Contents

	oduction	1
I.1	Definition of Emulsions	3
I.2	Definition of Solubilization	4
I.3	Definition of Microemulsion	5
I.4	Definition of HLB, HLB number and HLB Temperature (Phase Inversion Temperature = PIT in emulsion)	6
	References	7
	actants and Solubilization Microemulsions	
	mulsion Types in Surfactant/Water/Oil	
Syst	mulsion Types in Surfactant/Water/Oil ems The Effect of Temperature and/or the Hydrophilic Chain Length of Emulsifier on	11
Syst	ems The Effect of Temperature and/or the	11 12
Syst	The Effect of Temperature and/or the Hydrophilic Chain Length of Emulsifier on the Solution Behavior of Nonionic Surfactant, Solubilization, and Types of	

6	20 10 10	H (0-44	8 8 8	CO.
0	O	6 m	H H H	-

A

	1.1.2 The Effect of Temperature on the Solubilization of Oil in Aqueous Solutions of Nonionic Surfactants	19
	1.1.3 The Effect of Temperature on the Solubilization of Water in	
	Nonaqueous Solutions of Nonionic Surfactants	22
	1.1.4 The Change of Emulsion Type with Temperature	24
1.2	The Effect of Temperature and/or the	
	Hydrophilic Chain Length of Surfactant on	
	the Phase Equilibria and the Types of	
	Dispersions of the Ternary System	
	Composed of Water, Cyclohexane, and Nonionic Surfactant	28
	1.2.1 The Effect of Temperature on the	40
	Phase Equilibria	28
	1.2.2 Characteristic Temperature for the	
	Mutual Dissolution of Oil and Water:	
	Hydrophile-Lipophile Balanced	
	Temperature (HLB Temperature)	32
	1.2.3 The Effect of Oxyethylene Chain	
	Length of Nonionic Surfactant on the Phase Equilibria	34
	1.2.4 The Effect of Temperature on the	04
	Dispersion Types	36
1.3	Solution Behavior of Ionic Surfactant +	
2,0	Cosurfactant/Water/Oil Systems	40
	1.3.1 The Change of the Dissolution State	
	of Ionic Surfactant + Cosurfactant	
	with the Compositions	41
	1.3.2 The Effect of the Types of	
	Counterions, the Types of	
	Surfactants, and Hydrocarbon Chain Length of Surfactants	43
	Length of Sulfactants	40

		1.3.3 The Effect of Temperature on the HLB of Ionic Surfactant and	
		Cosurfactant Mixture	48
		References	50
		References	00
2		cepts of HLB, HLB Temperature, and HLB	55
	2.1	Concepts of Hydrophile–Lipophile Balance (HLB) of Surfactant	56
	2.2	HLB Temperature (Hydrophile–Lipophile Balance Temperature or PIT)	58
	2.3	HLB Number	68
		2.3.1 H/L Number	71
		2.3.2 Correlation Between the HLB Number and Other Properties	83
		2.3.3 Application of the HLB Method	84
	2.4	Hydrophile-Lipophile Balance, HLB, of	
		Ionic Surfactants	88
		References	91
			i.
3	Fact	ors Affecting the Phase Inversion	
		perature (PIT) in an Emulsion	95
	3.1	Influence of the Types of Oils on the PIT	96
	3.2	Effect of the Oxyethylene Chain Length of Emulsifier on the PIT	99
	3.3	The Effect of Phase Volume on the PIT of Emulsions Stabilized with Nonionic	100
		Emulsifiers	103
		The Effect of the Hydrocarbon Chain Length of Oils on the PIT of Emulsions	108
	3.5	The PIT as a Function of the Composition of Oil Mixtures	108

xii	Co	ontents	
	3.6	The PIT of Emulsions of Emulsifier	
		Mixtures	110
	3.7	The Effect of Added Salts, Acid, and Alkali	
		on the PIT of Emulsions	117
	3.8	The Effect of Additives in Oil on the PIT	122

123

148

References

4	Stat	oility of Emulsion	125
	4.1	Initial Droplet Diameter and Stability of	
		O/W-Type Emulsions as Functions of	
		Temperature and of PIT (HLB	
		Temperature) of Emulsifiers	126
		4.1.1 Emulsification by PIT Method	129
		4.1.2 Comparison of Emulsions Prepared by Simple Shaking and Those by the	
		PIT Method	132
	4.2	Emulsifier Selection and the Stability of	
		W/O-Type Emulsions as Functions of	
		Temperature and Hydrophilic Chain	
		Length of Emulsifier	136
	4.3	The Effect of the Size of Emulsifier and the	
		Distribution of the Oxyethylene Chain	
		Length of Nonionic Emulsifiers on the	
		Stability of Emulsions	144
		4.3.1 The Effect of the Size of the	
		Hydrophilic and Lipophilic Moieties	
		on the Stability of Emulsions	145
		4.3.2 The Effect of the Distribution of the	
		Hydrophilic Chain Lengths of	
		Emulsifiers on the Stability of	

Emulsions

	Con	tents	xiii
	4.3.3 The Effect of the Substitution of	of	
	$C_9H_{19}C_6H_4O(CH_2CH_2O)_{8.6}H$ w	ith	
	$\mathbf{C}_{12}\mathbf{H}_{25}\cdot\mathbf{C}_{6}\mathbf{H}_{4}\mathbf{SO}_{3}\mathbf{Ca}_{1/2}$		155
	References		157
5	Liquid Crystals and Emulsions		159
	References		168
	Index		171