

Contents

1 Introduction	1
References	4
2 Surface Forces	5
2.1 Force Measurements	5
2.1.1 Techniques for Surface Force Measurements	6
2.1.2 Recent Advances	9
2.1.3 Conclusion	23
2.2 Short-Range Forces and Adhesion Between Emulsions Droplets ...	24
2.2.1 Introduction	24
2.2.2 Basic Concepts	26
2.2.3 Some Adhesive Systems	31
2.2.4 Film Thickness Measurements	35
2.2.5 Adhesion from Macroscopic to Colloidal Scale	37
2.2.6 Asymmetric Adhesion Between a Droplet and a Substrate ..	38
References	42
3 Phase Transitions	47
3.1 Weak Attractive Interactions and Equilibrium Phase Transitions .	47
3.1.1 Experimental Observations	47
3.1.2 Models for Phase Transitions	58
3.2 Gelation and Kinetically Induced Ordering	59
References	64
4 Compressibility and Elasticity of Concentrated Emulsions	67
4.1 Introduction	67
4.2 Basic Concepts	68
4.3 Experiments and Discussion	72
4.4 Conclusion	76
References	77

5 Emulsification	79
5.1 Introduction	79
5.2 Deformation and Break-up of Drops	81
5.3 Emulsion Preparation and Characterization	82
5.4 Fragmentation Kinetics	83
5.4.1 The System	83
5.4.2 Results	83
5.4.3 First Regime	84
5.4.4 Second Regime	86
5.4.5 Origin of Monodispersity	86
5.4.6 Concentrated Emulsions	87
5.5 Parameters Governing the Fragmentation	88
5.5.1 Applied Stress	89
5.5.2 Viscosity Ratio	89
5.5.3 Rheological Behavior	90
5.6 Conclusion	92
References	93
6 Metastability and Lifetime of Emulsions	97
6.1 Introduction	97
6.2 Basic Concepts of Coalescence- and Diffusion-Driven Destruction	98
6.2.1 Coalescence	98
6.2.2 Diffusion	99
6.3 Measurement of the Hole Nucleation Frequency	101
6.4 Lifetime of a Close-Packed Emulsion Undergoing Coalescence ...	105
6.5 Destruction of Highly Concentrated Emulsions Undergoing Coalescence	107
6.6 Phase Transition Inducing Coalescence in Dense Emulsions	110
6.7 Role of Impurities	112
6.8 Conclusion	112
References	114
7 Double Emulsions	117
7.1 Introduction	117
7.2 Emulsion Preparation	118
7.2.1 System Composition	118
7.2.2 Techniques Used to Follow the Kinetics of Release	119
7.3 Results	120
7.3.1 W/O/W Surfactant-Stabilized Emulsions	120
7.3.2 W/O/W Polymer-Stabilized Emulsions	129
7.4 Conclusion	135
References	135

8 General Conclusion 137

Index139