Documentation Institute, and B. M. Woods, Special Libraries Association, to establish a cooperative venture for producing a serial publication for abstracts of papers of interest to members of each of the three organizations (see *Chem. Lit.*, Spring issue, 1966). This cooperative venture successfully resulted in the launching of *Documentation Abstracts* in 1966 under the equal initial sponsorship and financial support of the three organizations for Volume 1. Beginning with Volume 2, the new journal became self-supporting. The name was changed to *Information Science Abstracts* in 1969.

Chemical Literature has been the division's major communications with the membership. The first and longest serving editor was B. H. Weil, who launched the publication and made it into an important publication. Succeeding editors have been: Ethaline Cortelyou, 1958 and 1965–8; Iver Igelsrud, 1959–61; Virginia Valeri, 1962–4; Lorraine du Puis, 1969; J. E. Rush, 1970–2; and Gabriel Revesz, 1973–present.

Of historical importance were the two meetings the division held on its own: January 19–21, 1958, in Pittsburgh, Pa., at which attendance was 157; and March 14–17, 1973, in Columbus, Ohio, at which attendance was 147.

Within the first year of its formation, there were about 700 members in the division. Membership slowly increased to about 1100 in the late 1950's and early 1960's, and since then has been fairly stable at about 900–1000.

Officers of the division from its founding to the present are listed in Table I. These people and the chairmen of the various committees, especially the program chairmen, have contributed materially to the successful evolution and growth of the Division of Chemical Literature and to the increasing importance of the division to its members and to chemistry and chemical technology.

Changing Patterns in the Doctoral Research of Chemistry Majors

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The changing patterns in the dissertation research of Ph.D. candidates in chemistry were analyzed *via Dissertation Abstracts* for 1969–1970 *vs.* 1972–1973.

Many changes have occurred in the doctoral research programs of universities as a result of the changing patterns in the supply and demand for individuals with the Ph.D. in chemistry. In the mid 60's there was an apparent shortage of individuals with a terminal degree in chemistry; however, this shortage turned to an apparent oversupply of individuals by the early 70's. As a result, the number of students entering terminal degree programs has decreased and the major areas of study and research have shifted.

The purpose of this study was to analyze some of the changing patterns in the dissertation research of Ph.D. candidates in chemistry. More particularly, the purposes were to analyze the number of dissertations published in *Dissertation Abstracts* (DA) over a four-year period and the changing patterns of the dissertation topics based on the frequency of appearance of certain selected key words.

A frequency count was made of the number of doctoral dissertations abstracted in the Biochemistry and Chemistry sections (including subheadings) of DA during 1969–1970 (Volume 30)[1] and 1972–1973 (Volume 33).[2] A 4% sample of key words was selected from the 1,825 terms contained in the index of a general college chemistry textbook.[3] The resulting 4% sample yielded 73 words. In turn, these 73 words were matched with the key word index of Volumes 30 and 33 of DA. The results were 45 words that appeared both in the textbook and in DA. In turn, the key word index for the two volumes of DA were checked to locate the number of dissertations that contained each of the key words.

Table I shows the number and percentage of dissertations by major area and volume of publication in DA. A total of 2,503 abstracts of dissertations were published in Volume 30 of DA and 2,494 in Volume 33 representing a net decrease of 0.4%. It should be noted that over the four-year period the number of institutions contributing abstracts to DA increased from 249 to 259. Therefore, there was a net reduction in the number of abstracts published. In turn, this would lead one to conclude that, overall, there was a decrease in the amount of doctoral research in chemistry being conducted at institutions contributing to DA.

