TRISYL® Silica Gel
For Oils/Fats and Biofuel Refining
The Cost-Effective Solution for Improving Oil Quality

Conventional adsorbents perform two basic tasks; color removal and impurity adsorption.

Relatively large quantities of bleaching clays are normally required to perform both these tasks (due primarily to its low surface area). Decades of industrial practice, proved that TRISYL® silica is an efficient adsorbent for polar impurities. If color is not an issue, TRISYL® silica is a valid alternative to bleaching clay.

In oils for which reduction of color is more critical, the TRISYL® silica is used in combination with clay, preferably in a two-step addition process:

1. TRISYL® silica “cleans the oil” by removing polar impurities.
2. A reduced quantity of bleaching clay is left to perform only one function – to bleach, i.e. color reduction.

This significantly reduces the total quantity of adsorbent used and enhances quality of the oil.

TRISYL® Silica Product Portfolio

Our product portfolio includes several TRISYL® silica grades, both treated and untreated, able to respond to both regional and global needs, and made available in a variety of different packaging. Our globally available TRISYL® silica product range includes:

- TRISYL® silica for refining of oils and fats
- TRISYL® 300 silica for post treatments
- TRISYL® 150IE silica, specifically designed for Enzymatic Interesterification (EIE).

Benefits of TRISYL® Synthetic Amorphous Silica

- Reproducible quality
- High degree of chemical purity
- Amorphous silica, without crystalline quartz species
- Safe to handle
- Non-dusting, low product loss during handling
- Massive internal particulate surface area
- Small quantity, highly efficient
- Reduced need for process water
- No negative effects on oil chemistry

Helps make your processes environmentally friendly.

Conditions, Functions, and Use

Optimum conditions for the use of TRISYL® silica during the refining process are:

- Oil temperature 70-90°C
- TRISYL® silica added under “atmospheric” pressure
- The contact time between the TRISYL® silica and the slightly moist oil 10-15 minutes.
- The moisture in the oil plays an important role in the mechanism responsible for transporting the polar contaminants from the oil to the TRISYL® silica, where they are then trapped. The optimum moisture content of the oil should be between 0.2–0.5%.
- Following the removal of polar contaminants by the TRISYL® silica, the oil should be dried if clay is to be used in the bleacher.
- During the drying process (drier/bleacher vessel) under vacuum, water is removed from TRISYL® silica and the silica “sponge” shrinks, leaving a weight reduced amount (~40% of original weight) of TRISYL® silica powder or solid adsorbent to be collected on the filter.
- This results in a much reduced quantity of “filter cake” which enables higher filtration flows and a much longer filtration cycle.

A Reduction In Adsorbent Use Results In:

- A lower quantity of filter cake
- Lower waste management and associated disposal concerns and costs
- Reduced oil losses in the filter cake
- Longer filtration cycles
- Improved overall cost-efficiency of the process
Increase Your Oil Yield and Reduce Environmental Footprint

TRISYL® silica gel can be easily incorporated into the chemical, physical or enzymatic refining stages of the edible oil refining processes.

TRISYL® Silica Improves Your Process Yield

The concept of NOL (Neutral Oil Loss) on the filter cake is well known by the Oils and Fats Industry. By asking how much oil is entrapped in your absorbent’s spent cake, it’s quite common to get an answer between 20 and 25%. However, when critically analyzing filter cakes, the typical oil content will be higher.

General Filter Cake Composition

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inorganic Residue</td>
<td>58%</td>
</tr>
<tr>
<td>Organic Matter</td>
<td>40%</td>
</tr>
<tr>
<td>Hexane Extractable</td>
<td></td>
</tr>
<tr>
<td>Water (H₂O)</td>
<td>2%</td>
</tr>
</tbody>
</table>

Water Reduction

TRISYL® silica helps reduce your environmental footprint by offering the following benefits:

- Reducing the filter cake to be disposed
- Improving safety in the workplace—no self-ignition risks
- Reduces the amount of process water

Water is one of the most precious elements on Earth we have to preserve.

TRISYL® Silica For Your Process

The major drivers for using TRISYL® silica in a refinery is to improve productivity, reduce environmental footprint and reduce costs without compromising on quality.

Grace developed a variety of novel processes to allow for the easy incorporation of TRISYL® silica for a variety of different refinery configurations including:

- Sequential addition (2-step addition)
- Packed bed bleaching
- Modified caustic refining
- Modified physical refining
- Post treatment of modified oils/fats
- In enzymatic processes
- Staggered TRISYL® silica tri-clear refining process
TRISYL® Silica For Biofuel Feedstock Purification

The demand for Biofuel is expected to grow as governments around the world mandate its use as a means of reducing greenhouse gas emissions, building energy security, and improving domestic economies.

TRISYL® silica is recommended for the pre-treatment of feedstock oil in biodiesel production. It enables the economic conversion of biomass to biodiesel by increasing yields and improving fuel quality.

Our global technical support team of experienced technicians, scientists and engineers have experience in a range of biofuel processes.

For more information about TRISYL® silica or for help with choosing the best grade for your application, please contact your local Grace Representative, or visit us at grace.com.