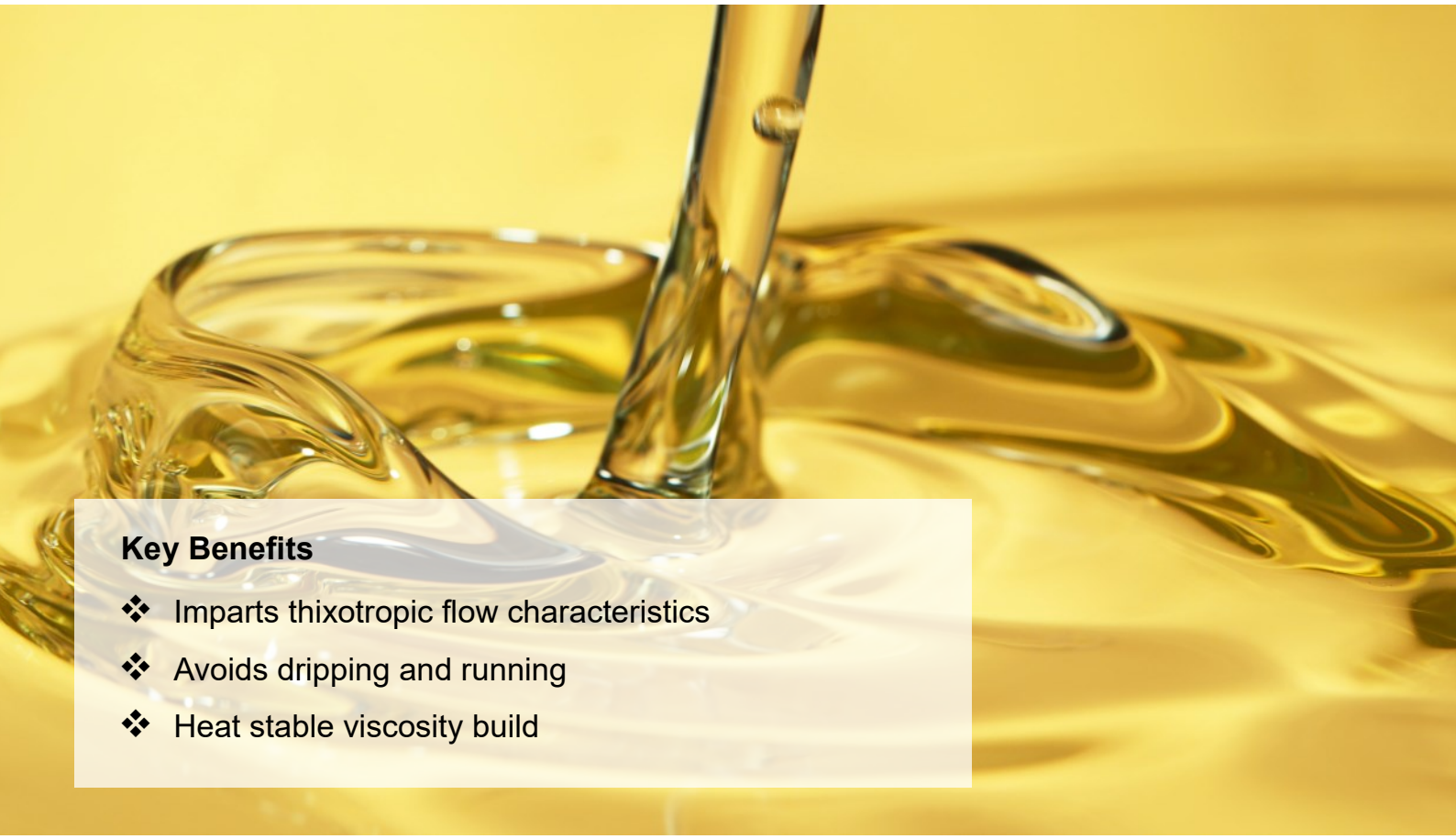
ELEMENTIS

A global specialty chemicals company

Application Leaflet

BENTONE® organoclays

Highly effective rheology modifiers for various oils types



Key Benefits

- Imparts thixotropic flow characteristics
- Avoids dripping and running
- Heat stable viscosity build

