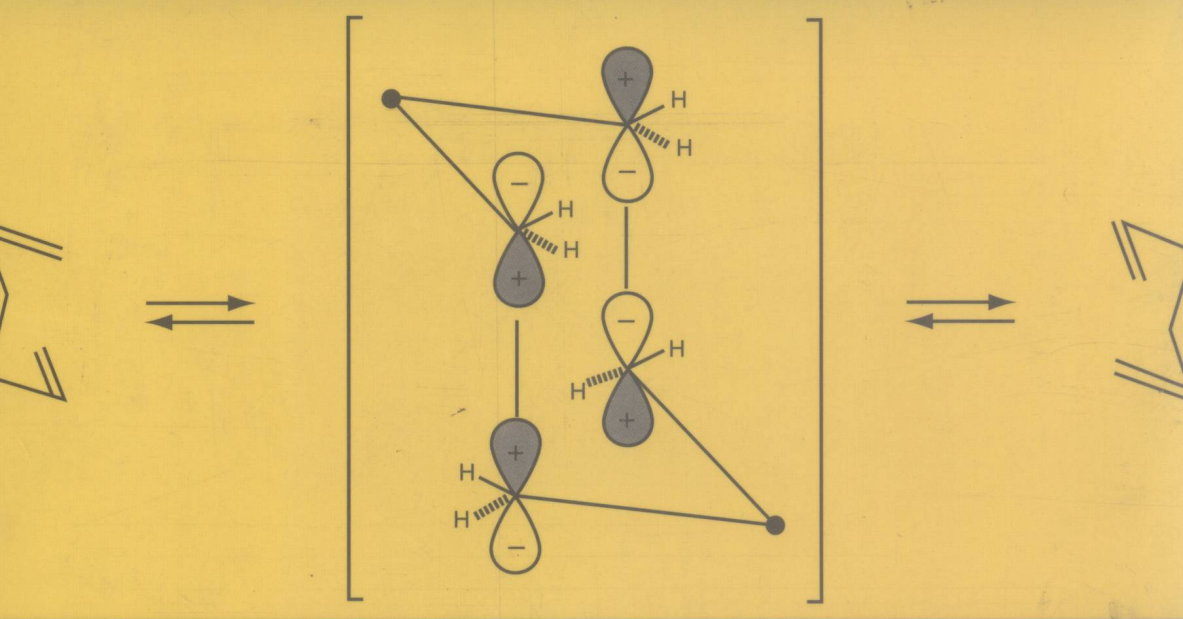
ORGANIC CHEMISTRY

a comprehensive degree text and source book



Hans Beyer *and* Wolfgang Walter

Translator and editor: **Douglas Lloyd**

Albion Chemical Science Series

Beyer/Walter
ORGANIC CHEMISTRY
A comprehensive degree text and source book

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Author's Foreword to the English Translation of the 22nd Edition of Beyer •Walter: Lehrbuch der Organischen Chemie

In 1953 the publisher Hirzel Verlag of Leipzig in the former DDR (Eastern Germany) produced the LEHRBUCH DER ORGANISCHEN CHEMIE by *Hans Beyer*, Professor of Chemistry at the University of Greifswald. Its use spread rapidly through German-speaking countries because it provided, in a readily understandable way, an ideal combination of basic fundamental material, factual information and theoretical considerations; it also paid appropriate attention to the relationship of chemistry to biochemistry.

Dr Hans Beyer died on February 1, 1971, and in the spring of 1973 I took over responsibility for the further developments of his book and edited the newly revised manuscript of its 17th edition, but by this time for Hirzel Verlag Stuttgart in the Federal German Republic (West Germany). Since then five further editions have appeared; these have repeatedly been made necessary by the vigorous development of organic chemistry and of the areas of biochemistry which are referred to in its text. In addition, attention is drawn to important synthetic methods which should be known in view of their regular use in recent times.

During this period Editorial Reverté in Barcelona has produced a Spanish translation of the 19th edition. This was undertaken by Dr José Barlengua Mur, Professor at the University of Oviedo, in Asturias. Its title is 'Manual de Quimica Organica'. In 1989 an unauthorised translation of the 18th edition into Chinese appeared; this was published by the High School Publishing House in Beijing under the title of 'Student Course in Organic Chemistry'.

Because of my insufficient knowledge of the language I was unable to contribute to the Spanish edition. I only became aware of the Chinese edition by chance a year after it had appeared. In contrast, in the present English edition I have collaborated closely with Douglas Lloyd throughout the enterprise.

