K. V. Vatsuro and G. L. Mishchenko

NAMED REACTIONS IN ORGANIC CHEMISTRY (HANDBOOK)*

Reviewed by G. V. Bykov

There is a real need for a handbook on named reactions: in the literature we find hundreds of reactions named after chemists who discovered particular reactions or worked on them. The factors that brought this tradition into being continue to be with us today. To speak of "Bart's reaction" is more convenient than "the reaction of arylidiazo compounds with alkali salts of arsenic acid in the presence of catalysts." Ours is an age pressed for time, an age of abbreviations, most of which are comprehensible to specialists but convey no information to those not belonging to the appropriate scientific "in-group." Of course an expression such as "Bart's reaction" cannot simply be decoded like an abbreviation such as SCF MO LCAO in quantum chemistry, where one can give a definition in terms of molecular orbitals and linear combinations of atomic orbitals; but to an organic chemist, especially if he is working in the field of heteroorganic compounds, the term "Bart's reaction" is just as informative as an abbreviation.

In the case of physics and chemistry, a handbook of named laws is not actually required. The Boyle–Mariotte law, the Gay-Lussac laws, the Faraday laws, and as a matter of fact the van der Waals equation, the Zeeman effect, the Markownikoff rule – all these do not need special explanations because, in the first place, there are comparatively few named laws, theorems, rules, and so on, and secondly, they apply to a rather broad domain of science and are not narrowly prescriptive in character.

But in organic chemistry, named reactions are far more common. Neither the student nor even the specialist is capable of keeping them all in mind – all the more so because certain reactions may be associated with more than one name, and along with synonymous named reactions we are also confronted with reactions that are homonyms, with an identical name being assigned to several reactions. Finally, some reactions are generally referred to in the literature by concise, pithy designations, and individual authors, in order to save space or sometimes from patriotic motives, will select one name or another to bestow upon a reaction, occasionally without any proper basis. This is why it is so important to have available a reference work like that compiled by Vatsuro and Mishchenko.

This handbood, which gives information on 880 reactions, is the most complete yet published either in the Soviet Union or abroad. The compilers very succinctly define the scope and manner of exposition of the material as follows: "The entry for each reaction includes a brief description of the chemical significance of the reaction, with the name of the process involved and the classes to which the initial and final compounds belong; an equation in standard format describing the reaction, generally including the mechanism and basic conditions whereby it can be performed; the reactive capability of the substances and the factors affecting it; the limits of applicability of the reactions with examples to illustrate how those limits can be extended; a description of side reactions; ways to use the reaction, and the advantages of a particular method compared with similar methods; modifications of the reaction; references to chemical reactions of the same type, to reactions yielding analogous compounds or other products if the reaction conditions are changed, and so on; and a brief bibliography with citations of the original paper of the author for whom the reaction is named, papers in which that name is used for the reaction, review papers, and recent research." From this passage we see what diversified information can be gleaned from the handbook.

A similar handbook by Alexander R. Surrey, Name Reactions in Organic Chemistry (2nd edition, Academic Press, 1961), was published 15 years ago in a Russian translation edited by N. S. Vul'fson (Goskhimizdat, Moscow, 1962, 300 pp.) and contains 111 named reactions, about a tenth of them added by the editor of of the Russian edition. The reactions are perhaps described somewhat more fully in Surrey's handbook than in the book under review (compare, for example, the descriptions of Bart's reaction, the Birch reduction, the

*Khimiya, Moscow (1976).

Translated from Khimiya Geterotsiklicheskikh Soedinenii, No. 10, pp. 1427-1429, October, 1977.

0009-3122/77/1310-1147$07.50

Bischler–Napieralski reaction, and so on). This circumstance probably should not be considered a shortcoming: a handbook on named reactions serves more as a finder than as a manual on the methods of preparative chemistry. But we feel that the brief statements given in Surrey's handbook concerning the chemists for whom the various reactions are named are not only interesting, but necessary for a full grasp of the named reactions. However, in addition to a biographical note on such-and-such a chemist, it would have been desirable to allot two or three phrases to a "biography" of the reaction itself, which Surrey, with rare exceptions (the Beckmann rearrangement and two or three other cases), does not provide.

