Title: Waterborne Resins for Surface Coatings

Goal of the course: Synthesis, Properties and applications of waterborne resins

1-Resin definition. Explanation on paint ingredients. Role of resins on some important paint parameters. Preliminary introduction to polymer science.

2- Principles of film formation. Classification of resins in viewpoints of film formation mechanism by focusing on Homogeneous and heterogeneous waterborne systems.

3- Chemistry and physical properties of water. Environmental aspects, general terms, safety and benefits.

4- Waterborne alkyds and polyester resins, emulsification and polymerization, Raw materials, Synthesis and properties. Emulsification of nitrocellulose in water. Film defects and modification methods.

5- Water-soluble amino and phenolic resins. Dispersion and solution. Raw materials, synthesis and properties.

6- Waterborne epoxy resins. Emulsification and modifications. Nano emulsion and micro emulsion. Thermodynamic and Kinetic stabilities of dispersion resins.

7- Waterborne polyurethane. Polyurethane dispersions (PUD). Four main techniques of synthesizing PUDs. Raw materials properties and applications.

8- Features of emulsion polymerization. Raw materials including acrylic monomers, surfactants and initiators. Techniques of synthesizing and general properties. Smith – Ewart and Harkins theories.

References

1- م، خراسانی؛ اصول و کاربردهای پلیمریزاسیون امولسیونی، انتشارات دانشگاه صنعتی امیرکبیر، ۱۳۹۸

2- P. A. Lovell, M. S. El-Aasser, Emulsion Polymerization and Emulsion Polymers, Wiley, 1997.

3- D. R. Karsa, W. D. Davies, Waterborne coatings and additives, Royal Society of Chemistry, 1995.

4- J. Edward Glass, Technology for Waterborne Coatings, American Chemical Society, 1996.

5- M. Schwartz, R. Baumstark, Waterbased acrylates for decorative coatings, Vincentz, 2001.