## **CONTENTS**

	Preface		ix
CHAPTER	1	SYNTHETIC DESIGN	1
	1.1	Retrosynthetic Analysis	1
	1.2	Reversal of the Carbonyl Group Polarity (Umpolung)	8
	1.3	Steps in Planning a Synthesis	14
	1.4	Choice of Synthetic Method	23
	1.5	Domino Reactions	26
	1.6	Computer-Assisted Retrosynthetic Analysis	26
CHAPTER	2	STEREOCHEMICAL CONSIDERATIONS IN	
		PLANNING SYNTHESES	31
	2.1	Conformational Analysis	31
	2.2	Evaluation of Nonbonded Interactions	35
	2.3	Six-Member Heterocyclic Systems	40
	2.4	Polycyclic Ring Systems	41
	2.5	Cyclohexyl Systems with sp <sup>2</sup> -Hybridized Atoms	44
	2.6	Significant Energy Difference	46
	2.7	Computer-Assisted Molecular Modeling	46
	2.8	Reactivity and Product Determination as a	
		Function of Conformation	47
CHAPTER	3	THE CONCEPT OF PROTECTING FUNCTIONAL	
		CROUPS	58
	3.1	Protection of NH Groups	58
	3.2	Protection of OH Groups of Alcohols	60
	3.3	Protection of Diols as Acetals	69
	3.4	Protection of Carbonyl Groups in Aldehydes and Ketones	7
	3.5	Protection of the Carboxyl Group	78
	3.6	Protection of Double Bonds	83
	3.7	Protection of Triple Bonds	82
CHAPTER	4	FUNCTIONAL CROUP TRANSFORMATIONS:	
		OXIDATION AND REDUCTION	88
	4.1	Oxidation of Alcohols to Aldehydes and Ketones	88
	4.2	Reagents and Procedures for Alcohol Oxidation	8
	4.3	Chemoselective Agents for Oxidizing Alcohols	9:
	4.4	Oxidation of Acyloins	90
	4.5	Oxidation of Tertiary Allylic Alcohols	9
	4.6	Oxidative Procedures to Carboxylic Acids	98
	4.7	Allylic Oxidation of Alkenes	9
	4.8	Terminology for Reduction of Carbonyl Compounds	10
	4.9	Nucleophilic Reducing Agents	103
	4.10	Electrophilic Reducing Agents	109
	4.11	Regio- and Chemoselective Reductions	113

	4.12	Diastereoselective Reductions of Cyclic Ketones	115
	4.13	Inversion of Secondary Alcohol Stereochemistry	117
	4.14	Diastereofacial Selectivity in Acyclic Systems	118
	4.15	Enantioselective Reductions	124
CHAPTER	5	FUNCTIONAL CROUP TRANSFORMATIONS:	
		THE CHEMISTRY OF CARBON-CARBON x-BONDS	
		AND RELATED REACTIONS	139
	5.1	Reactions of Carbon-Carbon Double Bonds	139
	5.2	Reactions of Carbon-Carbon Triple Bonds	193
CHAPTER	6	FORMATION OF CARBON-CARBON SINGLE BONDS	
		VIA ENOLATE ANIONS	213
	6.1	1,3-Dicarbonyl and Related Compounds	213
	6.2	Direct Alkylation of Simple Enolates	223
	6.3	Cyclization Reactions-Baldwin's Rules for Ring Closure	231
	6.4	Stereochernistry of Cyclic Ketone Alkylation	234
	6.5	Irnine and Hydrazone Anions	236
	6.6	Enamines	238
	6.7	The Aldol Reaction	240
	6.8	Condensation Reactions of Enols and Enolates	256
	6.9	Robinson Annulation	260
CHAPTER	7	FORMATION OF CARBON-CARBON BONDS VIA	
		ORGANOMETALLIC REAGENTS	273
	7.1	Organolithium Reagents	273
	7.2	Organornagnesium Reagents	283
	7.3	Organotitanium Reagents	286
	7.4	Organocerium Reagents	287
	7.5	Organocopper Reagents	288
	7.6	Organochromium Reagents	298
	7.7	Organozinc Reagents	300
	7.8	Organoboron Reagents	305
	7.9	Organosilicon Reagents	312
	7.10	Palladium-Catalyzed Coupling Reactions	322
CHAPTER	8	FORMATION OF CARBON-CARBON x-BONDS	359
	8.1	Formation of Carbon-Carbon Double Bonds	359
	8.2	Formation of Carbon-Carbon Triple Bonds	396
CHAPTER	9	SYNTHESES OF CARBOCYCLIC SYSTEMS	412
	9.1	Intramolecular Free Radical Cyclizations	412
	9.2	Cation-π Cyclizations	417
	9.3	Pericyclic Reactions	421
	9.4	Ring-Closing Olefin Metathesis (RCM)	433
EPILOGUE	<b>E</b>	THE ART OF SYNTHESIS	443
		viations	445
		ers to Select End-of-Chapter Problems	446
	Index		469