
# Rheology Modifiers
# Fundamentals for Use

## Hydration

Slowly add clay to water while continuously agitating the entire medium. To avoid clumping, add product directly to the vortex under high shear. It is important to hydrate clay flakes or powder in water first, mix until uniform before adding other ingredients.

The time required to complete hydration depends on the following factors:

- ✓ **Mixing Time**
- ✓ **Water Temperature**
- ✓ **Shear Rate**

| Mixer | Batch Size | Mixing Time |
|---|---|---|
| Waring Blender | 500g | 5 minutes |
| Homogenizer | 1000g | 15 minutes |
| Lightnin' Type Mixer | 30Kg | 30 minutes |

- For hot water (50°C and above), the mixing time can be reduced by as much as 25%, dependent upon the solids level and clay type.
- For addition rates up to 2%, the clay could be made into a pre-gel, or directly mix into medium so long as sufficient water is available for the hydration on the clay.
- The general rule of thumb is that the longer the clay is mixed (sheared), the more mechanical and thermal energy that is generated throughout the mixing medium—the more complete the clay will be hydrated.

**Synergy Guidelines with Organic Thickeners**

American Colloid's specialty clay products are often incorporated with organic thickeners, which combine synergistically; creating properties that the clay nor the organic thickener would achieve alone. Thus optimizing and expanding the options of a formulator.

**Suggested Mixing Procedures**

- Make a pre-gel of organic thickener and water. Slowly add pre-gel to a specialty clay under good agitation. Mix until uniform before incorporating additional ingredients.
- With nonionic cellulosics that are difficult to disperse in water. First, hydrate specialty clay in hot water under good agitation, cool while agitating until the cellulosic is completely dissolved.
- When working with carbomers, add simultaneously with a specialty clay or as dry blend to water. Mix until uniform before adding other ingredients. Neutralize carbomer after hydration.

| Organic Thickener | Weight to Weight Ratio Clay to Organic Thickener |
|---|---|
| Cellulosics | |
| Carboxymethylcellulose | 10:1 to 1:1 |
| Hydroxyethyl Cellulose | 1:1 |
| Hydroxypropyl Cellulose | 1:1 |
| Hydroxypropylmethylcellulose | 1:1 |
| Methylcellulose | 1:1 |
| Natural Gums | |
| Gum Arabic | 4:1 to 2:1 |
| Gum Tragacanth | 9:1 to 2:1 |
| Guar Hydroxypropyl | 1:1 |
| Sodium Alginate | 2:1 to 1:1 |
| Sodium Carrageenan | 10:1 to 1:1 |
| Xanthan Gum | 10:1 to 1:1 |
| Polyacrylates | |
| Carbomers | 10:1 to 1:1 |
| Polyacrylates | 5:1 to 1:1 |

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2870 Forbs Avenue, Hoffman Estates, IL 60192 - USA - Tel: 847.851.1500 | Fax: 847.851.1210