QS -302
Silicone Surfactant

JangXi Tiansheng New Materials Co. Ltd

Rappresentante per l’Italia:
Soitem Srl
DESCRIPTION

• QS-302 spray adjuvant is a super-spreading surfactant based on a trisiloxane ethoxylate. QS-302 spray adjuvant lowers the surface tension of spray solutions, beyond that which is achievable with conventional adjuvants.

• Typically, QS-302 spray adjuvant (@0.1 wt%) gives an aqueous surface tension of < 22 mN/m. On the other hand, an octylphenol ethoxylate containing 10 EO units (a commonly used nonionic surfactant) at 1.0 wt% gives a surface tension of only 30 mN/m.

• QS-302 spray adjuvant helps lower the aqueous tension more effectively than conventional spray adjuvants. Because QS-302 spray adjuvant is a superspreading surfactant, the contact angle of spray solutions on leaf surfaces is reduced, leading to an increase in spray coverage (Figure 1).
Figure 1: Spreading
Spreading of Mancozeb Spray Formulation on Potato Foliage (Adjuvant Rate: XmL/100Liters)
Spreading comparison:

Water + Conventional surfactants

Water + Silicone surfactants
• Additionally, under specific conditions, QS-302 spray adjuvant promotes rapid uptake of agrochemical into plants via stomatal infiltration. Spray solutions taken into plants in this way become rainfast, thereby improving application reliability (Figure 2).

**Figure 2:** Uptake of C-DOG into Bean Leaf (10 Min. A.T.)

DOG=Radio Labeled Deoxyglucose uptake at 10 Minutes After Treatment
Unlike other trisiloxane alkoxylation products, which are negatively affected by oil based components (i.e. EC formulations, spray oils, etc.), QS-302 spray adjuvant provides enhanced spreading in many of these types of formulations relative to competitive organosilicone based adjuvants (Figure 3).

**Figure 3: Spreading of Oil Based Agrochemicals (EC Formulation)**

Influence of Adjuvant on “Tank-Mix” Spreading Properties

- Organosilicone (0.1wt%)+Triclopyr, Butoxy Ester EC@0.3%
- Triclopyr as the butoxy ester @600g/L (Emulsifiable Concentrate Formulation)
KEY FEATURES AND TYPICAL BENEFITS

• Superspreader for soluble liquid and emulsifiable concentrate formulations
• Promotes spray volume reduction
• Promotes rapid uptake of agrochemicals (rainfastness)
• Improves spray coverage
• Nonionic
• Meets requirements of EPA 40CFR § 180.910
## TYPICAL PHYSICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface Tension (0.1%, mN/m)(^{(a)})</td>
<td>21.5</td>
</tr>
<tr>
<td>Cloud Point (0.1 wt%), °C</td>
<td>&lt; 10</td>
</tr>
<tr>
<td>Viscosity (cst @ 25 °C)</td>
<td>48</td>
</tr>
<tr>
<td>CMC (Wt%)(^{(b)})</td>
<td>0.007</td>
</tr>
<tr>
<td>Pour Point, °C</td>
<td>-8</td>
</tr>
<tr>
<td>Specific Gravity (25/25 °C)</td>
<td>1.021</td>
</tr>
<tr>
<td>Flash Point(^{(c)}) °C</td>
<td>117</td>
</tr>
</tbody>
</table>

\(^{(a)}\) Surface Tension by Wilhelmy Plate Method  
\(^{(b)}\) Critical Micelle Concentration  
\(^{(c)}\) Pensky-Martens Closed Cup, ASTM Method D93
POTENTIAL APPLICATION

QS-302 spray adjuvant has been used successfully in spray applications globally. Typical applications include:

<table>
<thead>
<tr>
<th>Application</th>
<th>Typical Use Rate&lt;sup&gt;(a)&lt;/sup&gt;</th>
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<tbody>
<tr>
<td>Plant Growth Regulators</td>
<td>0.025% to 0.05%</td>
</tr>
<tr>
<td>Herbicide</td>
<td>0.025% to 0.15%</td>
</tr>
<tr>
<td>Insecticide</td>
<td>0.025% to 0.1%</td>
</tr>
<tr>
<td>Fungicide</td>
<td>0.015% to 0.05%</td>
</tr>
<tr>
<td>Fertilizers and Micronutrients</td>
<td>0.015% to 0.1%</td>
</tr>
</tbody>
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(a) Note: use rates are dependent on crop, agrochemical and spray volume requirements
HOW TO USE

(1) In Agrochemical Formulations:
QS-302 spray adjuvant may be used as a component in agrochemical formulations. Although organosilicone surfactants are subject to hydrolysis under acidic or basic conditions, optimum performance is achieved by buffering the formulation to pH 6.5-7.5. Additionally, it is recommended that QS-302 spray adjuvant be used at a concentration of at least 5%, based on the total formulation.

(2) AS A Tank Mix Adjuvant:
QS-302 spray adjuvant, when used as a tank-side adjuvant may be used to improve spray coverage, improve uptake or to allow for a reduction in spray volume. QS-302 spray adjuvant is most effective as a tank-side adjuvant when spray mixtures are 1) within a pH range of 5-8, and 2) used within 24 hours of preparation.

High spray volumes, coupled with high surfactant rates, are not required to achieve sufficient coverage with QS-302 spray adjuvant. In fact, QS-302 spray adjuvant has the potential to provide adequate coverage in many low volume spray applications at rates between 0.025% and 0.1%
Herbicidal Effect:

Before spraying pharmacy

After spraying pharmacy (Herbicide+QS-302)
Obvious synergy for insecticides