The principles of selection are of great importance in compiling a handbook of this kind. Surrey, as he writes in his preface, sought to collect all named reactions. He clearly did not attain this goal and fundamentally could not have done so. Vatsuro and Mishchenko have endeavored to include in their handbook the named reactions mentioned in the literature of chemistry after 1950. They too have naturally been unable to cover every reaction; even though the range of sources they examined was representative, it could not possibly have embraced the whole chemical literature published since the date mentioned. But more needs to be said. It is important, we believe, when preparing a handbook on named reactions to take their frequency of occurrence into account. Reactions cited by name once, twice, or even more often, but only in papers by the same author or in an identical publication, perhaps do not warrant inclusion in a handbook if it does not pretend to be exhaustive. The present volume gives nine reactions named for E. Fischer (Surrey gives one). Probably some of them could have been eliminated if a frequency criterion were applied in making a selection. In any event, to avoid homonyms it would have been advisable to supplement the name by some more specific information: "Fischer's preparation of arylhydrazones," "Fischer's preparation of indoles" (this is the reaction given by Surrey), and the like.

One cannot, of course, hope to embrace the illimitable. And this handbook has too its share of omissions of named reaction that occur in the current literature. By current literature we would include university courses in organic chemistry as well. The compilers of the handbook have overlooked these, but just because textbooks generally give pre-sifted material one may regard named reaction appearing in textbooks as having a high degree of currency. In this vein let us compare the Vatsuro–Mishchenko handbook with A. N. Nesmeyanov and N. A. Nesmeyanov's Principles of Organic Chemistry (Vols. 1 and 2, Khimiya, Moscow, 1969-1970). Of the three Bamberger reactions listed in the handbook, none is mentioned by that name in the Principles, but instead there is a "Bamberger reaction" of converting nitro compounds into carbonic acids with the release of hydroxylamine (Vol. 1, p. 221). On the other hand, of the three Willgerodt reactions mentioned in the Principles, none is considered in the handbook, which does include a reaction missing from the Principles. And many other examples of this kind could be given.

The naming of certain reactions for two or even three chemists is open to some doubt. Thus, for instance, we find the "Borodin–Hunsdiecker reaction"; Borodin's work dates from 1861 while Hunsdiecker's paper was published in 1942. A footnote to the description of the reaction says: "Also called Borodin's reaction." Presumably it is sometimes called "Hunsdiecker's reaction" as well. Here it would have helped if the authors had given a brief "biography" of the reaction, making it clear to the reader what role was played by the Hunsdieckers (there were actually two German chemists with the same name) in working out this reaction. Similarly, in numerous other cases, where the handbook discusses "modification" of a particular reaction, it would have been convenient to include these in the "biography" of the reaction. Sometimes the naming of double-name reactions violates the chronological principle. A case in point is the "Shorygin–Wanklyn reaction" (Wanklyn's contribution dates from 1858, Shorygin's from 1907). In naming the Vyshnegradskii–Ladenburg reaction, the "biography" of the reaction takes on special importance, for the work of the first author (which is erroneously dated as 1889 in the bibliography rather than 1879) was separated by five years from that of the second (1884); thus a note should have been inserted stating that it is historically unfair to call this reaction for reducing pyridine and its derivatives by metallic sodium the Landenburg reaction, as often happens in the literature.

The names "Butlerov–L'vov reaction" and "L'vov–Sheshukov reaction" were evidently taken by the compilers from the literature they consulted. But these names are inaccurate. The first reaction should be credited wholly to L'vov (see, for example, L'vov's letter to Butlerov in the Collected Letters of Russian Chemists to A. M. Butlerov – a Scientific Legacy [in Russian], Vol. 4, Izd. Akad. Nauk SSSR, Moscow (1961), p. 193), and the second to Sheshukov (as follows, incidentally, from the work of L'vov to which the compilers refer). I think it is justified to name a reaction after two chemists only if the first description was given either jointly or by the two authors publishing at the same time.

