Xanthan
Xanthan gum

- **Source**
  - *Xanthomonas campestris*, a bacteria

- **Structure**
  - Basically a derivatized cellulose

- **Introduced in food in 1963**
Xanthomonas campestris
Xanthan gum structure

Cellulose backbone

Sidechain
Single xanthan molecules
High resolution xanthan image
Xanthan molecular network
Xanthan gum properties

- Xanthan is a very stiff rod (double helix) in dispersion
- Extraordinary stability to heat, acid, and alkali
- Average molecular weight is on the order of 2 million
- Xanthans that have the most pyruvic acid content have the highest viscosities and thermal stabilities
Xanthan gum properties

- Acetyl groups stabilize the ordered helix, pyruvate groups destabilize it
- Due to stiffness, molecules in solution are quite extended
- This leads to high viscosity and highly pseudoplastic dispersion rheology (may even behave as weak gels)
- Dispersions may have a Newtonian plateau at low shear
Xanthan viscosity

- Newtonian plateau
- Pseudoplastic thinning

Shear stress (dynes/cm²)

About 10 - About 100

Log viscosity
Xanthan interactions

- Interacts with
  - Guar
  - Locust bean gum

- Commercial xanthan tends to be contaminated with cellulase, Hence, you can’t use xanthan in systems with CMC
Xanthan-LBG synergism

**Graph:**

- Title: XG:LBG at different ratios: mixing effect on steady shear viscosity
- Y-axis: Viscosity (Pa s)
- X-axis: Ratios (XG, LX 1:3, LX 1:1, LX 3:1, LBG)
- Legend:
  - Blue square: 0.1 (1/s)
  - Pink diamond: 1.0 (1/s)
  - Red triangle: 10.0 (1/s)
  - Green circle: 100.0 (1/s)
Xanthan-LBG interaction
Viscosity behavior
Selected xanthan uses

- Stabilizes aqueous dispersions, suspensions, and emulsions
- Pourable dressings
- Gravies
- Frozen dessert stabilizers
- Cream cheese
- Syrups (Mrs. Butterworths)
- Chocolate syrup
Selected xanthan uses

- **Salad dressings**
  - Thickens and stabilizes
  - Suspends particles (spices)
  - Very often used in conjunction with propylene glycol alginate (PGA)
  - Xanthan:PGA = 1:2
  - [xanthan] = 0.3%, [PGA] = 0.6%

- For more uses, see Bemiller, Table 10.1
Labeling

- Xanthan
- Xanthan gum