

CONTENTS

	Page
Part I Apparatus	
1. Microscopes for Use in Micromanipulation	4
a) Ordinary compound Microscopes	5
b) Special Compound Microscopes	12
2. Micromanipulators	22
a) General Features	23
b) Development	29
c) Commercially Available Micromanipulators	41
3. Microdrills	72
a) The NAJET Microdrilling Machine Model 7 A	74
b) The ultrasonic Jack Hammer	78
4. Microhardness Testers	82
a) The Miniload (Durimet) Microhardness Tester	85
b) The Hanemann Microhardness Tester Model D 32	89
5. Apparatus for General Chemical Experimentation with Micrograms to Nanograms	92
a) Working in Capillary Cones	92
b) Apparatus Working in Hanging Drops	132
6. Microtools	136
a) Types of Microtools	136
b) Preparation of Glass Microtools	139
c) Storing and Cleaning of Glass Microtools	167
d) Metallic Micromanipulator Tools	168
7. Auxiliary Equipment	176
a) Pipet Controlling Devices	176
b) Operation Chambers	181
Part II General Techniques	
1. Preparation of Samples of Non-Biological Materials	187
a) Sampling of Layers and Microscopic Heterogeneities in Massive Materials	189
b) Core Sampling of Paint Films	191
c) Powders, Loose Debris, and Particles in Liquids	196
d) Sampling of Airborne Particles	201
e) Opening of Samples with Fluxes	206
2. Chemical Experimentation with Micrograms to Nanograms of Substance	208
a) Basic Operations and Qualitative Analysis	208
b) Semi-Quantitative Estimation	221
c) Gravimetric Analysis	223
d) Titration of Microgram Samples	226
e) Working with hanging Drops	233
3. Working with Living Cells and Tissues	239

Part III
Applications

1.	Chemical Experimentation and Analysis with Micrograms to Nanograms	244
	a) Qualitative Analysis	245
	b) Semi-Quantitative Estimations	251
	c) Gravimetric Analysis of Microgram Samples	254
	d) Titration of Microgram Samples	255
	e) Working with Hanging Drops : The Ultimate Limits of Simple Tests	257
2.	Nuclear Research	259
	a) Isolation of Microgram Amounts of Plutonium	260
	b) Investigation of Properties of Plutonium	262
	c) Determination of the Specific α -Activity and of the Half-Life of Pu-239	263
	d) Proof of the Oxidation Number of Plutonium	264
	e) Solubility Measurements with Plutonium Compounds	265
3.	Identification of Airborne Particles	267
4.	Archeology and Art	273
	a) Pigments on Chinese Oracle Bones	273
	b) Core Sections of Paint Films	275
5.	Metallurgical Microspectroscopy	275
6.	Microhardness Testing	280
7.	Mounting Small Crystals for X-Ray Investigations	287
8.	The Study of Fibers	291
9.	The Structure of Rubber Lates	292
10.	Micropaleontology : Single-Mounting of Microfossils	293
11.	Entomology	296
	a) Brain Research in Insects	296
	b) Artificial Insemination of the Queen Bee	301
12.	Microbiology	304
13.	Engineering and Technology	306
	Appendix	311
	Literature Cited	311
	General Bibliography	315
	Subject Index	322