

# CONTENTS

	<i>Page</i>
PREFACE	vii
INTRODUCTION	xiii
1. BASIC CONCEPTS AND EXPERIMENTAL METHODS	1
Elementary Theory	1
Absorption Intensity	3
Presentation of Absorption Spectra	4
Experimental Methods and Instruments	4
Standards	6
Slit Width	6
Cells, Solvents, Accessories	7
References	8
2. CHROMOPHORES AND TRANSITIONS	9
( $\sigma \rightarrow \sigma^*$ , $n \rightarrow \sigma^*$ , $\pi \rightarrow \pi^*$ , and $n \rightarrow \pi^*$ transitions)	
References	14
3. SIMPLE MOLECULES	15
Paraffins	15
Saturated Compounds Containing Auxochromes	15
Multiple Bonds	16
Multiple Bonds with Atoms Containing Unshared Electrons	16
(a) Carbonyl Group	17
(b) Thiocarbonyl Group	19
(c) Nitrogen–Oxygen Linkages	20
(d) Nitrogen–Nitrogen Linkages	22
(e) Inorganic Molecules and Ions	22
Solvent Effects on $n \rightarrow \pi^*$ Transitions	22
References	23
4. CONJUGATED MOLECULES	25
Dienes	25
Enynes and Diynes	27
$\alpha\beta$ -Unsaturated Carbonyl Compounds	27
Derivatives of Carbonyl Compounds	30
Dicarbonyl Compounds	32
$\alpha\beta$ -Unsaturated Compounds with Nitro and C=N Groups	33
Conjugated Polyenes	33
Polyacetylenes	36
Insulation of Chromophores	36
Cumulated Systems	37
References	37

CONTENTS

5.	AROMATIC MOLECULES	39
	Benzene	39
	Substituted Benzenes	40
	Correlations of Substituent Effects	43
	Condensed Ring Benzenoid Hydrocarbons	48
	Non-Benzenoid Aromatics	49
	References	50
6.	HETEROCYCLIC COMPOUNDS	52
	Five-Membered Unsaturated Heterocyclic Compounds	52
	Six-Membered Heterocyclic Aromatic Compounds	53
	Pyrimidines and Purines	56
	Meso-ionic Compounds	58
	References	59
7.	APPLICATIONS	61
	Control of Purification	61
	Identification and Assignment of Structure	62
	<i>cis-trans</i> Isomerism	69
	Optical Isomerism	70
	Tautomerism	70
	Quantitative Analysis	73
	Mixture Analysis	73
	Determination of Molecular Weights	74
	Dissociation Constants of Acids and Bases	75
	Study of Chemical Reactions	78
	Other Physicochemical Studies	79
	References	79
8.	STERIC EFFECTS	82
	Steric Effects Causing Decreased Electronic Interactions	82
	(a) Effect of Twisting a Single Bond in a Conjugated System	82
	(b) Effect of Twisting an Essential Double Bond in a Conjugated System	88
	Steric Effects Causing Increased or New Electronic Interactions	89
	Spectra of Bent Benzene Rings	89
	Strain in Three-Membered Rings	90
	References	90
9.	FAR ULTRA-VIOLET ABSORPTION SPECTRA OF ORGANIC MOLECULES	92
	Saturated Hydrocarbons and their Derivatives	92
	Olefins	93
	Diolefins	94
	Acetylenes and Allenes	94
	Aromatics	95
	Carbonyls	96
	Amides and Imides	96
	References	96

## CONTENTS

10. FLUORESCENCE	98
Photoelectric Measurement of Fluorescence Spectra	100
Fluorescence of Organic Compounds	100
Fluorescence of Common Dyestuffs	102
Fluorescence of Metallo-Organic Compounds	104
Fluorescence of Inorganic Compounds	104
Dependence of Fluorescence on pH	105
Stereoisomerism	105
Tautomerism	106
Polarized Fluorescence	107
Low-Temperature Fluorescence	107
Thermochromism	108
References	109
11. CHARGE TRANSFER SPECTRA	111
Absorption Spectra of Alkali Halides	112
General Spectral Features of Charge Transfer Complexes	113
Theory of Charge Transfer Complexes	114
Thermodynamics of Charge Transfer Complexes	118
Structural Alignment in Charge Transfer Complexes	120
References	121
12. MISCELLANEOUS TOPICS	124
Colours of Transition Metal Ions and their Complexes: Ligand Field Theory	124
Colour Centres in Inorganic Compounds	131
Radicals and Ions	134
Pigments, Dyes and Colouring Principles in Organic Compounds	134
Optical Rotatory Dispersion	137
Solvent Effects	139
Temperature Effects	142
Hydrogen Bonding	143
References	144
APPENDIX. PROTEINS	148
References	150
BIBLIOGRAPHY	152
INDEX	154