





Handbook of

BIOTRANSFORMATIONS OF AROMATIC COMPOUNDS

B.L. Goodwin



CRC PRESS

Contents

Introdu	ction		
Part I	Reaction	ons of Individual Compounds (A-Z)	Α
Part II	Enzyme	es and Reactions	
	nucle 1.1 1.2 1.3 1.4 1.5	Aromatization of 6-membered carbon and heterocyclic rings Formation of carbon ring systems Formation of heterocyclic ring systems Polymerization reactions Reactions involving carbon ring fission Reactions involving heterocyclic ring fission	1 1 1 1 2
	1.7 1.8	Dearomatization Ring expansion	3: 3:
	2. Oxid	ations and reductions involving the aromatic nucleus and organic substituents Hydroxylation of the aromatic nucleus 2.1.1 Hydroxylations associated with physiologically important amino acids and hormones 2.1.2 Hydroxylations of natural products and miscellaneous compounds associated with normal animal physiology 2.1.3 Hydroxylation of xenobiotics 2.1.4 Hydroxylation with elimination of substituent Formation of quinones and analogues from catechols, quinols and other precursors 2.2.1 Tyrosinase and unspecified types 2.2.2 Enzymes classified as laccase and quinol oxidases	33 33 34 44 55 55
	2.3	Free radicals from phenols	62
	2,4 2,5	Oxidation of nuclear amino groups and analogues	62
	2.5 2.6	Oxidation of heterocyclic amines	6.
	2.7	Reduction of nitro groups and analogues Oxidation and reduction of sulphur atoms	63 69
	2.8	Reduction of quinones and analogues	70
	2.9	Halogens and the aromatic nucleus	7
		Epoxide formation and reduction	74
		Deamination of arylamines without hydroxylation	7:
	2.12	Dehydroxylation of phenols	7:
	2 13	Nitro group addition and removal	7.

	3. Oxic	lations and reductions of substituent side chains and non-aromatic		
	ring	systems (without altering chain length)		77
	3.1	Hydroxylation of the carbon side-chain		77
	3.2	Alkyl oxidation to ketone		82
	3.3	Oxidations and reductions of alcohols, aldehydes and ketones		82
	3.4	Reductions of acids		92
	3.5	Deamination		93
	3.6	Oxidative removal of substituents on amino groups		100
	3.7	Oxidations and reductions involving nitrogen atoms		102
	3.8	O-Dealkylation		104
	3.9	Oxidations and reductions of non-aromatic ring systems		106
		Sulphur replacement		109
		Dehydroxylation		110
		Side chain halogenation		110
		Oxidative rearrangement		110
-		nation and degradation of side-chains		111
	4.1	Side-chain formation		111
	4.2	Decarboxylation reactions of phenolic groups without hydroxylation		114
	4.3 4.4	Decarboxylation reactions of side-chains		115
	4.4 4.5	Other reactions involving side-chain shortening and removal		122
	4.5	Chain lengthening reactions	1	127
5	. Conj	ugation and substitution reactions		130
	5.1	Ester formation A. Carboxylate esters		130
		B. Sulphate esters		135
	5.2	Sulphamate formation		139
	5.3	Glycoside formation		140
	5.4	Conjugation of thiols		150
	5.5	Formation of amides and substituted amides		156
	5.6	Phosphorylation reactions		164
	5.7	Ether formation		165
	5.8	N-Alkylation		172
	5.9	Silane anhydrides		174
,	Flim	ination of substituents		175
,	6.1	Ester hydrolysis		175
	6.2	Hydrolysis of glycosides		180
	6.3	Hydrolysis of amides		184
	6.4	Hydrolysis of phosphates		190
	6.5	Miscellaneous reactions		191
		sfer reactions		193
	7.1	Transamination	* *	193
	7.2	Isomerization	***	199
	7.3	Migrations		201
	7.4	Racemization		201

		Contents
8.	Formation and reactions of non-aryl double and triple bonds	203
	8.1 Double and triple bond formation	203
	8.2 Reactions of double bonds	205
9.	Hydration of epoxides	208
10.	Light-forming reactions	211
Bibliography		213
Index - Part II (enzymes and reactions)		567