Initially the 21st edition formed the basis of this translation but with the appearance of the 22nd edition the text was modified to bring it into line with the new edition. In addition, corrections and extra material which have already been gathered together in readiness for the forthcoming 23rd edition have been included in this English edition. Older nomenclature, as well as IUPAC nomenclature, is mentioned in order to improve the ease of access to older literature. An observant reader will not fail to notice the associations which are made between chemistry and general culture at appropriate places. Thus, because of chemical connections the names of *Plato* and *Hannibal* may be found in the name index of the 22nd German edition, and in the present translation the name of *Alexander Borodin* also appears.

In the course of working together the author and the translator have gained much first-hand experience of the interweave of language and culture and have derived great enjoy-

ment from it. Stimulating discussions of a variety of chemical matters have led to numerous improvements of the text, resulting in a translation that in many places is also a revision. Dr John Mellor also played an important role thanks to his collaboration in the project. Special thanks must go to my collaborator of many years, Anneliese Kuhlmann, who has dealt so efficiently with the large amount of correspondence associated with the translation.

I hope that this result of our work, which has occupied nearly five years will lead to its reaching many new readers. We will be very grateful to them for any criticisms or suggestions which may lead to further improvement of the book.

Hamburg, Easter 1995

Wolfgang Walter

Translator's Foreword

Translating another author's work is a difficult task which provides many pitfalls. Apart from inadequacies in the knowledge of the original language, the major challenge is to maintain the style and character of the author's language and approach so that it is still *his* book. This I have tried my utmost to do. Linguistic differences rule out the possibility of a completely literal translation, but I have endeavoured throughout to stay as closely as possible to the language of the original text, so that it retains the style and flavour of *Beyer–Walter*; the publishers have collaborated in this attempt by making the text appear as similar as possible to the German text. The blocks used for formulae and illustrations are those used for the 22nd, or in some cases the forthcoming 23rd, German editions.

When I was approached in 1990 about taking on this task, a first sight of the size of the book made me wonder. Looking at the cover, I read a review from *J. Am. Chem. Soc.* which was reprinted there and said 'This text is a prime example of the European "Lehrbuch" at its best. It is up to date, thorough, comprehensive, and written lucidly. ... To my knowledge, there is no comparable book in English. (It) seems to be meant for students with some basic knowledge of organic chemistry, but it is also an excellent reference book for chemists at any stage of their career. ....'. This suggested that time spent on a translation could be time well spent and, as soon as I opened the book and started to delve into its contents, I realised that someone had to translate it into English, because indeed no comparable English-language text was available, and that it would be a privilege and a pleasure to be associated with the project.

Ellis Horwood, with great wisdom, invited Professor Walter and me to meet as his guests in Chichester and to spend some time together by ourselves to see how we got on with one another. This was highly successful and our friendship has continued to grow throughout the project and, as mentioned in the author's preface, both of us have derived much stimulation and pleasure from the enterprise. I must warmly thank Wolf Walter for his unstinting support and critical assistance throughout the enterprise, not least for sometimes correcting and/or improving my English.

The publishers, author and translator had some difficulty in deciding what was the best translation of the German title 'Lehrbuch der Organischen Chemie' to use. It is so much more than a textbook. Rather it is both a background book for lecture courses in the European tradition, and also a companion, containing a wealth of material gathered together over a very wide range and not otherwise assembled in this way in an English text. It should be of value from one's first day as an organic chemist to one's last.

Furthermore it contains much material which is of interest not only to chemists but to others with scientific interests, perhaps especially biochemists and biologists (botanists and zoologists), but also to other physical scientists and industrial scientists. A unique feature for an English text is the manner in which industrial chemistry and processes are woven into the text and given the attention which they deserve. Indeed the text should serve as an

invaluable reference source to the role of chemistry in the widest sense, in everyday life and in its applications, as well as in the chemical laboratory. Bearing all these points in mind, the title 'Comprehensive Organic Chemistry' was chosen.

A characteristic feature of the book is that it has its roots firmly in facts and that these facts form the basis for mechanistic discussion and theory rather than vice versa. It is intended to be a European textbook, not just a German or a British one. Reflecting this wider outlook German language references have for the most part been retained but are supplemented by British and American language references, most of which, moreover, are present in the original German text; it is essential for modern chemists to be in touch with German as well as British and American approaches to the subject. In particular '*Houben–Weyl*' is frequently referred to. We trust that our American friends will also welcome this breadth. References are not limited to recent publications, although every attempt has been made to keep them up to date. In so doing, however, older references have often been retained, especially those to older review articles on a variety of topics of importance and some to the first reports on topics; such articles often provide an invaluable and irreplaceable introduction to these subjects.

