

CAVAMAX® W6 – STABLE OIL-IN-WATER EMULSIONS

From salad dressings to mayonnaise: many foods contain an oil-in-water phase and must be stabilized using emulsifiers. However, emulsifiers can create difficulties in the formulation. Alpha-dextrins (CAVAMAX® W6) solve this problem.

Lecithins, mono- and diglycerides, milk proteins or egg yolk are often used as emulsifying agents. In most cases, these are of animal origin, heat- and acid-sensitive, potentially allergenic and, in the case of egg yolk, an undesired source of cholesterol.

A Perfect Solution: Alpha-Dextrin

CAVAMAX® W6 is an alpha-dextrin – a naturally occurring, cyclic oligosaccharide, enzymatically produced from starch (see Figure 1). As a well-defined, chemically pure substance, it has consistent technical properties. It is a non-digestible, yet fully fermentable, water-soluble dietary fiber that stabilizes oil-in-water emulsions very effectively.

Emulsification via Molecular Encapsulation

Three-dimensional, donut-shaped cyclodextrins have a hydrophobic cavity on the inside and a hydrophilic cover on the outside.

The cavity can attract and encapsulate the fatty acid tail of triglycerides. This leads to the formation of a surfactant-like structure, which has emulsion-stabilizing properties (see Figures 2 and 3).

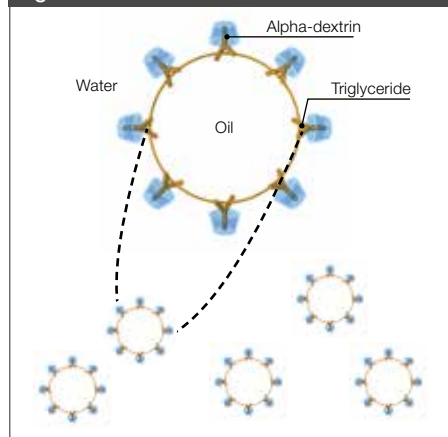
More than Stabilizing

In addition to stabilizing emulsions, CAVAMAX® W6 alpha-dextrin can alter the viscosity, and thus the organoleptic properties, of the emulsion, depending on the oil-to-water ratio and the amount of alpha-dextrin used. CAVAMAX® W6 allows manufacturers to adjust formulation viscosity to resemble anything from ketchup to icing – often with significantly less fat and thus fewer calories.

Figure 2

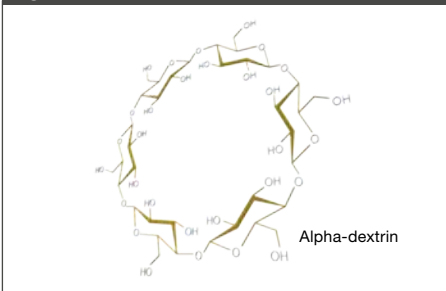


Figure 3



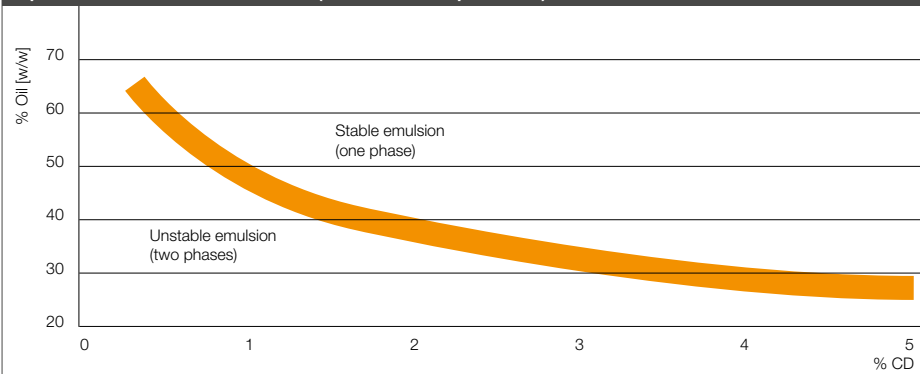
Oil-in-water emulsions can be stabilized by adding CAVAMAX® W6 alpha-dextrin.

