

**Rheology Fundamentals & Applications  
for Synthetic Latices and Associated  
Coating Formulations**

**Day 1**

**AM:** 8:30 AM to Noon

- Basics of creating and characterizing synthetic polymer latices
  1. Particle nucleation and growth
  2. Control of polymer composition, MW, gel content
  3. Functional additives (esp. vinyl acids) and neutralization
  4. Colloidal stability
  5. Measurement of particle size, glass transitions, MFFT, acid distribution
- Basics of fluid rheology, including polymer solutions
  1. Newtonian, shear-thinning, shear-thickening fluids
  2. Thixotropy, rheopexy
  3. Viscoelasticity
  4. Shear versus extensional deformation

**PM:** 1:15 to 5:00 PM

- Rheology of simple dispersions (volume fraction, particle size, temperature)
- Non-Newtonian behavior, structure development at high volume fraction
- Rheology of bimodal and multimodal dispersions
- Introduction of non-spherical particles

**Day 2**

**AM:** 8:30 AM to Noon

- Latex particle-particle interactions, DLVO approach, water soluble materials inherent in latex polymerization
- Surface region of latex particles, hairy layers, effective size
- Role of “functional additives” (e.g. vinyl acids), neutralization, polyelectrolytes, water swelling of latex particles
- Formulated systems
  1. Binders, pigments and fillers
  2. PVC, CPVC, NVV
  3. Coating life—cycle

**Day 2**

**PM:** 1:15 to 5:00 PM

- Coating ingredient effects on rheology
  1. Simple thickeners, rheology modifiers
  2. Associative thickeners
  3. Dispersants and others additives
  4. Interaction with latex surfactants
- Mixing and storage of formulated latex products
  1. Mechanical effects
  2. Heat-thaw effects
  3. Phase separation (syneresis), entropic flocculation

**Day 3**

**AM:** 8:30 AM to Noon

- Interactions between latex particles, pigments, fillers, and other additives
  1. Effects on coating formulation properties
  2. Effects on dry film physical properties
- Applying latex based dispersions
  1. Substrates effects
  2. Shear rates relevant to various application methods
  3. Extensional viscosity and normal stresses
- Flow and leveling after application

**PM:** 1:15 to 4:30 PM

- Film formation mechanisms
  1. Latex packing and particle coalescence
  2. Single and multiple phase particles
  3. Coalescing aids
  4. Low and “zero” VOC formulations
- Applications to Latex paints, Paper coatings, Pressure sensitive adhesives, Sealants and Caulks
- Problem solving sessions throughout workshop
- Course summary and review