REFERENCES TO SCIENTIFIC LITERATURE

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Nearly everyone who contributes to scientific publications, or who has occasion to make any extensive use of them, has to deal more or less with references to various sources of information. While one who merely uses the works of others may take little notice of the practice followed in placing and stating such references, the individual who is making contributions to the literature, or who is editing others' productions, must face the question of how to handle these items.

In an effort to determine what was considered editorially acceptable practice in chemical journals, the writer examined, in 1929, the references in the issue for November of the **Journal of the American Chemical Society**, the **Journal of Physical Chemistry**, **Industrial and Engineering Chemistry**, and the **Journal of Chemical Education.** In doing this all the different methods of stating references were compiled for each journal and from the combined list typical examples were selected of all the different ways employed. It is sufficient here to state that, in the one issue of the four journals, there were found seventeen methods of stating references to periodicals and twenty-eight to books. Since these periodicals, all sponsored by the American Chemical Society, are probably as carefully edited as any other similar group, it is assumed that such variations are more or less common.

The kinds of variations found may be summarized as relating to the following items:

1. Author's name—inclusion or omission, inclusion or omission of initials, and use of different punctuation marks following name.
2. Titles of articles in periodicals—inclusion or omission.
3. Names of periodicals—different abbreviations and different kinds of type.
4. Titles of books—use of quotation marks.
5. Publishers of books—inclusion or omission of names, together with inclusion or omission of place of publication.
6. Details for given periodical or book—variations in statement of series, number, volume, part, page, and date.

Such divergent practice as that just noted would seem to merit our attention and to raise the question of what is the most efficient and desirable thing to do, considered both from the viewpoint of the user and the producer of the literature. Probably no one individual has a sufficiently comprehensive knowledge of all the situations likely to arise in giving references to the different kinds of scientific publications that he could state definitely what one thing should be done under all circumstances; but, from the expressed views of those interested, a committee should be able to formulate a proposal, the practice of which, by both authors and editors, would lead to general improvement in the present situation. In at least one scientific organization the writer has been unaware of any opposition on the part of authors toward the editorial board's insistence on following a standard practice in handling references.

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During 1930[1] this matter has had editorial consideration by at least part of the American chemists, but no general agreement seems forthcoming. Even if each periodical follows some one procedure consistently, one not only has to discover what that procedure is, but also to face the possibility of having to rewrite an article if the editor to whom it was first sent turns it over to another editor, who follows a different system, as being more suitable for his publication.

Suggested Practice

Two important questions are involved: the best place in a publication to locate a reference, and the details to include for each reference, including the manner of arranging these details with respect to each other.

Referring first to the former of these, in the writer's opinion the only question of place in a journal article should be between footnotes at the bottom of each page, with the references consecutively numbered (in Arabic italics) throughout the article, and a bibliography at the end of the article, with the separate entries arranged serially, if they are cited by a number indicating the numerical order in which they are mentioned, or chronologically, if cited by the year of publication[2]. An alphabetical arrangement by authors is advantageous if there is included in the text the name of the author cited followed (in parentheses) by the year in which he published the work. Personal preference would decide a vote for the footnotes, although either is satisfactory. Printing and editorial efficiency should decide the question of the use of superior numerals or numbers in parentheses (either serial number or year of publication) set in the line of reading matter.

In considering what would be satisfactory for the details of each reference, perhaps first of all account should be taken of the various kinds of publications to which references are made,[3] since what is sufficient for one may well be either too limited or entirely inapplicable for another. It is believed that, for the present purpose at least, scientific publications may be divided into four groups: periodicals, institutional publications (such as governmental bulletins), patents, and books.

Whatever data are given in a reference to anyone of these groups, the items included should be such as to guide the searcher unerringly to the source sought[4]. At the same time they should be as brief as possible in the interest of efficiency in reading, proof reading, writing, and preventing errors. With this thought in mind there is indicated below what seems a reasonable and workable proposal for each of the above classes. At least it is hoped it will serve as a basis for discussion from which will develop a more nearly uniform practice.

1. *Periodicals*—author's name; abbreviation of name of periodical, in italics; series (if there is one), in brackets; volume, in bold face type and Arabic numerals, using Roman numerals only when necessary to indicate parts, and then as subscripts; page (indicating beginning of article or place where cited material is located), preceded by no abbreviation (such as p. or pp.), and followed by none (such as ff.), and in Roman numerals only when referring to a section where they are used to distinguish it from another section using Arabic numerals; and year, in parentheses.

In each class the author's name would not include initials unless necessary for identification. A standard abbreviation, such as those adopted in 1922 for chemistry by the International Union of Pure and Applied Chemistry and used

[1] **Ind. Eng. Chem. News Ed., 8,** Nos. 2 and 21 (1930).
[2] St. John, **Science,** *70,* 217 (1930).
[3] Mellon, "Chemical Publications," p. 14 (1928).
[4] Merrill, **Science,** *62,* 419 (1925).

in **Chemical Abstracts** would seem to be desirable. In many cases the inclusion of titles merely adds to the labor and uses space as they are often not indicative of the actual contents; but, if given, they should follow the year. The value of inclusive pages in abstracts is evident but they may well be neglected here unless only a specific part of a publication is of value. The year is valuable but should not be insisted upon until we have available much more comprehensive volume-year tables for individuals who do not have access to the journals themselves. If the periodical has no volume number, the year, in bold face type, may be used instead. The number or month of the issue concerned should not be included if consecutive paging is used throughout the volume concerned.

The following form of reference would be considered satisfactory: Smith, **Ann. chim. phys.,** [9], 25_{II}, 481 (1912); or **Chem. Zentralb.** *1910*, 341, 450-492.

2. *Institutional Publications*—author's name; name of institution (or division of government) issuing the publication, together with proper designation, such as technical paper, scientific paper, or similar class; number, either in bold face type or preceded by the abbreviation No.; page, unless the reference is to the whole publication as a unit; and year, in parentheses.

An example of this would then be, Williams, Bur. Mines, **Tech. Paper,** No. 135, 40 (1920).

3. *Patents*—patentee's name; name of country issuing patent, suitably abbreviated; number of patent; and date of issuing patent, including month, day and year, all in parentheses.

A typical reference would then be, Jones, U. S. Patent, 1,729,300 (Feb. 4, 1929).

4. *Books*—author's name; title, in quotation marks; volume, if it is one of a set, using Arabic numerals and reserving Roman numerals to use as small subscripts to indicate parts which are separately paged; page (unless the citation is to the book as a whole, when inclusive pages might be given) preceded by the abbreviation p. only if no volume is given, and followed by no abbreviation, using Roman numerals only when referring to a section of a book so paged; year, or number of the edition, in parentheses; and, should a committee think it desirable, the name of the publisher and the place of publication. The same procedure would apply to dissertations and to manufacturer's technical publications.

An example would be, Friend, "Textbook of Inorganic Chemistry," 9_1, 381-389 (1920). Chas. Griffin and Co., London; or, Olsen, "*Chemical Annual,*" p 31 (5 Ed.).