Emulsion Polymers Consulting and Education, LLC

An international consulting group with offices in the USA (New Hampshire) and Canada (Ontario)
Corporate office: 39 Nute Road, Madbury, NH 03823-7500 USA www.epced.com

the wisdom of experience, the power of knowledge

Tutorial Outline for Surfactant Adsorption

1. Molecular nature/characteristics for surfactants (anionic, cationic, non-ionic)
2. Surfactants in aqueous systems
    a. CMC (Critical Micelle Concentration) and variation with Temperature and Ionic Strength (IS)
    b. Measurement techniques for CMC
3. Surfactant adsorption onto latex particles
    a. How do surfactant molecules adsorb on the polymer surface?
        •Adsorption/desorption molecular dynamics
    b. How much surface area does each molecule cover (A_S)?
        1.) A_s values at saturation (equilibrium coverage)
        2.) Partial saturation – adsorption isotherms
4. DLVO theory and applications/insight
    a. Critical coagulation concentration (CCC) and Ionic Strength (IS)
    b. Definition of Zeta Potential
5. Effect of copolymer composition at particle surface
    a. Non-acid monomer containing systems
        1.) Polar/non-polar copolymers (e.g. MMA/BA)
        2.) Effects for composite particles (two different polymer interfaces exposed)

3.) Adsorption on latex blends (2 latexes with different polymer polarities)

4.) Effects of initiator end groups

b. Acid monomer containing systems (AA, MAA, etc.)

1.) Acid content at surface of particles

- Surface *region* vs. COOH actually "on surface"
- Measurement techniques

2.) pH dependencies with acid at surface

- E.g. what happens during neutralization (COOH → COO-)

6. Non-ionic surfactants

a. Various types of non-ionics

- Effect of molecular weight (gel formation, bridging flocculation, etc.)

b. Anionic/non-ionic systems

- Competitive adsorption at polymer surfaces