

VIVAPUR® MCG 900X F as a Stabilizer for Nutraceutical Emulsions

Introduction

Many nutraceutical ingredients are not water soluble. Therefore, they are often formulated as either suspensions or emulsions. In the case of nutraceutical emulsions, the active ingredients are dissolved in oil or the oil phase itself can be a nutraceutical ingredient, for example fish oil, which contains high quantities of health-promoting omega-3 and omega-6 fatty acids. In order to stabilize the thermodynamically instable system of two immiscible phases, emulsifying agents are required. Classic emulsifiers support the emulsion formation and stabilization by lowering the surface tension. **VIVAPUR® MCG** enables additional long-term stability of oil-in-water emulsions by the formation of a gel network.

Stabilization Mechanism of VIVAPUR® MCG

VIVAPUR® MCG functions as an additional secondary emulsifier which imparts a gel structure to the aqueous phase. This helps to keep the oil droplets homogeneously distributed within the gel network over a long time period and thereby prevents flocculation, coalescence, creaming and phase separation (Fig. 1). Due to shear thinning properties of **VIVAPUR® MCG**, the emulsion can be dosed accurately after shaking and the thixotropic behavior enables a fast regeneration of the gel. Moreover, with **VIVAPUR® MCG** the viscosity of the emulsion can be adjusted for usage in stickpacks or in multidose containers.

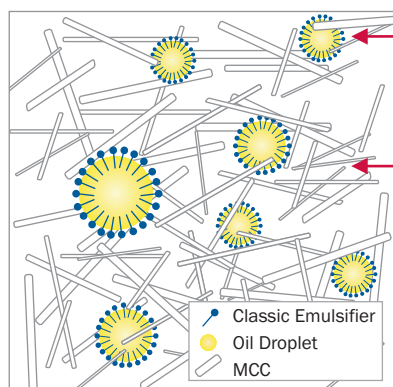


Fig. 1 Schematic representation of the stabilizing mechanism of oil droplets in a MCG stabilized oil-in-water emulsion.

The classic primary emulsifier accumulates on the oil droplet surface and lowers the surface tension.

VIVAPUR® MCG as the secondary emulsifier forms a three dimensional fiber network. The oil droplets can be kept homogeneously within the gel network and are prevented from floating.

Characteristics of VIVAPUR® MCG

VIVAPUR® MCG is a synergistic, co-processed composite consisting of microcrystalline cellulose (MCC) and sodium carboxymethylcellulose (CMC). It is a free flowing powder, which forms a thixotropic suspension after activation. **VIVAPUR® MCG 900X F** is a special grade for nutraceutical applications, which additionally contains xanthan gum and is characterized by an improved salt and acid tolerance as well as an optimized long-term stability.

Example Formulation

Ingredient	(g/100 mL)
Fish Oil	25
VIVAPUR® MCG 900X F	0.5
Water (deionized) for Activation	20
Acacia Gum	3
Xylitol	30
Flavor	q.s.
Citric Acid	0.07
Potassium Sorbate	0.035
Mixed Tocopherol, Rosemary Extract, Ascorbyl Palmitate	q.s.
Water (Deionized) for Pre-dissolving further Ingredients and Volume Adjustment	q.s.

Tab. 1 Fish Oil Emulsion

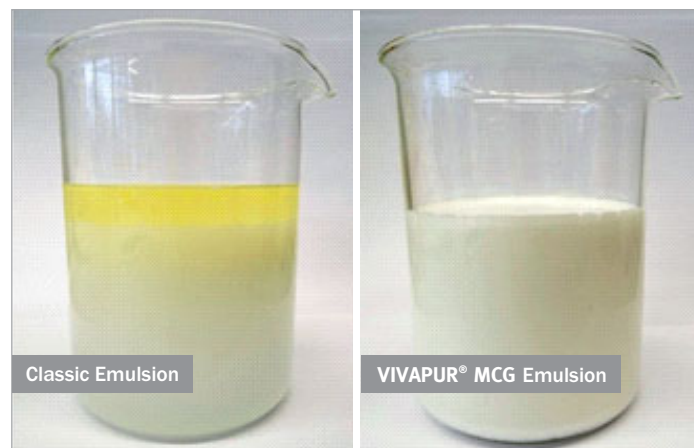


Fig. 2 O/W Emulsion stabilized without **VIVAPUR® MCG** (left) and with **VIVAPUR® MCG 900X F** (right).