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THE CHEMISTRY OF HETEROCYCLIC COMPOUNDS

A SERIES OF MONOGRAPHS Vol 10.

ARNOLD WEISSBERGER, *Consulting Editor*

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THE 1,2,3- AND 1,2,4-TRIAZINES,  
TETRAZINES AND  
PENTAZINES

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## The Chemistry of Heterocyclic Compounds

The chemistry of heterocyclic compounds is one of the most complex branches of organic chemistry. It is equally interesting for its theoretical implications, for the diversity of its synthetic procedures, and for the physiological and industrial significance of heterocyclic compounds.

A field of such importance and intrinsic difficulty should be made as readily accessible as possible, and the lack of a modern detailed and comprehensive presentation of heterocyclic chemistry is therefore keenly felt. It is the intention of the present series to fill this gap by expert presentations of the various branches of heterocyclic chemistry. The subdivisions have been designed to cover the field in its entirety by monographs which reflect the importance and the interrelations of the various compounds, and accommodate the specific interests of the authors.

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## Preface

This volume presents, with the exception of 1,3,5-triazines, the chemistry of all six-membered nitrogen heterocycles containing more than two nitrogen atoms in the ring. It also covers all condensed systems containing the rings. We have tried to make a complete survey of the literature covered by *Chemical Abstracts* through 1950. A few later references of special interest are also included.

The structures assigned to many of these compounds rest only upon their modes of formation and upon elemental analyses. We have accepted these structures without comment, except where equally likely or more plausible structures may be written. In many cases, keto-enol tautomerism is possible. Here we have usually assumed enolization if it makes the heterocyclic ring fully aromatic. This principle cannot be followed completely because chemical evidence, in some cases, favors the keto tautomers. Future research in these fields should include use of physical methods, such as studies of absorption spectra, in determining the structures of some of these compounds.

*The Ring Index* and *Chemical Abstracts* systems of nomenclature and numbering are usually employed in this book. Ring systems are given the orientations used by the compilers of *The Ring Index* when developing methods of numbering positions. The numbers assigned by *The Ring Index* to fundamental ring systems are given throughout the volume (thus *R.I.* 159).

In arranging the material, we have considered first the types of ring system involved. The Table of Contents shows the method of classification. Then, in handling the compounds possessing any given ring system, we have used substantially the same treatment as Meyer and Jacobson. That is, compounds are taken up in the following order:

parent heterocycles, their homologs and aryl derivatives,  
halogen derivatives,  
amines,  
hydroxy and oxo derivatives,  
mercapto and thioxo derivatives,  
ketones, and  
carboxylic acids.

Further, under each of the categories listed above, the more nearly aromatic compounds are considered first, followed by successive degrees of hydrogenation. Methods of preparation are described first, followed by discussions of chemical and physical properties. In a few places, particularly in Chapter III, we found that the material was more efficiently organized by deviating somewhat from this order of treatment. To a considerable extent, the system of classification just described is also a classification by methods of ring closure. We have used tables as liberally as possible.

We wish to acknowledge the contribution of Dr. D. W. Kaiser, who was one of the original authors of this monograph, and who did part of the literature search but was unable to continue for reasons of health. We also wish to thank the following persons for their kindness in reading portions of the manuscript and for valuable criticisms and suggestions: Drs. Kendrick R. Eilar, Owen A. Moe, Scott Searles, George L. Sutherland, D. Stanley Tarbell, and Donald T. Warner. Thanks are also due Miss Margaret Carlson, formerly of the American Cyanamid Research Library, for much appreciated help in acquiring some of the literature used.

We want especially to thank our wives for their assistance in the preparation of the manuscript.

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*Indianapolis, Indiana*  
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## Contents

<b>I. The 1,2,3-Triazines. By John G. Erickson</b> .....	1
Introduction .....	1
1. Uncondensed 1,2,3-Triazines .....	3
A. Unbridged 1,2,3-Triazine Rings .....	3
B. 1,2,3-Triazine Rings with Valence Bridges .....	4
2. 1,2,3-Triazine Rings Condensed with Carbocycles .....	5
A. Condensed with Benzene .....	5
(1) 1,2,3-Benzotriazine .....	5
(2) 1,2,3-Benzotriazines with Valence Bridges .....	27
B. Condensed with Naphthalene .....	31
(1) Condensed with the 2,3 Positions of Naphthalene .....	31
(2) Condensed with the 1,8 Positions of Naphthalene .....	31
3. 1,2,3-Triazine Rings Condensed with Heterocycles .....	34
A. Condensed through Two Carbon Atoms .....	34
(1) Condensed with the Thiazole Ring .....	34
(2) Condensed with the Pyrazole Ring .....	35
B. Condensed through a Carbon Atom and a Nitrogen Atom ....	36
(1) Condensed with the Pyrazole Ring .....	36
(2) Condensed with the Thiazole Ring .....	37
(3) Condensed with the Imidazole Ring .....	38
(4) Condensed with the Pyrimidine Ring .....	41
Bibliography .....	41
<b>II. The 1,2,4-Triazines. By John G. Erickson</b> .....	44
Introduction .....	44
1. Uncondensed 1,2,4-Triazines .....	45
A. Unbridged 1,2,4-Triazine Rings .....	45
B. 1,2,4-Triazine Rings with Valence Bridges .....	85
2. 1,2,4-Triazine Rings Condensed with Carbocycles .....	88
A. As Parts of Spiro Ring Systems .....	88
B. Condensed with Alicyclic Ring Systems in 1,2 Positions ....	89
(1) Condensed with Cyclopentane .....	89
(2) Condensed with the Norcamphane System .....	89
(3) Condensed with the Cyclopentaphenanthrene Ring System	91
(4) Condensed with the Spiro[4,5]decane Ring System .....	92
(5) Condensed with the Phenanthridine Ring System .....	92
C. Condensed with the Benzene Ring .....	93
(1) 1,2,4-Benzotriazine .....	93
(2) Two 1,2,4-Triazine Rings Condensed with One Benzene Ring	111



