

# CAB-O-SIL® M-5F AND EH-5F FUMED SILICA FOR FOOD APPLICATIONS

## APPLICATION GUIDE

System	CAB-O-SIL Food-Grade Fumed Silica Benefits	Application Examples	CAB-O-SIL food-grade fumed silica benefits																									
LIQUIDS & SEMI SOLIDS	<b>CARRIER, FLAVOR MASKING AGENT:</b> CAB-O-SIL food-grade fumed silica adsorbs liquids to produce dry powders that can be easily mixed with other solids. At higher concentrations, CAB-O-SIL fumed silica can act as a flavor masking agent to facilitate the formulation of fortified/nutritious foods.	<ul style="list-style-type: none"> <li>✓ Vitamin E and Omega 3 adsorption</li> <li>✓ Masking of bitter/metallic flavors</li> </ul>	<ul style="list-style-type: none"> <li>◆ Liquid adsorption</li> <li>◆ Anti-settling</li> <li>◆ Improved flow</li> <li>◆ Improved dispensability</li> <li>◆ Increased storage stability</li> <li>◆ Improved aesthetic appeal</li> <li>◆ Liquid thickening</li> </ul>	<ul style="list-style-type: none"> <li>◆ Microencapsulation</li> <li>◆ Transparency</li> <li>◆ Conditioning agent</li> <li>◆ Increased drying rates</li> <li>◆ Flavor masking</li> <li>◆ Lipid substitution</li> <li>◆ Improved process efficiency</li> </ul>																								
	<b>MICROENCAPSULATION:</b> CAB-O-SIL food-grade fumed silica encapsulates volatile compounds, reducing evaporation rates. This increases flavors' shelf life and reduces costly losses due to flavor change in the final product.	<ul style="list-style-type: none"> <li>✓ Flavor microencapsulation</li> </ul>																										
	<b>DRYING AID, PROCESS EFFICIENCY:</b> CAB-O-SIL food-grade fumed silica reduces clogs in the spray dryer atomizer and decreases the amount of product sticking to the walls; it delivers higher powder recovery, improves drying efficiency, and increases throughput by facilitating lower spray dryer atomizer temperatures.	<ul style="list-style-type: none"> <li>✓ Non-dairy coffee creamer</li> <li>✓ Spray dried tomato powder</li> <li>✓ Canned vegetable oil spray</li> </ul>																										
	<b>THICKENING, ANTI-SETTLING, EMULSIFICATION:</b> CAB-O-SIL food-grade fumed silica is an effective thickening, emulsification, and anti-settling agent, due to its ability to form a network and hold heavier ingredients in place. Its low sensitivity to temperature and pH makes it an attractive replacement for other stabilizers and viscosity control agents.	<ul style="list-style-type: none"> <li>✓ Salad dressing</li> <li>✓ Frozen desserts</li> <li>✓ Gelling oils</li> <li>✓ Pickering emulsions</li> </ul>																										
POWDERS	<b>FREE FLOW, TRANSPARENCY, STORAGE STABILITY:</b> CAB-O-SIL food-grade fumed silica acts as a spacer and moisture adsorbent, reducing lump formation and crystallization, and facilitating free flow, exact dosing, and storage stability.	<ul style="list-style-type: none"> <li>✓ Automatic coffee powder dispensing</li> <li>✓ Snacks' powdered flavors</li> <li>✓ Powdered egg whites</li> </ul>	<b>Selection guide</b> <table border="1"> <thead> <tr> <th></th><th>CAB-O-SIL M-5F Fumed Silica</th><th>CAB-O-SIL EH-5F Fumed Silica</th></tr> </thead> <tbody> <tr> <td>Adsorption</td><td>***</td><td>*****</td></tr> <tr> <td>Microencapsulation</td><td>***</td><td>*****</td></tr> <tr> <td>Dispersability</td><td>*****</td><td>***</td></tr> <tr> <td>Anti-settling</td><td>***</td><td>***</td></tr> <tr> <td>Anti-caking</td><td>***</td><td>***</td></tr> <tr> <td>Transparency</td><td>***</td><td>*****</td></tr> <tr> <td>Surface area</td><td>200 m<sup>2</sup>/g</td><td>380 m<sup>2</sup>/g</td></tr> </tbody> </table>			CAB-O-SIL M-5F Fumed Silica	CAB-O-SIL EH-5F Fumed Silica	Adsorption	***	*****	Microencapsulation	***	*****	Dispersability	*****	***	Anti-settling	***	***	Anti-caking	***	***	Transparency	***	*****	Surface area	200 m <sup>2</sup> /g	380 m <sup>2</sup> /g
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END PRODUCT	<b>LIPID SUBSTITUTION, TEXTURE, AESTHETIC APPEAL:</b> CAB-O-SIL food-grade fumed silica facilitates the substitution of up to 40% of fat contained in foods, by: a) providing a more homogeneous lipid distribution to enhance the fat's effectiveness; and b) acting as an effective stabilizer of Pickering emulsions that replace fat fractions. In both cases, the organoleptic properties of the final product are preserved.	<ul style="list-style-type: none"> <li>✓ Extruded snacks</li> <li>✓ Baked cookies</li> <li>✓ Low calorie frozen foods</li> <li>✓ Pickering emulsions for fat substitution</li> </ul>	<b>Performance:</b> Best = ***** Good = ***																									

## Health & safety

- ◆ High purity, food grade silica quality.
- ◆ Colorless, odorless, tasteless.
- ◆ No Genetically Modified Organisms.
- ◆ Products do not contain common food allergens.
- ◆ Food Grade Statement provided by Cabot Corp.