There was an apparent increase in the amount of research in biochemistry. The number of dissertations increased from 488 in Volume 30 to 617 in Volume 33. Decreases in the number of dissertations abstracted were noted in the fields of organic chemistry (753 *vs.* 654) and biological chemistry (181 *vs.* 108). However, it should be pointed out that the number of dissertations in the areas of

Table I. Number and Per Cent of Dissertations by Major Field and by Volume of Publication in *Dissertation Abstracts*

Field	Volume 30 (1969–70) No.	Volume 30 (1969–70) %	Volume 33 (1972–73) No.	Volume 33 (1972–73) %
Biochemistry	488	19.5	617	24.7
Chemistry		—		
General	57	2.3	83	3.3
Agricultural	0	0.0	1	0.1
Analytical	129	5.2	133	5.3
Biological	181	7.2	108	4.3
Inorganic	273	10.9	265	10.6
Nuclear	34	1.4	20	0.8
Organic	753	30.1	654	26.4
Pharmaceutical	52	2.1	54	2.2
Physical	477	19.1	469	18.8
Polymer	50	2.0	77	3.1
Radiation	9	0.4	13	0.5
Totals	2503		2494	

Table II. Number of Dissertations Containing Selected Key Words

Area	Volume 30 (1969–70)	Volume 33 (1972–73)	% change
Acid(s)	181	192	+6.1
Analysis or analytical	44	64	+45.4
Chemical	46	66	+43.5
Chemistry	69	69	0.0
Complexes	138	118	−14.4
Compounds	125	115	−8.0
Electron	47	37	−21.3
Energy	27	38	+40.7
Enzyme	19	28	+47.4
Halide(s)	31	24	−22.6
Hydrocarbon(s)	16	23	+43.8
Infrared	18	22	+22.2
Kinetics	53	55	+3.8
Ligand(s)	25	26	+4.0
Molecular	67	78	+16.4
Molecule(s)	32	54	+68.8
Nmr	11	30	+172.7
Olefin	25	8	−68.0
Organic	42	40	−4.8
Physical	23	20	−13.0
Protein(s)	52	78	+50.0
Proton	12	23	+91.7
Salt(s)	41	38	−7.3

biochemistry and biological chemistry increased by a combined total of 56.

Table II shows a summary of the number of dissertations containing selected key words. Only key words that were listed for a minimum of 20 dissertations in either Volume 30 or 33 of DA are included in the summary (a total of 23 key words). Also shown in this table is the percentage of change in appearance of the key words. Significant increases were noted in the frequency of appearance of analytical, energy, enzyme, hydrocarbon(s), molecule(s), NMR, and proton. Significant decreases were noted for the key words olefin and halide(s).

Although a minimal amount of data is shown, it appears warranted to conclude that there has been some change in the doctoral research patterns of Ph.D. candidates in institutions of higher education. Emphasis has shifted toward the areas of biochemistry and polymer chemistry and away from the traditional study of organic chemistry. The amount of research in the other areas of chemistry has not changed significantly over the four-year period studied. However, there has been an overall decrease in the number of dissertations as measured by the number of abstracts in DA. The shifting of emphasis of selected areas of chemistry was also noted in the changing patterns of the frequency of appearance of selected key words. In general, there was an increase in the number of words pertaining to the areas of biochemistry and biological chemistry and a decrease in words normally associated with organic research. Also, significant increases were noted in the frequency of appearance of the key words NMR and energy studies.

The information presented in this paper can serve as a baseline for examining changing patterns of doctoral research of Ph.D. candidates in the next decade. In turn, this information may be of value in determining areas of needed research.

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Microfilm-Based Information Systems and Their Use in an R&D Center†

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One of the major problems facing industrial information centers is that of storing the voluminous masses of information and data needed by the scientists. Microfilm is becoming the accepted media for this storage. Through standard indexing and retrieval practices, microfilm can be incorporated into information systems to replace the document holdings. There are cost and time savings through the elimination of space filing requirements and in search time. Case histories of applications of microfilm-based systems are given.

INTRODUCTION

Today's industrial research organizations are producing and accumulating large masses of data and information which are pertinent to successful R&D operations. Those responsible for information handling are faced with the problem of storing this material in a minimal amount of space, yet it must be available in a form readily accessible to users.

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TYPES OF MICROFILM

Few organizations can afford to buy and store all the information that could possibly be needed for future operations by their technical staff. Space requirements to store this information in a paper format would restrict most organizations in what they could afford to keep, much less purchase. Thus, there must be a means of reducing the space requirements for this material. The use of microfilm is one means of achieving this end.

There are two major types of microfilm, microfiche and roll microfilm. Microfiche is a 4 × 6 in. slab of film that can