Course:

Colloid Chemistry and Colloidal Dispersions - Fundamentals and Practical Aspects

21-23 May 2019

Location: RISE, Drottning Kristinas väg 45, Stockholm, Sweden

Lectures:

Introduction to Colloid Chemistry
• Nature of the colloidal state and classification
• Brownian motion
• Particle size and shape

Forces in Colloidal Systems
• Origin of attractive forces
• Hydrophobic forces
• Entropic forces

Colloidal Instability
• The six different instabilities of colloidal dispersions
• Stabilization of colloidal systems through an osmotic barrier

Colloidal Stability – Charge Stabilization I & II
• How to introduce charges on colloidal particles
• Theories of stabilization with charge
• Characterization of colloidal particles by electrokinetic measurements

Solvent Properties
• Solvents other than water

Introduction to Phase Diagrams
• Phase diagrams of two-, three-, and four components
• Stability, instability and metastability

Surfactants in Solution and Adsorption of Surfactants on Colloidal Particles
• Self-assembly structures (micelles, bilayers, vesicles)
• Mixtures of surfactants
• Surface and interfacial tension
• Adsorption on solid and liquid surfaces

Polymers in Solution
• Characterization and properties
• Polymer phase behaviour
• Mixtures of polymers in solution

Adsorption of Polymers on Colloidal Particles - Steric Stabilization
• Effect of polymer molecular weight and kinetic effects
• Adsorption of polyelectrolytes
• Stabilization of colloids with polymers – steric stabilization
• Flocculation with polymers

Surfactant – Polymer Interaction in Solution and at Surfaces
• Phase behaviour of surfactant – polymer mixtures
• Adsorption of surfactant – polymer mixtures at surfaces

Preparation of Colloidal Particles/Dispersions
• Condensation methods
• Dispersion methods

Heterosystems – Stability and Instability
• Systems with particles and liquid interfaces – suspoemulsions
• Attachment of dispersed particles to interfaces and effects on colloidal stability of emulsions and foams
• Heterocoagulation

Rheological Behaviour of Colloidal Systems I & II
• Basic concepts and definitions
• Effect of dispersion state and solid content
• Thickeners in aqueous solution
• Viscoelasticity and rheometry techniques

Emulsion and Emulsifiers
• Emulsion characteristics
• Surfactant choice and the preparation of emulsions
• Mechanisms of emulsion stability and instability ***Foams***
• Foam characteristics, preparation and stability
• Foam breaking

The course program also includes a shorter tour of the laboratory facilities of RISE. The tour is an opportunity to see and learn more about a couple of research instruments relevant to the topics of the course.