## Regulatory compliance

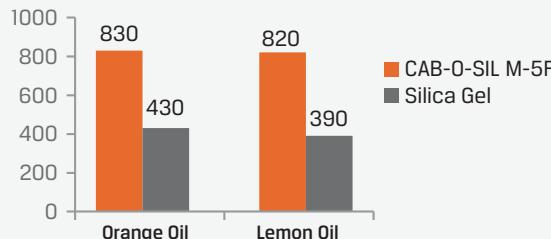
- CAB-O-SIL M-5F and EH-5F fumed silica are silicon dioxides that:
- ◆ Are approved food additives (E551) per listing in EC Regulation N° 1333/2008.
  - ◆ Are labeled according to EC Regulation N° 1333/2008.
  - ◆ Meet the purity criteria of E551 monograph as laid out in EU Regulation 231/2012.
  - ◆ Are determined as US FDA GRAS per scientific procedure established under 21 CFR170.30 ( b )

Cabot GmbH, Rheinfelden plant is a registered food ingredients supplier and is HACCP, Kosher and Halal certified.

**CARRIER**

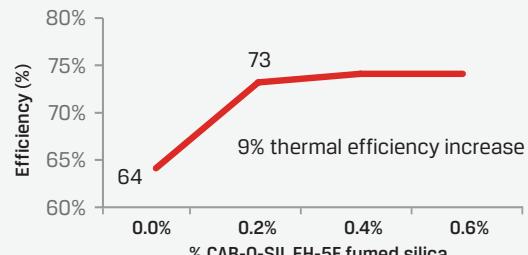
Liquid, semisolid, or pasty substances can be converted into dry flowing powders by adding CAB-O-SIL M-5F fumed silica. Improved carrier performance occurs at higher adsorption values.

**Oil adsorption values**  
(g/100g of Silica)

**SPRAY DRYING AID**

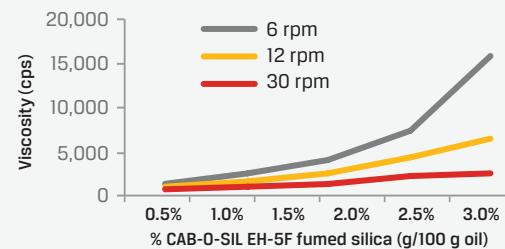
CAB-O-SIL EH-5F fumed silica can improve spray-drying thermal efficiency by up to 10%, prevent clogs in the atomizer and deliver higher powder recovery. It also can increase higher throughput, as spray dryers can be operated with a lower outlet temperature.

**Spray drying thermal efficiency**

**THICKENING**

Increased CAB-O-SIL EH-5F fumed silica concentrations can lead to a substantial increase in viscosity. Mixing at low shear forces achieves the best results, as high blending speeds fragment the network formed by CAB-O-SIL fumed silica, reducing viscosity.

**Thickening of soybean oil**

**FREE FLOW**

CAB-O-SIL M-5F fumed silica offers equivalent performance as a flow aid when compared to precipitated silica, with the advantage that it does not dull the natural food color (whereas precipitated silica does). This is thanks to its low refractive index of 1.46 and to the lower loading required.

**Tomato powder and precipitated silica\***



\*For illustration purposes only

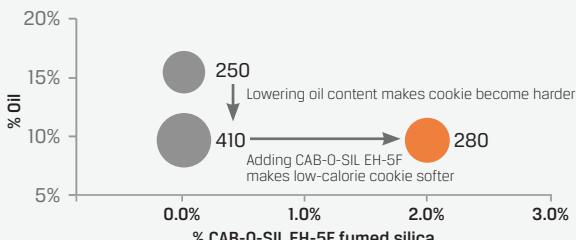
**Tomato powder and fumed silica\***

**LIPID SUBSTITUTION**

CAB-O-SIL EH-5F fumed silica lowers moisture loss, reduces lipid oxidation, and provides stabilization against staling, all while reducing the required lipid fraction. Example: low-calorie soft cookies.

**Hardness value of low-calorie cookies**

Bubble Size = Force (g) → Hardness (lower is better)

**FINAL PRODUCT STORAGE STABILITY**

CAB-O-SIL EH-5F fumed silica can improve the texture of extruded foods, as measured by breaking strength, which is a proxy for crispiness or brittleness.

**70% wheat starch / 30% gluten extrudate shear**

Force (N) → Crispiness / Brittleness

