The Number of Review Articles in Various Subject Areas of Chemistry*

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A study of the twenty-five thousand items included in the first four volumes of *Bibliography of Chemical Reviews*** reveals that the proportion of chemical review-type articles in applied subject areas is larger than the proportion in theoretical subject areas. At the same time, there is evidence that these 25,000 reviews provide over one million bibliographic references to the chemical and related scientific literature.

The publication, *Bibliography of Chemical Reviews*, is a product of the Chemical Abstracts Service and the American Chemical Society. Each volume of *Bibliography of Chemical Reviews* (*BCR*) collects together the abstracts of review articles included in one year of *Chemical Abstracts* (*CA*). The first four volumes of *BCR* covered the *CA* publication period of 1958–1961.

With the subject areas of chemistry defined in terms of the abstract classification system of *CA*, I found a great variation in the distribution of abstracts of review articles in the various *CA* sections. These percentages range from a low of about 3% to a high of over 28% of the published articles abstracted in the 33 major *CA* sections studied. Abstracts of patents are, of course, not included in these counts.

In this study, the subject areas of chemistry are stated in terms of the classification scheme used in *CA* through volume 55 (1961). However, in 1962, *CA* began using a new 73-section classification arrangement. Where possible in this paper, the equivalent section numbers in terms of the 1962 classification are also provided.***

The top section in terms of percentage was "Chemical Industry and Miscellaneous Industrial Products," (Table I). Review abstracts constituted 28.3% of this section. At the time of this study this was section 13, and it is now part of the new section 56 and other sections. Next highest was "Fats, Fatty Oils, Waxes, and Detergents" with 13.5% reviews. This was section 27 and is now parts of sections 41 and 42. Third in size was section 5, "Photography," with 12.9% reviews. "Photography" is now in sections 11 and 14. Following closely were "Pharmaceuticals, Cosmetics, and Perfumes," and "Paints, Varnishes, Lacquers, and Inks," with 10.7 and 10.5% reviews.

At the other end of the scale was "Soils and Fertilizers" with only 3.2% review abstracts. This was section 15 and is now parts of the new sections 2, 18, and 61. Only slightly higher was "Organic Chemistry" with 3.3% reviews. The ten subsections of section 10 are now sections 26–38. Other low percentage sections were the section, "Electronic Phenomena and Spectra," and the section "Electrochemistry," with 3.6% reviews each.

"Biological Chemistry," section 11, was the largest subject area during the 4-year period and accounted for about 30% of the abstracts of papers in *CA*. This subject area ranked slightly above the arithmetic mean with 7.1% reviews. The arithmetic mean for all of the sections was 6.0%.

The second largest subject area during this period, "Organic Chemistry," section 10, ranked very low with 3.3% reviews.

Another large section in terms of all the abstracts published in *CA* was "General and Physical Chemistry," section 2. This also ranked low with 4.9% reviews.

In the section classification scheme used through 1961, sections 1–11 were considered to be theoretical areas. The remaining sections were thought of as applied areas. Of the 33 major areas only a few theoretical sections had percentages above the arithmetic mean of 6.0% and the median section of 6.1%. "Photography" ranked third. In the thirteenth of the 33 positions was "Biological Chemistry." In the sixteenth and seventeenth positions were "Apparatus, Plant Equipment, and Unit Operations," and "Nuclear Phenomena." Thus, as a whole, the applied areas of chemistry tend to consist of a larger proportion of review articles than do the theoretical areas.

Undoubtedly, the discovery that the proportion of review articles in applied subject areas is higher than in the theoretical subject areas is not unexpected. When the technical periodicals in the applied areas such as *Industrial and Engineering Chemistry* and *Manufacturing Chemist* are examined, many of their articles are found to be reviews. This probably is inevitable if the editorial material will attract the readership which in turn attracts the advertising which supports the journal.

