Aromatic character and aromaticity

Cambridge Chemistry Textbook Series

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G. M. BADGER
Vice-Chancellor,
University of Adelaide

CAMBRIDGE
at the University Press, 1969

CAMBRIDGE UNIVERSITY PRESS
Cambridge, New York, Melbourne, Madrid, Cape Town,
Singapore, São Paulo, Delhi, Tokyo, Mexico City

Cambridge University Press
The Edinburgh Building, Cambridge CB2 8RU, UK

Published in the United States of America by
Cambridge University Press, New York

www.cambridge.org
Information on this title: www.cambridge.org/9780521095433

First published 1969
Re-issued 2013

A catalogue record for this publication is available from the British Library

ISBN 978-0-521-07339-4 Hardback
ISBN 978-0-521-09543-3 Paperback

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Preface

Aromatic compounds have provided many intriguing problems for chemists. At first, attention was directed to benzene and its derivatives; and the term 'aromatic' was once regarded as synonymous with 'benzenoid'. It was soon recognized, however, that the structures and reactions of many unsaturated heterocyclic compounds are similar to those of substituted benzenes, and the former were therefore called heterocyclic aromatic compounds. They are now commonly called hetero-aromatic compounds. In the last two or three decades there has been in increasing interest in non-benzenoid unsaturated cyclic compounds having 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28 or 30 π-electrons. Many new non-benzenoid compounds, both monocyclic and polycyclic, have been synthesized and studied; and it must be asked whether these substances are aromatic? Physical methods for the study of cyclic compounds have been improved, and new techniques have been devised, so that new evidence is now available.

This book attempts to summarize the evidence relating to the nature, and to the electronic structures, of aromatic compounds. Like the other books in this series, it is directed to students in the final year of an undergraduate honours chemistry course, and to those who are beginning graduate work. The physical evidence relating to the shape and size of the benzene molecule is first summarized, and this is followed by the wave-mechanical picture of its electronic structure. The polycyclic compounds and the hetero-aromatic compounds are similarly pictured, and aromaticity is then defined in terms of the electronic structure.

The second chapter is concerned with the physical methods which can be used to determine whether an unsaturated cyclic compound possesses aromaticity. The remaining chapters summarize recent studies on non-benzenoid cyclic compounds, and discuss the extent to which these compounds possess aromatic character and aromaticity.

It is a pleasure to express my thanks to Dr Jillian Teubner, whose help in the preparation of this book has been invaluable. I am also greatly indebted to my friends and colleagues, Dr J. A. Elix, Dr G. E. Lewis and Dr T. M. Spotswood, for many helpful discussions. Finally, I am grateful to Dr K. Schofield, and to the officers of Cambridge University Press, for the skilled attention which has greatly simplified my task in the publication of the book.

G. M. B.

Adelaide, 1968