

A Computerized Current Awareness System for Journal Literature[†]

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The Hercules journal literature information system is discussed in terms of the following parameters: timeliness, selectivity of journals and of their contents, abstracting and indexing orientation to the users, multiple products from one input, integration with other in-house information systems, and cost effectiveness.

R&D chemists and engineers in the industrial environment require a high order of accessibility to the contents of documents relevant to their assignments and to their continuing professional education. Least accessible of these documents undoubtedly is the journal literature. The journal literature has grown at a tremendous rate over the past 50 years to today's approximately 40 000 scientific and technical journals. Of these, 10 000–12 000 are covered by *Chemical Abstracts* (CA) as being pertinent to chemistry and chemical technology. When CA was established in 1907, it was necessary to monitor less than 400 journals for the 12 000 abstracts published. Coverage was increased to 600 journals by 1912, 1000 by 1922, 2000 by 1932, over 5000 in the 1950s, and over 10 000 in the 1960s. The number of abstracts passed 300 000 per year in 1971.

Paralleling the proliferation of new journals and the increasing size of existing journals has been that of secondary information services, which now number about 2000. Most have been introduced over the past 25 years. A more recent trend over the past ten years or so has been the availability of numerous information services as on-line databases through information brokers, some of which also provide SDI (selective dissemination of information) services.

No industrial R&D organization can exist long without access to the more important information services, including on-line databases, no more than it could exist without the books, journals, patents, etc., in its library. Not too many years ago, most industrial technical information centers provided to R&D personnel a current awareness bulletin for the selected content of journals subscribed to and maintained by their research libraries. Some also provided retrospective searching indexes of the journal articles in the cumulative bulletins.^{2-5,7-11,13} For a variety of reasons, many of these in-house bulletins have been curtailed drastically or eliminated and replaced with external information services.^{1,6,12}

External information services are essential to R&D personnel. No in-house information operation can begin to approach the world-wide coverage of CA or of other information services. Nor can an in-house information operation index the world's journal literature effectively or economically. Industrial research libraries thus subscribe to and make available to R&D personnel a variety of external information services. Consequently, an in-house information operation for journals basically is supplemental to or complementary with external information services. To attempt to do more would not be feasible economically and intellectually.

Some of the external information services subscribed to by the Hercules Research Center Library and the number of scientists and engineers using them routinely are:

Abridged Index Medicus—3
Abstract Bulletin, Institute of Paper Chemistry—7
Analytical Abstracts—15

Chemical Abstracts Sections—102
Chemical Titles—11
Current Contents—13
Graphic Arts Literature Abstracts—11
World Textile Abstracts—6

The above is but a partial list and excludes major tools such as the hard copy and microfilm editions of *Chemical Abstracts*, *Business Periodicals Index*, *Applied Science and Technology Index*, and selected coverage services, such as ASCATOPICS, and *CA Selects*. Furthermore, over 30 on-line databases are made available to R&D people, including *CA Condensates* and SDI services. Whichever service is used routinely is a matter of choice by each Hercules scientist and engineer. It is significant that over 400 of them prefer and routinely receive the Hercules Journal Literature Bulletin (JLB) for maintaining their current awareness of the journal literature. In addition to the immediate availability of journals to them of the JLB contents and the small size of the JLB relative to external abstracting services, we feel the following factors contribute to the viability and effectiveness of the JLB as an in-house journal literature operation:^{1,6,13,17-19}

Timeliness
Selectivity of journals and of their contents
Abstracting and indexing oriented to the users
Multiple products from one input
Integration with other in-house information systems
Cost effectiveness

TIMELINESS

The JLB was initiated 48 years ago in response to the need of Hercules research chemists and engineers to maintain a current awareness of articles in journals received by the library relevant to their R&D assignments. Then, as now, the library subscribed to all abstracting services requested and required by those in R&D functions. CA was the abstracting service most essential, as it is today. Until relatively recently, no abstracting service was of much value as a current awareness mechanism. It was not unusual for a time lag of six months to over one year between the receipt of the journal and the issue of CA with abstracts of articles of interest.^{17,20} Timeliness was the critical parameter that prompted the introduction of the JLB. It is still an important parameter today, but less so as CA now is current within an average of about two months, according to a recent study we made (Table I). The statistics in Table I, obtained over a six-month period, are comparisons of time intervals between the receipt of journals in the Hercules Research Center Library and the appearance of heavily requested articles in the JLB, CA, and the Lockheed/Dialog *CA Condensates*.

