (77°F), Maximum Bubble Pressure at 4 bubbles/sec.

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Table 3–Solubility of TERGITOL™ 15-S Surfactants

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<td>Water</td>
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*Trademark of The Dow Chemical Company (“Dow”) or an affiliated company of Dow.
**Wetting Performance**
TERGITOL™ 15-S Surfactants provide more rapid wetting at low concentrations than PAE and NPE surfactants as shown in the comparison. Figure 3 demonstrates that at 0.05 weight percent surfactant wetting for the 15-S is more than 25% faster than for a PAE with similar HLB.

**Hard Surface Wetting**
TERGITOL™ 15-S Surfactants exhibit low aqueous wetting compared to other general purpose surfactants. Figure 4 compares hard surface wetting performance of TERGITOL™ 15-S-9, NPE, and OPE surfactants using spread index methodology.

**Dissolution Time**
Figure 5 shows that TERGITOL™ 15-S Surfactants dissolve rapidly in water—significantly faster than PAE or NPE surfactants—contributing to faster, easier product formulation. TERGITOL™ 15-S Surfactants also offer formulating flexibility because dissolution rates are rapid even in cold water and in highly concentrated systems.

**Foam Performance**
TERGITOL™ 15-S Surfactants have much less stable foam than NPE, OPE and PAE surfactants. Their rapid foam collapse aids in product rinsability, a significant advantage in cleaning product and other formulations. Figure 6 shows initial and five-minute Ross-Miles foam performance.

**Hard Surface Cleaning**
Figure 7 compares the hard surface cleaning performance of TERGITOL™ 15-S Surfactants to PAE surfactants. In this example, the detergency of the surfactants was compared on an oily/particulate soil on a vinyl floor tile. The more hydrophobic (lower HLB) products in the TERGITOL™ 15-S product line exhibit significantly higher detergency than the PAE products. The TERGITOL™ 15-S products exhibit the best overall performance when compared to both PAE and NPE surfactants.
Figure 3–Draves Wetting Comparison

Figure 4–Hard Surface Wetting Comparison

Figure 5–Dissolution Time Comparison

Figure 6–Ross-Miles Foam Performance

Figure 7–Hard Surface Cleaning

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Applications

Cleaning Products
- High Performance Cleaners and Detergents
- Hard Surface Cleaners
- Solid Cleaners
- Hydrocarbon- and Water-based Prespotters
- Dry Cleaning
- Emulsion Cleaners

Emulsion Polymerization

Paints & Coatings

Other Applications
- Oil Field Chemicals
- Textile Processing
- Paper Processing
- Agrochemicals
- Metalworking Fluids
- Defoamers

TERGITOL™ 15-S Series Selection Guide

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To Learn More…

To learn more about TERGITOL™ 15-S Surfactants and the full line of anionic and nonionic surfactants from Dow—or to receive product samples—contact the Dow location for your region, listed below.

The Dow Chemical Company
Midland, Michigan 48674 U.S.A.
In the United States, Canada, Mexico: call 1-800-447-4369 • fax 989-832-1465
In Europe: call toll-free +800-3-694-6367 • call (+32) 3-450-2240 • fax +32 3-450-2815
In the Pacific: call +800 7776-7776 • call (+60) 3-7958-3392 • fax +600 7779-7779 • fax (+60) 3-7958-5988
Latin America: call (+55) 11-5188-9222 • fax (+55) 11-5188-9749
Or visit us at www.dowsurfactants.com

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