

# Contents

<b>Introduction</b> .....	xv
<b>Synthesis of Five-Membered Nitroazoles</b> .....	1
Electrophilic Nitration of Azoles .....	1
Electrophilic Nitration Mechanism .....	2
Nitration with Nitric Acid or Sulfuric–Nitric Acid Mixture .....	5
Kinetics and Mechanism of Nitration of Azoles by Sulfuric–Nitric Acid Mixture .....	21
Nitration by Other Nitrating Agents.....	25
<i>Ips</i> o-Nitration of Azoles.....	32
Synthesis from Aminoazoles .....	35
Synthesis Based on Heterocyclization.....	40
Synthesis from Various Cyclic Systems .....	49
Other Methods of Preparation.....	55
Polynitroazoles.....	60
Conclusions.....	64
References.....	64
<b>Synthesis of Nitrobenzazoles</b> .....	81
Introduction.....	81
Nitration of Benzazoles.....	82
Indazoles.....	82
Benzimidazoles.....	84
Benzisoxazoles, Benzoxazoles, and Benzoxadiazoles .....	87
Benzisothiazoles, Benzothiazoles, and Benzothiadiazoles .....	91
Benzoselenazoles and Benzoselenodiazoles .....	93
Benzotriazoles .....	93
Synthesis of Nitrobenzazoles via Heterocyclization.....	95
Nitroindazoles.....	95
Nitrobenzimidazoles.....	102
Nitrobenzisoxazoles, Nitrobenzoxazoles, and Nitrobenzoxadiazoles .....	109

Nitrobenzothiazoles, Nitrobenzothiazoles, and Nitrobenzothiadiazoles .....	120
Nitrobenzisoselenazoles, Nitrobenzoselenazoles, and Nitrobenzoselenodiazoles .....	130
Nitrobenzotriazoles.....	130
Other Methods of Synthesis.....	136
The Sandmeyer Reaction.....	136
Recyclization .....	137
Conclusions.....	140
References.....	141
<b>Structure and Physical–Chemical Properties of Nitroazoles .....</b>	<b>157</b>
Molecular and Crystalline Structure .....	157
Nuclear Magnetic Resonance .....	181
Pyrazoles.....	182
Imidazoles.....	199
Isoxazoles, Oxazoles, and Oxadiazoles.....	206
Isothiazoles, Thiazoles, and Thiadiazoles .....	215
Triazoles and Tetrazoles .....	217
Indazoles.....	229
Benzimidazoles.....	236
Benzoxazoles, Benzisoxazoles, and Benzofurazans .....	245
Benzothiazoles, Benzothiadiazoles, and Benzoselenazoles .....	253
Benzotriazoles .....	256
Conclusions .....	262
Electron Spin Resonance Spectroscopy.....	263
Polarography .....	280
Infrared Spectroscopy .....	295
Nitropyrazoles .....	295
Nitroimidazoles .....	297
Nitroisoxazoles, Nitrooxazoles, and Nitrooxadiazoles .....	298
Nitroisothiazoles and Nitrothiazoles .....	300
Nitrotriazoles .....	302
Nitrotetrazoles .....	305
Nitroindazoles.....	305
Nitrobenzimidazoles.....	307
Nitrobenzisoxazoles, Nitrobenzoxazoles, and Nitrobenzoxadiazoles.....	308
Nitrobenzoselenodiazoles.....	310
Nitrobenzothiazoles.....	310
UV Spectroscopy .....	310
Nitropyrazoles .....	310
Nitroimidazoles .....	313
Nitroisoxazoles, Nitrooxazoles, and Nitrooxadiazoles .....	316
Nitroisothiazoles and Nitrothiazoles .....	317

Nitrotriazoles .....	318
Nitrotetrazoles .....	321
Nitroindazoles.....	321
Nitrobenzimidazoles.....	322
Nitrobenzoxazoles and Nitrobenzoxadiazoles .....	324
Nitrobenzothiazoles and Nitrobenzothiadiazoles.....	327
Nitrobenzotriazoles.....	328
Dipole Moments.....	328
Mass Spectrometry.....	332
Nitropyrazoles .....	332
Nitroimidazoles .....	336
Nitroisoxazoles.....	341
Nitroisothiazoles, Nitrothiazoles, and Nitrothiadiazoles.....	345
Nitrotriazoles and Nitrotetrazoles.....	346
Nitroindazoles.....	350
Nitrobenzimidazoles.....	352
Nitrobenzisoaxazoles, Nitrobenzoxazoles, and Nitrobenzoxadiazoles .....	357
Nitrobenzothiazoles, Nitrobenzothiadiazoles, and Nitrobenzothiadiazoles .....	360
Nitrobenzoselenodiazoles.....	360
Nitrobenzotriazoles.....	363
Conclusions.....	364
Other Physical–Chemical Properties .....	364
References.....	373
<b>Application of Nitroazoles .....</b>	<b>407</b>
Introduction.....	407
Five-Membered Nitroazoles .....	408
Nitrobenzazoles.....	423
Conclusions.....	423
References.....	424
<b>Abbreviations .....</b>	<b>433</b>
<b>Index.....</b>	<b>435</b>



<http://www.springer.com/978-0-387-98069-0>

Nitroazoles: Synthesis, Structure and Applications

Larina, L.; Lopyrev, V.

2009, XVIII, 441 p. 340 illus., Hardcover

ISBN: 978-0-387-98069-0