D. Condensed with Naphthalene .....	112
(1) Condensed with the 2,3 Positions of Naphthalene .....	112
(2) Condensed with the 1,2 Positions of Naphthalene .....	113
E. Condensed with Higher Aromatic Ring Systems .....	120
(1) Condensed with the Acenaphthene System .....	120
(2) Condensed with the Phenanthrene System .....	121
3. 1,2,4-Triazine Rings Condensed with Heterocycles .....	124
A. Condensed through Carbon Atoms .....	124
(1) Condensed with the Pyran Ring .....	124
(2) Condensed with the Indole Ring System .....	125
B. Condensed through a Carbon Atom and a Nitrogen Atom .....	128
(1) Condensed with the Pyrazole Ring .....	128
(2) Condensed with the Indazole Ring System .....	131
(3) Condensed with the 1,2,4-Triazole Ring .....	132
<i>Bibliography</i> .....	132
<b>III. The 1,2,3,4-Tetrazines. By V. P. Wystrach</b> .....	138
Introduction .....	138
1. Uncondensed 1,2,3,4-Tetrazines .....	140
A. 1,2,3,4-Tetrazine .....	140
B. Dihydro-1,2,3,4-Tetrazines .....	141
(1) Substituted in the 2- and 3-Positions with Aryl Groups ..	142
(2) Substituted in the 2- and 3-Positions with Benzoyl Groups	150
(3) 1,2- and 2,5-Dihydro-1,2,3,4-Tetrazines .....	159
C. Tetrahydro-1,2,3,4-Tetrazines .....	162
D. Hexahydro-1,2,3,4-Tetrazines .....	163
E. 1,2,3,4-Tetrazines with Valence Bridges .....	164
2. 1,2,3,4-Tetrazine Rings Condensed with Carbocycles .....	165
A. Condensed with a Benzene Ring .....	165
B. Condensed with a Naphthalene Ring .....	168
3. 1,2,3,4-Tetrazine Rings Condensed with Heterocycles .....	171
A. Condensed through Two Carbon Atoms .....	171
(1) Condensed with 1,4-Pyrone .....	171
(2) Condensed with 1,2,3-Triazole .....	171
B. Condensed through a Carbon Atom and a Nitrogen Atom .....	173
(1) Condensed with Piperidine .....	173
(2) Condensed with 1,2,4-Triazole .....	174
<i>Bibliography</i> .....	175
<b>IV. The 1,2,3,5-Tetrazines. By John G. Erickson</b> .....	177
<i>Bibliography</i> .....	178
<b>V. The 1,2,4,5-Tetrazines. By Paul F. Wiley</b> .....	1
Introduction .....	1
1. Uncondensed <i>s</i> -Tetrazines .....	1
A. Mononuclear <i>s</i> -Tetrazines .....	1
(1) <i>s</i> -Tetrazines and Hydro Derivatives .....	1
(2) Substituted <i>s</i> -Tetrazines and Hydro Derivatives .....	1

B. Polynuclear Uncondensed <i>s</i> -Tetrazines .....	207
(1) Aliphatic Carbocyclic Rings Coupled Directly to <i>s</i> -Tetrazines	207
(2) Aromatic Carbocyclic Rings Coupled Directly to <i>s</i> -Tetrazines	208
(3) Heterocyclic Rings Coupled Directly to <i>s</i> -Tetrazines .....	236
(4) Rings Coupled through Carbon Chains to <i>s</i> -Tetrazines ....	238
2. Condensed <i>s</i> -Tetrazines .....	244
<i>Bibliography</i> .....	246
<b>VI. The Pentazines. By John G. Erickson</b> .....	250
<i>Bibliography</i> .....	251
<b>Subject Index</b> .....	253

