



“Gheorghe Asachi” Technical University of Iasi, Romania



Book Review

EMULSION FORMATION AND STABILITY

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The title of this book reflects the importance of emulsification techniques for studying the interaction between the emulsion droplets. This book is based on a selection of some papers from the Fifth World Congress on Emulsions and emphasizes the importance of emulsions in the food, cosmetics, pharmaceuticals, agrochemicals and paints industries.

The first chapter describes various issues related to emulsion classification, the main methods of emulsion manufacture, and the physical-chemical characterization of the various types of emulsions: thermodynamic of emulsion formation and breakdown, interaction energies between emulsion droplets, as well as different emulsifier selection criteria. The first chapter also tackles the creaming or sedimentation of emulsions, as well as the flocculation of emulsion, Ostwald ripening and emulsion coalescence. The end of the first chapter is devoted to emulsion rheology, including both interfacial rheology as well as the bulk rheology of emulsions.

Emulsion formation in membranes and microfluidic devices is also dealt with in the second chapter. The authors of this chapter point out the main applications of droplet formation in membranes and microfluidic devices and they argue that the main advantages of the use of these devices consist of their ability to accurately control the inner structure, evenness and sizes of particles.

The third chapter includes issues related to the qualitative and quantitative analysis of the interface properties of C_n TABs adsorption layers at the water/hexane interface. Two techniques are used here: the profile analysis tensiometer (PAT-1) and oscillating drop and bubble pressure analyzer

(ODBA). The theoretical models employed by the authors are as follows: the Frumkin ionic compressibility model for qualitative analysis, and the classical Frumkin model for qualitative analysis.

The chapter called “Measurement Techniques Applicable to Investigation of Emulsion Formation during Processing” reports the main experimental study techniques of the emulsion formation process, which may be grouped in three categories: those monitoring droplet size, those that concentrate on droplet breakup, and those that consider coalescence individually. The authors of this chapter argue that the combined use of the various techniques may lead to the better understanding of emulsification.

Chapter five dwells on emulsification in rotor-stator mixers, which is frequently used in the food, pharmaceutical and fine chemical industries since it is relatively inexpensive, robust and versatile. In this chapter the authors also show the existing rather basic description of the flow and dispersion processes that are currently used in engineering applications. The CFD model offers unique possibilities in describing single-phase flow. However, the development of new breakage and coalescence models within the population balance equations combined within CFD and verified by experiments should enable a more detailed analysis of the emulsification processes in rotor-stator mixers.

Chapter 6 is devoted to surfactant selection, formation and properties of paraffin emulsions. The industrial application of paraffin emulsions is described highlighting the property of paraffin and method of preparation.

Chapter 7 describes nano-emulsion formation using a method called phase inversion emulsifications (PIC). Polymeric nano-emulsions obtained by the PIC method can be used as templates for nanoparticle preparation for biomedical applications.

The last chapter of the book starts by a general classification of polymeric surfactants, the classification criterion being their structure in: homopolymers, the block and graft copolymer type. The next subsection is devoted to emphasizing the main interactions between the droplets adsorbed on the polymeric surfactant surface. The applications of block and graft copolymer for the preparation of highly stable emulsions is also described. The principles of the various rheological techniques that can be applied to study the interaction between droplets in an emulsion are described at the end of the chapter.

Each chapter of the book contains an up-to-date well documented list of references. The book is written in a contemporary fashion and includes many illustrations which make the text more useful for specialists in chemical engineering. The book is necessary to people working into various fields, such as food, cosmetics, pharmaceuticals, agrochemicals and paints industries.

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