Introduction

BENTONE® organoclay materials are based on either Bentonite or Hectorite, both minerals are belonging to the smectite group. In their natural form both minerals are expandable in water due to their microfine platelet stacks based mineralogical structure. As visualized in *Figure 1*, the Hectorite platelets are significantly smaller than those of Bentonite, the resulting edge length per gram of silicate in the Hectorite is much larger. This makes Hectorite additives able to build up a much denser and more rheologically effective network.

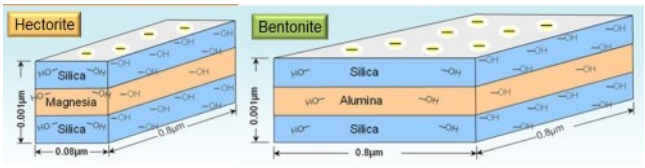


Figure 1: Hectorite/Bentonite comparison

To make the clays compatible with non-aqueous media e.g. various oils, it is necessary to modify the surface of their silicate plates with quaternary ammonium compounds.

In order to be activated, organoclays must be exposed to high shear forces over a defined swelling period. During the activation process, the platelet stack is first subjected to swell in the proposed oil and then smashed with strong shear (*Figure 2*).

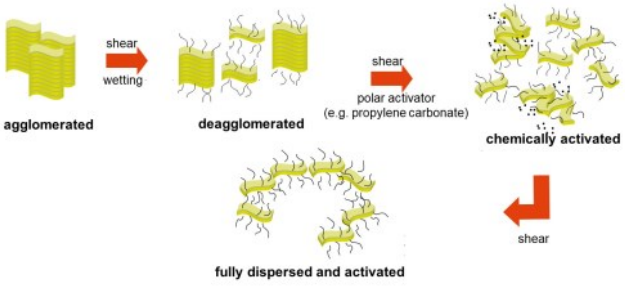


Figure 2: Mechanism of activation

As it can be seen in Figure 3, the delaminated, organically modified silicate platelets that result can then effective rheologically via intermolecular forces, e.g. hydrogen bonds with the water molecules of a polar activator.

In case of the conventional organoclay (non SD grades) the use of polar/chemical activator, such as propylene carbonate, is needed.

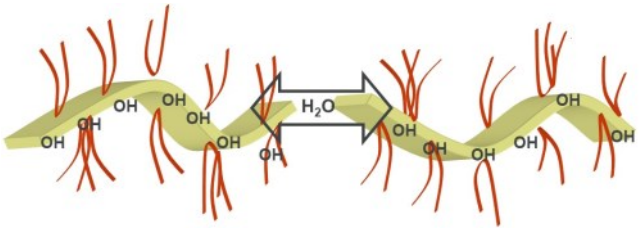


Figure 3: Hydrogen bonding

As rheology modifiers for oils, organoclays are offering a number important benefits.

Key properties

- High and low temperature stability - important in activation, heavy duty industry and mining
- Applicable over a wide range of oils - paraffinic, naphtenic, biodegreable vegetable oils, etc
- Bleed resistance
- Excellent aging stability
- Easy manufacturing

With respect to the individually utilized organic modification of the clay, none of the available organoclays fits with oils of various polarity.

Specific organoclay recommendations can be found in the selection chart below.

	Mineral oil		Polyalpha -olefine	Synthetic oil	Siliconoil	Ester oil	Glycol oil	Vegetable oil	Soybean oil
	paraff.	napht.							
BENTONE® 34	++		+	++					+
BENTONE® SD-1	++		+	++					+
BENTONE® 1000	++	+	++	+	+	+			
BENTONE® 38	++		++	++	+				++
BENTONE® SD-2		++			++	++	++	++	
BENTONE® 27		++			++	++	++	++	

++ = recommended + = alternative, pre-tests recommended

Selection chart

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