
Contents

<i>Preface</i>	<i>v</i>
<i>About the Author</i>	<i>ix</i>
<i>Acknowledgment</i>	<i>xi</i>
<i>Introduction</i>	<i>xvii</i>
1. Phenol, Cresols and Other Alkyl Phenols	1
1.1. General	1
1.2. Monohydroxy Benzenes	3
1.3. Dihydroxy Benzenes	4
1.4. Trihydroxy Benzenes	4
1.5. Alkyl Phenols	5
1.6. Production of Phenol and Higher Homologues— Global Scenario	14
1.7. Indian Scenario	16
2. Production of Synthetic Cresols	19
2.1. General	19
2.2. Sulfonation of Toluene	23
2.3. Alkylation of Toluene	30
2.4. Chlorination of Toluene [1,6]	36

3. Production of Individual Cresols	39
3.1. Crystallization and Centrifuging	39
3.2. Separation of <i>Meta</i> -, <i>Para</i> -Cresols via Alkylation with Isobutylene	42
3.3. Other Processes for Production of Pure <i>Para</i> - and <i>Meta</i> -Cresols	46
3.4. Production of <i>Ortho</i> -Cresol	48
3.5. Production of <i>Meta</i> -Cresol	49
3.6. Separation of <i>Meta</i> and <i>Para</i> -Cresol from a Mixture—A Review of Other Processes	52
3.7. Summary	57
4. Cresols and Their Derivatives	59
4.1. General	59
4.2. Derivatives of Cresols	59
5. Derivatives of <i>Para</i>-Cresol	63
5.1. BHT	63
5.2. <i>p</i> -Anisic Aldehyde	66
5.3. Vanillin	77
5.4. 3,4,5-Trimethoxy-Benzaldehyde (TMBA)	81
5.5. <i>Para</i> -Hydroxy Benzaldehyde	83
5.6. Raspberry Ketone	86
5.7. 2-Nitro- <i>p</i> -Cresol [45]	88
5.8. Ethers and Esters	90
5.9. 3,4-Dimethoxy Toluene [2]	94
5.10. Creosol [45]	95
6. Derivatives of <i>Meta</i>-Cresol	97
6.1. <i>Para</i> -Chloro <i>Meta</i> -Cresol [1,33]	97
6.2. Thymol [1,30]	99
6.3. 2,3,6-Trimethyl Phenol (2,3,6-TMP) [1]	103
6.4. 4-Nitro- <i>m</i> -Cresol [45]	104
6.5. <i>Meta</i> -Phenoxy Toluene and <i>Meta</i> -Phenoxy Benzaldehyde [45]	104
6.6. Musk Ambrette [30]	107
6.7. <i>m</i> -Anisic Aldehyde [46]	108
6.8. <i>m</i> -Anisyl Alcohol [45]	109

6.9. <i>m</i> -Cresyl Acetate	109
6.10. <i>m</i> -Anisic acid [2,45]	110
7. Derivatives of <i>Ortho</i>-Cresol	113
7.1. Coumarin	113
7.2. Epoxy-Cresol–Novolac (ECN) Resins	115
7.3. Other Products	117
7.4. <i>O</i> -Anisic Aldehyde [2,45,46]	119
7.5. <i>O</i> -Anisyl Alcohol [46]	120
7.6. <i>O</i> -Anisic Acid [46]	121
7.7. <i>O</i> -Cresyl Acetate [46]	122
8. Cresol Derivatives—Building Blocks for Agrochemicals	123
8.1. General	123
8.2. Fenitrothion [14,26]	129
8.3. Acifluorfen-Sodium [26]	131
8.4. Tolclofos-Methyl [26]	132
8.5. DNOC [26,35]	133
8.6. Bromoxylin [26,35]	134
8.7. Ioxynil [26,35]	136
8.8. Mecoprop (MCP) [26,35]	138
8.9. MCPA [26,35]	139
8.10. Other Herbicide/Insecticides from <i>m</i> -Cresol [14]	139
9. Cresol Derivatives—Building Blocks for Pharmaceuticals	141
9.1. General	141
9.2. Dilitiazem Hydrochloride [36,37]	142
9.3. Trimethoprim [36,37]	144
9.4. Nadifloxacin [44]	146
9.5. Vitamin E	147
9.6. Pentazocine [44]	149
10. Flavors, Fragrances, and Food Additives from Cresol Derivatives	151
10.1. General	151
10.2. Essential Oils	152

10.3. Global Scenario [42]	164
10.4. Indian Scenario	166
10.5. Industrial Cresols as Components of Aroma Chemicals and Food Products	167
11. Waste Minimization Through Recovery of Inorganic By-Products in a Cresols Complex	173
11.0. Backdrop	173
11.1. Sodium Sulphite and Sodium Sulfate	175
11.2. Calcium Sulfate	178
11.3. Manganese Sulfate	179
11.4. Cobalt Acetate and Manganese Acetate	182
11.5. Summary	184
12. Conclusions	187
12.1. Current Scenario	187
12.2. Future Possibilities	192
<i>References</i>	<i>195</i>
<i>Index</i>	<i>201</i>