

## CONTENTS

	Page
Section I	
Physics of the contact region of a Liquid in Equilibrium at a solid Surface	
Introductory Lecture: Contact Angles	3
I    Introduction	3
II   Physics of contact angle systems	8
III  Applications	23
References	34
1.    On the Thermodynamics of Contact Angles, Line Tension and Wetting Phenomena	
I    Introduction	37
II   Thin film on a nondeformable solid	40
III  Thin film on a deformable solid	48
IV   Influence of the line tension on the contact angle	50
References	58
2.    Intermolecular forces and the Three-Phase contact line	
I    Introduction	61
II   The equilibrium contact angle between a solid and a liquid	63
III  The equilibrium contact angles for three fluid phases meeting at a common Three-Phases Contact line	66
IV   The Neumann triangle	70
V    Discussion	72
VI   Experimental	77
References	79
Appendix	80
3.    A Statistical Mechanical theory for the Solid-Liquid Interface	
I    Introduction	83
II   Microscopic statistical theory	84
III  Work of adhesion and contact angle	88
IV   Conclusion	91
Acknowledgements	92
References	92
4.    Surface Forces in Solid-Liquid –Fluid Systems III. Kinetic Theory of Capillary Phenomena	
I    Introduction	93
II   The liquid state model	96
III  molecular mechanisms in wetting	99
IV   Solid Surface effects	102
V    Summary	105
References	105
Discussion of section 1	107
Section II	
Model Systems of Solid – Liquid – Vapour Interfaces at Equilibrium	
5.    Contact Angles of Pure Liquids and Surfactants on Low-energy surfaces	
I    Introduction	128
II   Experimental	129
III  Theory	131
IV   Results and Discussion	137

	Acknowledgements	145
	References	145
6.	The Wetting of Outgassed Glass and Silica by Mercury, and the Dependence of the Contact Angle on Water Vapour Pressure	
	I Introduction	147
	II Experimental	148
	III Results	152
	IV Discussion	154
	V Applications	159
	Acknowledgements	160
	References	160
7.	The thickness of Aqueous Films on Silica	
	I Introduction	161
	II Experimental	163
	III Results	170
	IV Discussion	173
	Acknowledgements	181
	References	181
8.	The Variation of contact Angle at the silver Iodide-Liquid-Vapour Interface with the Charge on the Solid surface	
	I Introduction	183
	II Experimental	184
	III Results	188
	IV Discussion	193
	Acknowledgements	198
	References	198
9.	Examination of Thin Layers of Liquids on Various Solid Substrates	
	I Introduction	201
	II $\alpha$ – Films of water on quartz	202
	III Films of tetradecane on various solid substrates	204
	IV Conclusions	211
	References	211
10.	Liquid Drops on a Tilted Plate, Contact Angle Hysteresis and the young Contact Angle	
	I Introduction	213
	II Experimental determination of $\theta_Y$	215
	III Calculation of $\theta_Y$ from $\theta_a$ and $\theta_r$	217
	References	222
	Discussion of Section II	223
	Section III	
	Dynamic Wetting in Porous Media and Spreading of liquids on Macroscopic Surfaces	
11.	A Theory of the Rate of Wetting of a Finely Dispersed Random Porous Medium	
	I Introduction	242
	II General macroscopic theory of wetting/dewetting	243
	III Numerical solutions of equation of motion	249
	IV Discussion	258
	References	260
12.	Liquid Imbibition into Evacuated mesoporous Media	
	I Introduction	261
	II Experimental	263
	III Theory	266
	IV Experimental results	271
	V Summary	282

	Acknowledgement	282
	References	282
13.	Displacement Studies in Uniformly Wetted Porous Media	
	I Introduction	289
	II Experimental	290
	III Results	294
	IV Discussion	305
	V Wettability effects in porous media formed from solids of high surface energy	315
	VI Classification of wetting behaviour	316
	References	318
14.	Wetting and Spreading – Some Effects of Surface Roughness	
	I Theoretical study of the influence of surface roughness	322
	II Experimental study of the influence of surface roughness	322
	III Resistance to spreading by sharp edges	323
	IV The apparent contact angle of liquids on finely-grooved solid surfaces – a SEM Study	323
	V Micro-spreading studies on rough surfaces by scanning electron microscopy	324
	VI Scanning electron microscopic studies of spreading of liquids on paper	324
	VII The steady movement of a liquid meniscus in a capillary tube	324
	VIII Capillarography: a new surface probe	325
	References	326
15.	Dynamic Wetting and Air Entrainment at a Liquid-Solid-Gas junction	
	I Introduction	328
	II Experimental	331
	III Results	333
	IV Discussion	352
	V Conclusions	358
	Acknowledgements	359
	References	360
16.	Dynamic Surface Phenomena Associated with the Spontaneous Spreading of Silicone Fluids	
	I Introduction	361
	II Experimental	362
	III Results and Discussion	364
	Acknowledgement	374
	References	374
	Discussion of Section III	377
Section IV		
Applications of Wetting, Spreading and Thin Films to Industrial and Biological processes		
17.	The Influence of the Surface Coating on the Wettability of Nylon 6 Fibres	
	I Introduction	391
	II Experimental	392
	III Results and discussion	394
	Acknowledgements	401
	References	401
18.	The Wetting Properties of Lithographic Printing Surfaces	
	I Introduction	403
	II Experimental	409
	III Results	412
	IV Discussion	414
	V Conclusion	418
	Acknowledgements	420
	References	420

19.	Spreading and Retention of Aqueous Solution Droplets of Fluorocarbon and Hydrocarbon Surfactants and their mixtures on Wheat Leaves	
	I Introduction	424
	II Basic equations	425
	III Experimental	425
	IV Results and discussion	428
	Acknowledgements	437
	References	437
20.	On the Wetting and Drying of Epithelial Surfaces	
	I Introduction	440
	II Description of the tear film system	441
	III Wettability of corneal epithelium	442
	IV Tear film stability	444
	V Characterization of the lacrimal surfactant	444
	VI Dynamic aspects of tear film formation	446
	VII Tear film rupture	447
	VIII Variability in surface properties of cell and tissue boundary	449
	References	450
	Discussion of section IV	451
	Concluding Remarks	459
	Workshop Sessions	469
	Index	483