

SPAN



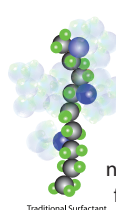
EXTENDED TERM SOIL SURFACTANT

TECHNICAL INFORMATION BULLETIN

SPAN is a specialized extended term soil surfactant formulation designed to improve and maintain uniform water movement, distribution, retention, drainage and air-to-water ratios in water repellent soils for approximately 120 days! SPAN incorporates a blend of two uniquely different, but highly complementary block surfactant technologies that are capable of significantly extending the performance window of SPAN's surfactant activity. This unique surfactant technology combination is ideally suited for superintendents looking for a long-lasting solution for water repellent soils.

WHAT LIMITS THE LENGTH OF SURFACTANT PERFORMANCE?

Regardless of the efficacy of surfactant, how long it will maintain its promised performance is usually determined by how rapid its polymer structure is degraded and disassociated by microbes and chemical interaction in the soil profile.



Traditional "long-term" surfactants (with claims of 2 – 3 months of activity) are usually formulations containing higher concentrations of surfactants in order to compensate for microbial degradation. Soil microbes that proliferate in the rootzone of turfgrass consider surfactants as a viable food (carbon) source they need to provide the energy necessary to sustain life. Since microbial populations are normally quite high and active in turf soil rootzones, few of these formulations can be expected to deliver consistent performance for a full 60 to 90 days.

It is common for soil microbes to begin their degradation of surfactants through enzymatic cleavage of bonds at oxygen sites of the surfactant. This can result in the rapid separation (Fig. 1) of the hydrophobic part of the surfactant molecule that attaches to the water repellent surface of the soil particle from its hydrophilic molecular counterpart that attracts water molecules. **As a result of this separation, the surfactant is rendered ineffective and its surfactant performance is lost.** The biodegradation sequence is usually completed with the stepwise degradation of the remaining molecular chains.

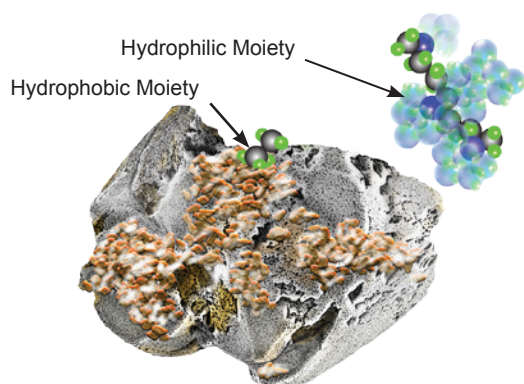


Fig. 1 Illustration showing cleavage and disassociation of hydrophilic part (site of hydration) from hydrophobic part (site of attachment) of surfactant molecule.

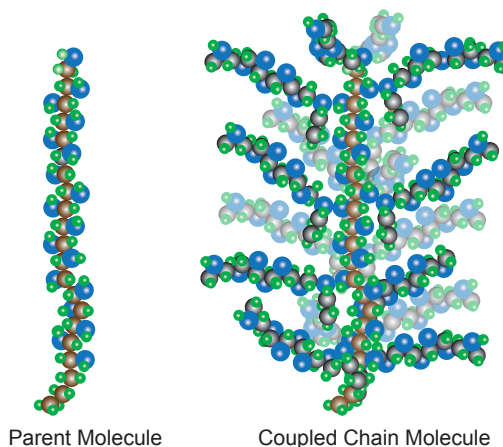
SPAN TECHNOLOGY

SPAN represents a new dimension in surfactant chemistry that places the product at the forefront of extended term surfactant technologies. It combines novel surfactant structures ideally suited to extend performance over a longer period of time when compared to other "long-term" soil surfactants on the market.

Radically Different Chemistry

At the heart of the SPAN long term soil surfactant technology is unique controlled copolymerization processes that allow selected surfactants to adhere to a large fully functional surfactant parent molecule. The result is a large macromolecular architecture resembling a "brush" with its copolymer side chains functioning as a "bristle-like" coating.

This branched configuration of independent copolymer surfactants allows the final product to be "tuned" for increased surfactant performance as well as provide a means to compensate for microbial degradation of the surfactant's structure -- the primary cause of performance decay.



Unlike traditional "long-term" surfactants whose surfactant characteristics are terminated when disassociated by the cleavage of their molecular structure, the SPAN's side chain molecules are constructed in a manner that allows them to be removed from the parent surfactant molecule, attach to water repellent sites on soil particles and retain their surfactant activity (Fig. 2).

Once attached to hydrophobic areas on the soil particle surface, the copolymers establish new sites of hydration. This greatly extends the time that SPAN will continue to provide improve hydration on water repellent soils. It should be noted that the parent molecule also retains its surfactant structure and activity – even when all its side chain copolymers are removed.