Figure 1

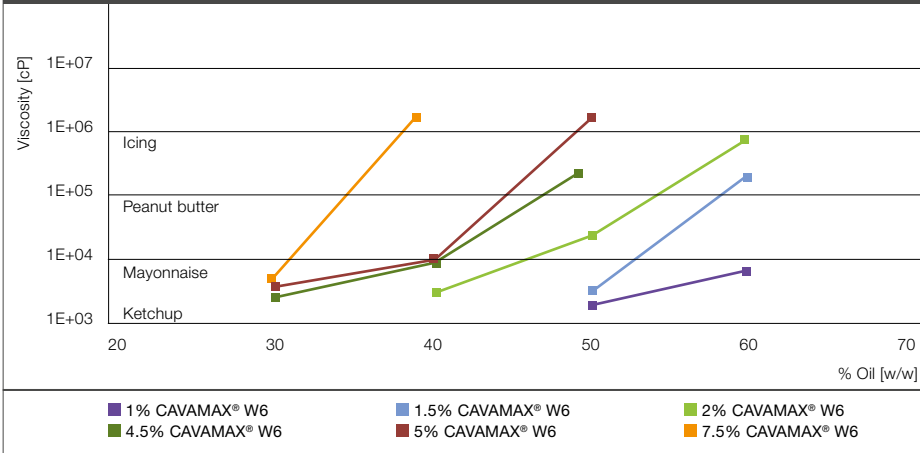


WACKER uses a patented process to produce CAVAMAX® cyclodextrins enzymatically from starch. WACKER is the only producer in the world that offers three types (sizes) of cyclodextrins. Alpha-dextrins are best suited for use with emulsions.

Graph 1: Emulsions with Vegetable Oil (Canola), Water and Different CAVAMAX® W6 Alpha-Dextrin Concentrations (at Room Temperature)

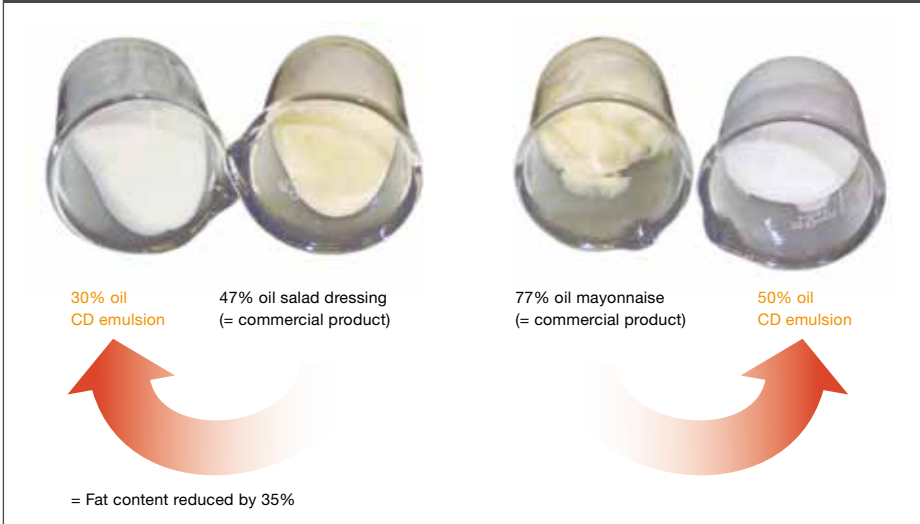


Graph 2: Viscosity Modulation of Emulsions (Canola Oil and Water) by Addition of CAVAMAX® W6 Alpha-Dextrin



At room temperature, viscosities of oil-in-water (canola) emulsions can easily be adjusted from ketchup-like to icing-like by adding varying amounts of CAVAMAX® W6 alpha-dextrin.

Graph 3: A Broad Range of Emulsion Viscosities with Reduced Fat Content Are Possible



For a Variety of Applications

CAVAMAX® W6 can be used whenever an oil-in-water emulsion has to be stabilized, viscosity has to be modulated, or where a stable emulsion is to be obtained, e.g. in sauces, dressings, mayonnaise-like applications, whipped foods and margarines.

CAVAMAX® W6 Alpha-Dextrin O/W Emulsions – Summary of Technical Properties

- Purely vegetarian (vegan on request)
- Water-soluble CAVAMAX® W6 alpha-dextrin and triglycerides form very stable emulsions at low to high oil concentrations – the “sweet spot” lies between 40% and 65% oil
- Increasing the oil level increases viscosity
- Increasing the CAVAMAX® W6 alpha-dextrin level increases the viscosity
- Temperature during emulsion preparation should stay below 30 °C
- Stability is good over a temperature range of 4 to 40 °C
- Shear-thinning effect
- The lower the pH, the lower the viscosity
- Compatible with common hydrocolloids (xanthan gum, guar gum, etc.)

CAVAMAX® W6 alpha-dextrin stabilizes oil-in-water emulsions (canola oil and water) with viscosities at room temperature similar to those of commercial products (such as salad dressings or mayonnaise), but with a markedly reduced fat content.



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