The review journals in pure chemistry such as *Chemical Reviews* and *Science Progress* actually carry only a few review articles during any year. These, of course, are reviews in greater depth than the papers published in the applied areas. However, because there are more theoretical

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** With volume five the name was changed to *Bibliography of Reviews in Chemistry*.
*** The classification arrangement was changed again in 1963.

Table I

The Number of Review Abstracts in *Chemical Abstracts* Sections

Rank		*Chemical Abstracts* Section (1961 title)	No. of abstracts of review papers in *Bibliography of Chemical Reviews*, Volumes 1–4 (1958–1961)	No. of abstracts of all papers in *Chemical Abstracts*, Volumes 52–55 (1958–1961)	Per cent reviews
1	13	*Chemical Industry and Miscellaneous Industrial Products*	707	2,495	28.3
2	27	*Fats, Fatty Oils, Waxes, and Detergents*	408	3,025	13.5
3	5	*Photography*	161	1,246	12.9
4	17	*Pharmaceuticals, Cosmetics, and Perfumes*	907	8,463	10.7
5	26	*Paints, Varnishes, Lacquers, and Inks*	170	1,624	10.5
6	25	*Dyes and Textiles*	373	3,803	9.8
7	14	*Water, Wastes, and Air Pollutants*	468	5,286	8.9
8	30	*Rubber and Other Elastomers*	176	2,013	8.7
9	22	*Petroleum, Lubricants, and Asphalt*	437	5,125	8.5
10	29	*Leather and Glue*	101	1,303	7.8
11	24	*Propellants, Explosives, and Explosions*	62	847	7.3
12	21	*Fuels and Coal Products*	378	5,258	7.2
13	11	*Biological Chemistry*	8,801	123,495	7.1
14	31	*Synthetic Resins and Plastics*	401	5,745	7.0
15	28	*Sugars, Starches, and Gums*	114	1,694	6.7
16	1	*Apparatus, Plant Equipment, and Unit Operations*	600	9,842	6.1
17	3A	*Nuclear Phenomena*	1,220	20,093	6.1
18	19	*Glass, Clay Products, Refractories, and Enameled Metals*	246	4,266	5.8
19	6	*Inorganic Chemistry*	386	6,895	5.6
20	15A	*Pesticides and Crop-Control Agents*	298	5,352	5.6
21	18	*Inorganic Industrial Chemicals*	120	2,157	5.6
22	23	*Cellulose, Lignin, Paper, and Other Wood Products*	276	5,232	5.3
23	9	*Metallurgy*	1,260	24,129	5.2
24	12	*Foods*	483	9,413	5.1
25	8	*Mineralogical and Geological Chemistry*	769	15,278	5.0
26	7	*Analytical Chemistry*	844	16,816	5.0
27	2	*General and Physical Chemistry*	1,852	37,614	4.9
28	16	*The Fermentation Industries*	120	2,743	4.4
29	20	*Cement, Concrete, and Other Building Materials*	101	2,439	4.1
30	4	*Electrochemistry*	257	7,043	3.6
31	3	*Electronic Phenomena and Spectra*	880	24,603	3.6
32	10	*Organic Chemistry*	1,428	43,721	3.3
33	15	*Soils and Fertilizers*	262	8,133	3.2
			Total 25,066	Total 417,191	Average 6.0%

articles than applied articles abstracted in *CA*, the actual number of reviews in theoretical subject areas is larger than in applied subject areas.

THE NUMBER OF AND NEED FOR MORE REVIEWS

Since *Bibliography of Chemical Reviews* attempts to include every review paper abstracted in *CA*, it represents a readily available source for a chemist to obtain background information and extensive bibliographies in fields of knowledge new to him. Volume one of *BCR* contained 5,553 review abstracts. The number has increased each year, and volume four for 1961 contained 6,799 review abstracts. The four volumes represent a total of 25,066 abstracts of reviews (Table II).