Compilers of handbooks on named reactions in the Russian language unavoidably face one difficulty of a special kind. The names of many foreign chemists, including some of the most eminent ones, are either traditionally transliterated into the Cyrillic alphabet in an improper way, or several quite different transliterations occur. At one time it was the custom to write English and French names so that, when read in Russian, they would be pronounced in the German fashion; thus the name John Dalton should phonetically be spelled Dolton in Russian, but instead the Germanic transliteration Dal'ton was used. Similarly, Linus Pauling would normally be Poling in Russian; Pauling is a Germanic transliteration. Auguste Laurent was spelled in that manner rather than phonetically as O. Loran. But today there is a tendency to Anglicize the Russian spelling of the names of German chemists; thus the founder of coordination chemistry, Alfred Werner, now becomes not Verner but Uorner. On the whole the authors of the handbook have coped with this problem rather well, deferring to tradition in the most essential cases (August Wilhelm von Hofmann is spelled Gofman, as is customary in Russian, rather than Khofman, the phonetic spelling; the tradition was established in the Russian chemistry literature of the late 19th century), while at the same time attempting, in accord with prevailing rules, to transcribe phonetically in Russian the names as pronounced in the native language of the author.

However, it is not so simple a matter in every individual case to determine the national origin of the author of a reaction in the past and even today (especially now with the notorious "brain drain"). The compilers have made hardly any crude mistakes (they do pronounce the name of the German chemist Heinrich Debus as though it were French and spell it in Russian as Debu), but in a number of instances the solution remains controversial (here is another reason why it is so useful for settling arguments to give a biographical note for the person for whom a reaction is named). It seems to us, however, that no logical answer to the problem can be laid down, and that we will always be confronted with some confusion when we transliterate into Russian the names of foreign chemists. No wonder that A. M. Butlerov, in his classical Introduction to the Complete Study of Organic Chemistry (Kazan', 1864-1866), preferred to leave foreign names in the original, Latin alphabet. Wouldn't it be sensible to make wider use of this orthographic convention in our scientific literature on chemistry, including handbooks like the one discussed in this review? For example, reactions Nos. 646 and 647 in the handbook, named for W. H. Haworth, would not be headed "Kheiuort (Haworth, W. H.)," with the Cyrillic transcription first, but instead the name in the Latin alphabet would be followed by the alternative Cyrillic spellings: "Haworth, W. H. (Kheiuort, Kheuors, Gevort, etc.)." In parentheses one would give, as fully as possible, the various transliterations of the name of each chemist that occur in the Russian literature, beginning with the most "authoritative" version, and all the different spellings would of course be included in the index.

In offering some suggestions for compiling handbooks of named reactions in organic chemistry, we do not want to belittle the major, very painstaking and valuable effort undertaken by the compilers of the volume at hand.

V. É. Kolla and I. S. Berdinskii

THE PHARMACOLOGY AND CHEMISTRY OF HYDRAZINE DERIVATIVES*

Reviewed by E. F. Terent'eva

The authors of this book have endeavored to link the pharmacological properties of hydrazines with their chemical structure. Only 30 pages of the text are devoted explicitly to the chemistry of the arylhydrazides of disubstituted glycol acids; very cursory mention is made of the ultraviolet spectra, halochromism, and complexing capability of these compounds. For the most part the book deals with various forms of the pharmacological effects of hydrazine derivatives (which include many different hydrazides of the heterocyclic series), their influence on the central nervous and cardiovascular systems, their analgesic, convulsive and antispasmodic, antimicrobic, and antiviral activity. The list of references used includes 1246 citations.

*Mariiskoe Knizhnoe Izd., Ioshkar-Ola (Mari Auton. Sov. Soc. Rep., near Kazan'), 1976.

Translated from Khimiya Geterotsiklicheskikh Soedinenii, No. 10, p. 1429, October, 1977.

 0009-3122/77/1310-1150$07.50