

CONTENTS OF VOLUME 3, PART A

CONTRIBUTORS TO VOLUME 3, PART A	ix
FOREWORD	xi
CONTENTS OF VOLUME 3, PART B	xiii
CONTRIBUTORS TO VOLUME 3, PART B	xv

1. Introduction

by DUDLEY WILLIAMS

1.1. Introduction	1
1.2. Origins of the Molecular Theory	2
1.3. Molecular Physics	5

2. Molecular Spectroscopy

2.1. Microwave Spectroscopy	11
by DAVID R. LIDE, Jr.	
2.1.1. Introduction	11
2.1.2. The Rigid Rotor	12
2.1.3. Selection Rules and Relative Intensities	30
2.1.4. Rigid-Rotor Spectral Patterns	37
2.1.5. Vibration-Rotation Interactions	51
2.1.6. Centrifugal Distortion	72
2.1.7. Inversion and Ring Puckering	77
2.1.8. Internal Rotation	83
2.1.9. Determination of Molecular Structure	90
2.1.10. The Stark Effect	98
2.1.11. Nuclear Quadrupole Hyperfine Structure	105
2.1.12. Intensities and Line Widths	109
2.1.13. Saturation and Double Resonance	113
2.1.14. Experimental Techniques	119

2.2. Infrared	126
by W. E. BLASS and A. H. NIELSEN	
2.2.1. Introduction	126
2.2.2. General Theory of Infrared Spectra	129
2.2.3. Experimental Considerations	172
2.3. Electronic Spectroscopy	203
by C. WELDON MATHEWS	
2.3.1. Introduction	203
2.3.2. Experimental Apparatus and Techniques	203
2.3.3. Description of Electronic States	248
2.3.4. Analysis of Electronic Transitions	277
2.4. Molecular Lasing Systems	302
by GEORGE W. CHANTRY and GEOFFREY DUXBURY	
2.4.1. Molecular Beam Masers	303
2.4.2. Submillimeter Lasers	305
2.4.3. Submillimeter Laser Mechanisms	307
2.4.4. Submillimeter Stimulated Emission Devices— Experimental Details	319
2.4.5. Dynamics of the Active Plasma	332
2.4.6. Velocity of Light Determinations	338
2.4.7. Spectroscopy with Submillimeter Lasers	343
2.4.8. Tunable Devices for the Generation of Coherent Submillimeter Power	368
2.4.9. Miscellaneous Submillimeter Lasers	374
Appendix	380
Addendum	391
 3. Light Scattering	
by D. H. RANK and T. A. WIGGINS	
3.1. Introduction	395
3.2. Spontaneous Rayleigh and Brillouin Scattering	395
3.2.1. General Rayleigh Scattering .	395
3.2.2. Brillouin Effect	397
3.2.3. Experimental Techniques	399
3.2.4. Measurements of Sound Speeds and Relaxation Frequency by Means of Light Scattering . . .	412

3.3. Spontaneous Raman Scattering	421
3.3.1. Historical Introduction and General Resume of Theory	421
3.3.2. Experimental Techniques	423
3.3.3. Gases, Pure Rotation and Vibrational Raman Effect	427
3.4. Stimulated Scattering	429
3.4.1. Introduction	429
3.4.2. Experimental Techniques	430
3.5. Stimulated Brillouin Scattering	434
3.5.1. Introduction	434
3.5.2. Experimental Techniques	434
3.5.3. Results	442
3.6. Stimulated Raman Scattering	446
3.6.1. Introduction	446
3.6.2. Experimental Techniques	447
3.6.3. Results	449
3.7. Other Stimulated Effects	450
3.7.1. Optical Mixing	450
3.7.2. Rayleigh Wing Scattering	453
3.7.3. Stimulated Thermal Rayleigh Scattering	460
AUTHOR INDEX	1
SUBJECT INDEX	17