Spelling is British; on occasions when alternatives appeared to exist, I commonly referred to the Penguin Dictionary of Chemistry (ed. *D.W.A. Sharp*) as an arbiter. Translation had passed the halfway mark when 'sulfur' was authorised as a permitted alternative to 'sulphur' in British publications. Since 'sulfur' is only an approved alternative, and less remained to be translated than had already been accomplished, 'sulphur' has been retained throughout. In any case it seemed somewhat more consistent to match 'phosphorus' with 'sulphur'.

Nomenclature is always controversial; should trivial names be used or systematic nomenclature be the rule? Both the German and English texts meet this problem by using both, indeed a variety of names, ancient and modern, are often given for a compound. A knowledge of trivial names makes access to older literature and to technical literature much simpler. It should be remembered that the objective of the Geneva rules was not to supersede trivial names but to provide 'official names' for purposes of indexes and dictionaries. Furthermore, in much official legislation it is the trivial names which are commonly cited. It is a feature of everyday life that nicknames frequently take the place of 'real' names and need to be known. Although both IUPAC and other names appear for most compounds, where applicable, a choice often had to be made as to which name actually to use in the text. The answer here has always been the one which is most commonly used, and, if I have needed external guidance I have always sought it from the various catalogue handbooks issued by the larger suppliers of fine chemicals, and selected the ones of their choice; there is some advantage in knowing what to ask for when one goes to a shop[1].

[1]Extract from Guide to IUPAC Nomenclature of Organic Compounds, Recommendations 1993 (IUPAC 1993):

In contrast to such systematic names, there are traditional names, semisystematic or trivial, which are widely used for a core group of common compounds. Examples are 'acetic acid', 'benzene', 'cholesterol', 'styrene', 'formaldehyde', 'water', 'iron'. Many of these names are also part of general non-scientific language and are thus not confined to use within the science of chemistry. They are useful and in many cases indispensable (consider the alternative systematic name for cholesterol, for example). Little is to be gained, and certainly much to be lost, by replacing such names. Therefore where they meet the requirements of utility and precision, and can be expected to continue to be widely used by chemists and others, they are retained and, for the most part, preferred in this Guide. Semisystematic names also exist such as 'methane', 'propanol', and 'benzoic acid', which are so familiar that few chemists realize that they are not fully systematic. They are retained, and indeed, in some cases there are no better systematic alternatives.

Two terms which I have decided to use perhaps need comment. I have followed the German text in using *mesomerism* rather than *resonance*. More unusually I have used the literal translation of German *grenzformeln*, namely *limiting structures*, or sometimes, when apposite, *contributing structures*, rather than *canonical forms*, because it seems to me that the German term provides a more evident description.

I have already mentioned my indebtedness and gratitude to Professor Walter for his unstinting help with the translation. A number of other people have also given me great help, first and foremost my wife Lydia, and my colleague and friend Dr Raymond K. Mackie. My wife is a zoologist not a chemist but was gallant enough to read portions and advise me on their improvement; in particular she guided me away from misleading translations of biological material. In addition I am grateful to her for her general support throughout the exercise. Dr Mackie, in addition to being a friend, is also a neighbour in the department, and was therefore all too handily placed for me to pester him with queries and requests for advice and information. All this he gave with great good grace and he has contributed a lot to the translation. Various other colleagues also helped with specialist knowledge; particular thanks go to Dr Alan Aitken, Dr Nigel Botting and Dr John Walton in the Department of Chemistry and Professor H.G. Callan and Dr C. Muir, both formerly of the Department of Zoology in the University of St Andrews, and Dr Heather McOmie (Bristol), who helped me over some medical queries. Dr John Mellor (University of Southampton), the publisher's consultant, also very kindly read the whole text, and the proofs, and offered many valuable suggestions. To all of these people I, and the book, owe a big debt of gratitude. Last but not least an enormous expression of thanks must go to Mrs. Lynn Marouf (Department of Chemistry, The University of Edinburgh) who typed the whole work and prepared the disks which were used in its production. Her very able and willing collaboration made life very much easier and happier for me.

