PURE THIX[®] NONIONIC POLYMER THICKENERS





PURE THIX[®] – Novel Nonionic Associative Thickeners for Cosmetics and Personal Care

For water-based systems different types of rheological additives are available:

- Inorganic thickeners: Smectite layered silicates
 Optigel[®] and Laponite[®] (separate Technical Information available)
- Polysaccharides: Cellulose Gum, Xanthan Gum
- Synthetic organic polymers (non-associative): Acrylates
- Associative thickeners: PURE THIX®

Nonionic Associative Thickeners PURE THIX®

With the PURE THIX[®] product line Rockwood is offering a novel type of water phase thickeners. PURE THIX[®] products are nonionic associative thickeners based on hydrophobe modified PEG-180. The hydrophilic polyethylene glycol backbone gives the PURE THIX[®] water solubility, while the hydrophobic modifications form an associative network with each other and with hydrophobic moieties and surfaces of other substances in the formulation, e. g. with pigments and surfactants. Associative thickeners have surfactant-like hydrophobes that »associate« with themselves and with solids dispersed in the medium. (see Fig. 1)

The PURE THIX[®] technology enables variable rheological characteristics of products. Derived from type and amount of hydrophobes on the polymer backbone, rheology can be more Newtonian or more pseudoplastic.

The PURE THIX[®] products are delivered as colourless 100% active flakes. They can be classified as follows by their INCI names and by their rheology:

Product	INCI Name	Rheology
PURE THIX [®] 1450	PEG-180/ Laureth-50 TMMG Copolymer	Almost Newtonian
PURE THIX [®] 1442	Polyether-1	Pseudoplastic

PURE THIX[®] 1450 is thickening by association with other ingredients of the formulation, e. g. polymers and pigments. PURE THIX[®] 1442 can actually gel water without any other hydrophobic substances.

Both products are easy to process without need of high shear. For PURE THIX[®] 1442 heating to 60°C with moderate stirring is recommended for quick solution. PURE THIX[®] 1450 is easy soluble even in cold water.

PURE THIX[®] is distinguished from other water phase thickeners by the following benefits:

- Crystal clear gels
- Salt tolerance
- Compatibility even with cationic surfactants
- No neutralisation
- pH independent viscosity in the application range pH 5.5 to 12
- Multifunctionality: Emulsifier, film former, humectant as additional effects
- »Associative« thickening with other formulation ingredients

Gellation of Water

Polyether-1 can actually gel water without any other substances in the formulation. Viscosity as a function of concentration when gelling water with PURE THIX[®] 1442 is shown in Figure 2.

Salt Tolerance

lonic thickeners are strongly affected by salt content. The viscosity of systems with nonionic PURE THIX[®] products is fairly constant at sodium chloride levels of 4% and higher. The salt tolerance of Polyether-1 in the range of 0 to 4% sodium chloride is shown in Figure 3.

PEG-180/Laureth-50/TMMG Copolymer will have even higher salt tolerance in its areas of application.





Figure 2 – Gellation of water with PURE THIX® 1442



Thickening of Cationic Surfactants

Thickener PURE THIX®

Many anionic thickeners are incompatible with cationic surfactants. Even at low concentrations of cationic surfactants mutual inactivation through salt formation may occur. With PURE THIX® systems with cationic surfactants can be thickened as well. The graph in Figure 4 demonstrates thickening of a 1% solution of stearyl dimethyl benzyl ammonium chloride (INCI name: Stearalkonium Chloride) with PURE THIX® 1442. In a 3% emulsion of di(hydrogenated tallow alkyl) dimethyl ammonium chloride (INCI name: Quaternium-18) PURE THIX® 1442 is thickening even more. (see Fig. 5)

Associative Thickening with Zinc Oxide

Sunscreen products frequently contain micronised titanium dioxide or zinc oxide. The interaction of the hydrophobic moieties of PURE THIX[®] with the surface of these pigments results in an associative thickening. The addition of 8% zinc oxide increases the viscosity of a 2% aqueous solution of PURE THIX[®] 1442 by nearly 40%. (see Fig. 6)

Due to its unique benefits, PURE THIX[®] is used in personal care and cosmetic applications as follows:

- Skin care: Emulsifying properties, elegant feel
- Bath and shower gels: Excellent skin feel, transparent thickening
- Hair care: Combability, use in conditioners with cationic surfactants, use in styling products
- Sunscreen products: Associative interaction with titanium dioxide or zinc oxide gives rise to thickening and dispersion of the actives
- Decorative cosmetics: Associative thickening with pigments

The novel nonionic associative thickeners of Rockwood can further be used in cleaners:

- Liquid cleaners for household and I&I applications: Transparent thickening of neutral and alkaline cleaners
- Disinfectants, fabric softeners, etc.: Thickening and viscosity control of systems containing cationic surfactants and water as main solvent, at pH-values above 5.5.





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EUROPE

Rockwood Additives Limited Moorfield Road Widnes Cheshire WA8 3AA United Kingdom Tel: +44 (0)151 495 2222 Fax: +44 (0)151 420 4401

Rockwood Clay Additives GmbH Stadtwaldstr. 44 85368 Moosburg, Germany Tel: +49 (0)8761 72150-373 Fax: +49 (0)8761 72150-334

ASIA

Rockwood Specialties (Singapore) Pte. Limited 171 Chin Swee Road Unit No: #10-08 San Centre Singapore 169877 Tel: +65 6532 0676 Fax: +65 6532 0502

NAFTA

Southern Clay Products, Inc. 1212 Church Street Gonzales, Texas 78629, USA Telephone: +1-800-324-2891 Direct Line: +1-830-672-2891 Fax: +1-830-672-1903

Southern Clay Products, Inc. 1600 W. Hill Street Louisville, Kentucky 40210, USA Tel: +1-800-468-7210 Fax: +1-502-634-7727

e-mail: rheoinfo@rockwoodadditives.com