Yet, even with all these review articles in the literature, there are some areas which have very few. As mentioned earlier, "Organic Chemistry" ranked next to last with 3.3%. This is low enough, but some of the organic subsections had almost no reviews. For example, in 1960 there were three abstracts in section 10J, "Steroids." This is not to say that these were the only reviews on steroids. There were others, but they occurred mostly in the "Biological Chemistry" area. However, on the subject of the laboratory synthesis of steroids there were only three for a total of 0.7% of the abstracts in the subsection. Incidentally, only one of these articles was in English, and it was from an Indian journal. The others were in Japanese and German.

There are other areas where the number of reviews may be too small. Probably several more are needed in optical

Table II

The Number of Review Abstracts Published in *Bibliography of Chemical Reviews*[a]

Volume	Year	Number of review abstracts
1	1958	5,553
2	1959	6,344
3	1960	6,370
4	1961	6,799
	Total	25,066

[a] The number of reviews for volumes 1–3 (1958–1960) correct the preliminary totals printed in the prefaces of these volumes.

rotatory dispersion. There were two in 1960 and four in 1961. Biological aging had four in 1960 and one in 1961. Organic conductors of electricity had one in 1960 and none in 1961. However, it's quite probable that by 1962 there will be more reviews in these areas. At the same time, though, other new subject areas will need reviews.

There will always be a need for review papers in new fields of interest, but we should not overlook the fact that there are already many reviews available. The four volumes of *Bibliography of Chemical Reviews* contain over 25,000 abstracts of reviews. That is a rather large number, but in terms of the cited references to the literature provided with most reviews, the numbers become much larger.

A sampling of the reviews indicates there are at least 40 bibliographic references in each review. This is the resulting average value when all review papers with no definitely stated number of references are counted in the total as having zero references. When only those reviews with a stated number of references are used in the total, the average is about 68 references per review. Thus, the 25,000 reviews provide between one million and 1.7 million literature references.

Of course, it must be realized that there probably is a great deal of duplication of references in the more than one million cited references, and what that amount of duplication is, is not known. In any case, we can see what a powerful information retrieval tool a collection of reviews can be.

SELECTING THE REVIEWS

A few statements might be appropriate about the material we put into *Bibliography of Chemical Reviews*. First of all, I include every abstract which the abstractor has stated is a review. If it is both a review and a presentation of new work, then we attempt to alter the abstract to suit our purposes. Also, we include any abstracts of separate bibliographies.

There are a number of papers described as discussions. I try to examine the original papers here and in other borderline cases. Usually I accept this kind of material if it has a number of references to the literature. The same thing applies to lectures. There I try to distinguish review lectures from lectures where only new information is presented. I also include biographical material about chemists if there is a list of publications appended.

Beginning with volume three of *BCR* we have included author and keyword-in-context indexes in each volume. Response to these changes has been favorable.

Changes in future volumes will depend both upon the needs of the users and further developments in the general area of information storage and retrieval.

Development and Use of Records in the Processing of Technical Papers in an Industrial Organization*

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One of the more important facets of the corporate image presented by an industrial corporation today is the quality, quantity, and placement of its technical publications. The current surge of interest in basic research has caused a company to be judged in a large part in the scientific community by the papers of its staff that appear in such scholarly journals as *The Journal of the American Chemical Society* or *The Journal of Physical Chemistry*. Indeed, one might say that publications of the right type in the right journals have become a corporate status symbol.

The individual author also feels this need for good publications. This is instilled in his university training by his professors, whose chief means of gaining prestige and stature in the sciences has been through publications. There is also the desire of the true scientist to exchange his findings with others working in his field around the world. Finally, as he progresses in an industrial organization, the professional man finds that his publications are a good means of bringing himself and his work to the attention of his colleagues not only in his own immediate area, but throughout the industry.

The legal staffs of industrial companies also have an interest in publications, apart from security, since the timing of technical disclosures in publications can influence the future of their own and competitive patents in a given field.

INTERNAL CONTROL

Faced with this snowballing interest in publication, companies have recognized that some means of internal control must be established to guide the author and to protect company interests. This is usually accomplished through formulation of clearance or review procedures of

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