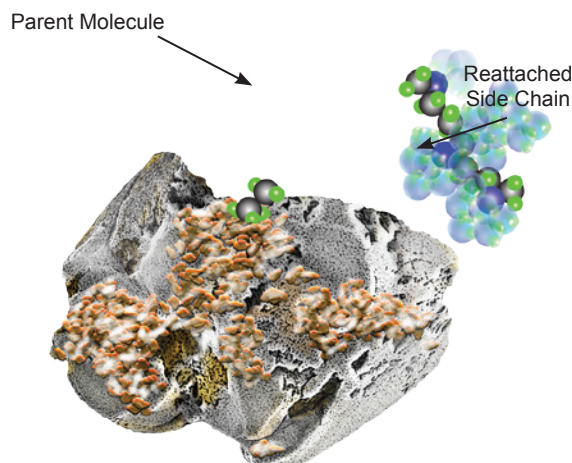


Fig. 2 Illustration showing cleavage, disassociation and reattachment of fragmented side chain surfactants on water repellent soil particle surface.

Improved Hydration Strategy

SPAN makes use of an advanced combination of two surfactant technologies –a block polymer surfactant in addition to its long-lasting branch copolymer surfactant. These surfactants have been selected specifically for their unique hydration properties, their impact on water movement into and within the soil and their overall contribution to improved water management. Truly, SPAN puts technology to work for you for unsurpassed performance.

The use of a combination of surfactants in the SPAN formulation is a key element in the product's hydration strategy. Used in combination, these surfactants create a hydration matrix that promotes a more effective and efficient use of applied water (Fig. 3).

Turfgrass managers who use SPAN extended term soil surfactant will experience technologies that power a new standard for "long-lasting" surfactant solutions to water repellency in greens, tees, fairways and other areas suffering from hydrophobic soil conditions. Golf course superintendents will find that using SPAN will result in:

- 120 days of uniform vertical and lateral movement of water and solutes into and through the soil profile
- Exceptional hydration and rehydration of existing areas showing symptoms of hydrophobicity
- Improved stress tolerance, color and overall turf quality
- Significant improvement in soil air:water ratios
- Better drainage
- Reductions in localized dry spot (LDS)
- Safe to use on all grasses

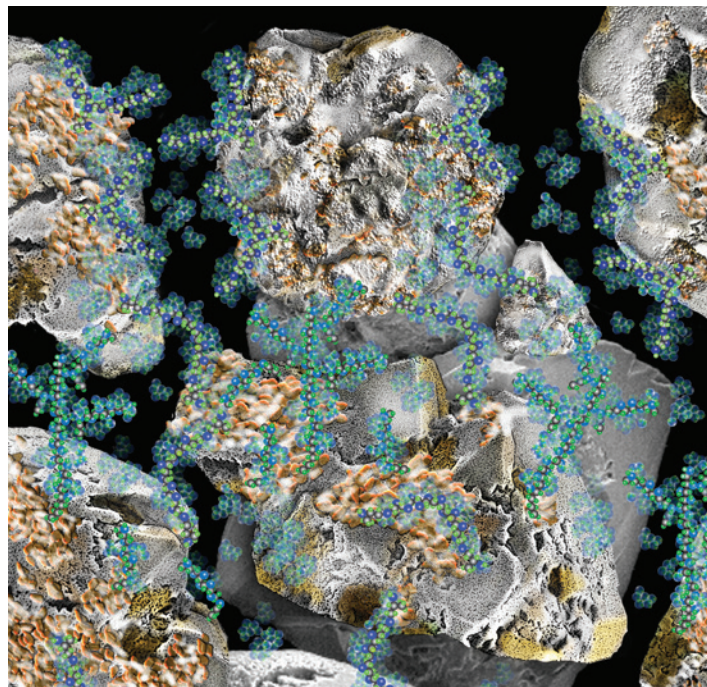


Fig. 3 Illustration showing hydration matrix formed from the combination of surfactants found in SPAN. Not only is hydration enhanced, but movement of water from irrigation or rainfall events moves uniformly throughout soil profile.

USE DIRECTIONS

ACTIVE INGREDIENT: 100% Alkoxylated Polyols
NOT A PLANT FOOD INGREDIENT

DIRECTIONS FOR GENERAL TURF USE

GREENS, TEES, FAIRWAYS, LAWNS AND SPORTS TURF

Localized Dry Spot and Water Repellency Conditions:

SPAN L Formulation: Apply SPAN L as a preventive program. SPAN L can be applied in two applications. Apply at 8 ounces per 1,000 ft² (240 ml. per 100 sq. meters). Wait 7 to 30 days to reapply second application. Under the two split applications SPAN L should be sprayed at 8 ounces per 1,000 ft² (240 ml. per 100 sq. meters) and should be applied in 2 gallons of water per 1,000 ft² (8 liters of water per 100 sq. meters) spray solution.

SPAN L can also be applied at 16 ounces per 1,000 sq. ft. in 5 gallons of water per 1,000 ft² (480 ml. 100 sq. meters in 20 liters of water per 100 sq. meters).

SPAN G Formulation: Apply SPAN G as a preventive program. Granular rates can be two split applications at 3.5 lbs per 1,000 ft² (1.6 kilograms per 100 sq. meters) each. SPAN G can be applied in one application at 7.0 lbs. per 1,000 ft² (3.2 kilograms per 100 sq. meters). Irrigation should be applied after application to remove SPAN G from the leaf surfaces. SPAN G is safe on turf.

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