I am also grateful to the staff of Ellis Horwood, and to Ellis Horwood himself for all the practical help in the preparation of the first English version, published in hardback binding in 1996 by Prentice-Hall Europe as *Handbook of Organic Chemistry,* and in the preparation of the present edition. I also thank Rosemary Harris for her skills in implementing the emendations to this first paperback edition published by Albion Publishing limited and retitled *Organic Chemistry: a comprehensive degree text and source book.* The valuable help and co-operation of Sabine Körner of S. Hirzel Verlag, is also gratefully acknowledged.

It would be unnatural if I had perpetrated no errors of omission or commission. I apologise for them to Professor Walter and trust that kind friends will point them out to me.

Finally, I would like to express the pleasure which I have received from carrying out this task; I am grateful to the author and to the publisher for trusting me with it. I hope that readers may gain as much pleasure and learn as much of interest as I have.

Douglas Lloyd
University of St Andrews
Martinmas term 1996

Periodic System of the Elements

	Ia	IIa	IIIa	IVa	Va	VIa	VIIa	VIII			Ib	IIb	IIIb	IVb	Vb	VIb	VIIb	0
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	1 **H** 1.008																	2 **He** 4.003
2	3 **Li** 6.94	4 **Be** 9.01											5 **B** 10.81	6 **C** 12.011	7 **N** 14.01	8 **O** 16.00	9 **F** 19.00	10 **Ne** 20.18
3	11 **Na** 22.99	12 **Mg** 24.31											13 **Al** 26.98	14 **Si** 28.09	15 **P** 30.97	16 **S** 32.06	17 **Cl** 35.45	18 **Ar** 39.95
4	19 **K** 39.10	20 **Ca** 40.08	21 **Sc** 44.96	22 **Ti** 47.90	23 **V** 50.94	24 **Cr** 52.00	25 **Mn** 54.94	26 **Fe** 55.85	27 **Co** 58.93	28 **Ni** 58.71	29 **Cu** 63.55	30 **Zn** 65.37	31 **Ga** 69.72	32 **Ge** 72.59	33 **As** 74.92	34 **Se** 78.96	35 **Br** 79.90	36 **Kr** 83.80
5	37 **Rb** 85.47	38 **Sr** 87.62	39 **Y** 88.91	40 **Zr** 91.22	41 **Nb** 92.91	42 **Mo** 95.94	43 **Tc** 98.91	44 **Ru** 101.07	45 **Rh** 102.91	46 **Pd** 106.4	47 **Ag** 107.87	48 **Cd** 112.40	49 **In** 114.82	50 **Sn** 118.69	51 **Sb** 121.75	52 **Te** 127.60	53 **I** 126.90	54 **Xe** 131.30
6	55 **Cs** 132.91	56 **Ba** 137.34	57 **La** 138.91	72 **Hf** 178.49	73 **Ta** 180.95	74 **W** 183.85	75 **Re** 186.2	76 **Os** 190.2	77 **Ir** 192.22	78 **Pt** 195.09	79 **Au** 196.97	80 **Hg** 200.59	81 **Tl** 204.37	82 **Pb** 207.2	83 **Bi** 208.98	84 **Po** 208.98	85 **At** 209.99	86 **Rn** 222.02
7	87 **Fr** 223.02	88 **Ra** 226.03	89 **Ac** 227.03	104 **Rf/Ku** 261.11	105 **Ha** 262.11	106 **Sg**[1)] 263.12	107 **Ns** 262.12	108 **Hs**	109 **Mt**									

Lanthanides	58 **Ce** 140.12	59 **Pr** 140.91	60 **Nd** 144.24	61 **Pm** (145)	62 **Sm** 150.4	63 **Eu** 151.96	64 **Gd** 157.25	65 **Tb** 158.93	66 **Dy** 162.50	67 **Ho** 164.93	68 **Er** 167.26	69 **Tm** 168.93	70 **Yb** 173.04	71 **Lu** 174.94	
Actinides	90 **Th** 232.04	91 **Pa** 231.04	92 **U** 238.03	93 **Np** 237.05	94 **Pu** 244.06	95 **Am** 243.06	96 **Cm** 247.07	97 **Bk** 247.07	98 **Cf** 251.08	99 **Es** 252.08	100 **Fm** 257.10	101 **Md** 258.10	102 **No** 259.10	103 **Lr** 262.11	

[1]The name Seaborgium (Sg), which was proposed by the American Chemical Society, has not yet been accepted by IUPAC

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