For the majority of articles relevant to the needs of Hercules R&D personnel, a time lag of 57 or 71 days is quite tolerable. But for a few, a time lag of even six days may be too much. Because every page of every issue of each journal received is examined by the JLB editor, a mechanism is automatically

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Table I. Time Lag between Receipt of Journal and the Appearance of Articles in JLB, CA, and Lockheed CA Database

Article in	No. of days to appearance in		
	JLB	CA	Database
<i>AIChE J.</i>	8	130	155
<i>Anal. Chem.</i>	6	42	48
<i>Can. J. Chem.</i>	4	50	56
<i>J. Appl. Polym. Sci.</i>	8	33	39
<i>J. Catal.</i>	4	74	89
<i>J. Chem. Phys.</i>	4	84	99
	6	62	68
<i>J. Chem. Soc., Perkin Trans.</i>	8	55	70
<i>J. Chromatogr.</i>	7	86	92
<i>J. Coat. Technol.</i>	6	105	111
<i>J. Org. Chem.</i>	4	31	46
	6	22	37
<i>J. Polym. Sci., Polym. Chem. Ed.</i>	3	49	55
<i>Kunststoffe</i>	12	18	42
<i>Macromolecules</i>	3	49	55
<i>Monatsh. Chem.</i>	8	54	62
<i>Nature (London)</i>	3	84	109
<i>Pulp Paper Can.</i>	8	35	60
<i>Staerke</i>	12	29	54
<i>Sven. Papperstidn.</i>	8	32	38
<i>Tappi</i>	7	54	79
<i>Tetrahedron Lett.</i>	6	76	91
Average	6	57	71

available to notify key R&D personnel promptly of critical articles.

There is no substitute for the interaction of a chemist or engineer with a journal article. Consequently, we subscribe to as many copies of each journal as necessary to have one in the library and others for routine and reasonably prompt circulation to those who request the service. The first copy of all subscriptions is routed on receipt to the JLB editor. Routine journal circulation is requested by just about every technical person for an average of about ten titles/person. As we subscribe to approximately 700 titles, R&D personnel depend on the JLB to include articles from all journals that may relate to their assignments. They also have the option of informing the JLB editor of special needs to see relevant articles promptly or to have them included in the JLB for some useful period.

SELECTIVITY

Industrial R&D is relatively well defined by areas of interests. These areas and the disciplines of science and technology exercised by the R&D staff determine the spectrum of journals required. In our case, this number is approximately 700 in which we expect to find at least 95% of the articles relevant to Hercules products, processes, and R&D programs. Should we discover additional journals within our spectrum of interests, we would, of course, add them to our subscription list. The need for additional journals is determined from a periodic examination of the library's interlibrary records of requests by R&D personnel; in general requests for three or more articles in a specific journal not in the library justifies a subscription.

Of the 700 journals subscribed to, approximately 100 cross the JLB editor's desk per week. As there is an average of about 20 articles in each issue, approximately 2000 articles are scanned per week for those which are relevant to our spectrum of information needs. The editor averages about 100-150 per week for indexing and abstracting within this limitation, thus concentrating the journal literature by well over 90% for the R&D personnel.

In addition to the concentration factor, the JLB also includes items other than articles in the journals that may be relevant to an R&D team. Such items may be news items, editorials,

co AMINE -P* / NITRILE -R* / REDUCTION / BOROHYDRIDE -U* //
 57 "Sodium Acyloxyborohydride as New Reducing Agents."
 II. Reduction of Nitriles to the Corresponding Amines."
 Aliphatic and aromatic nitriles are reduced to the corresponding amines in high yields by the use of sodium tri-fluoroacetoxyborohydride in tetrahydrofuran under mild conditions.
 Tanabe Seiyaku // Umino, N / Itoh, N /
 Tetrahedron Lett 1976, 2875-6, No 33, Aug

*P = preparation; R = reaction; and U = use.

Figure 1.

and even book reviews, which rarely or never are entered into external services. Furthermore, the editor will also scan serials, such as *Business Week*, *Forbes*, *Consumers Report*, *Fortune*, and the *Federal Register* which generally are not covered by CA, yet often contain informative articles of interest to chemists.

ABSTRACTING AND INDEXING ORIENTATION

Knowing and understanding the information problems and needs of our users is the first step in designing an indexing and abstracting system in harmony with the needs. Selected articles in the JLB are presented in the following classified arrangement:

Analytical Chemistry
 Physical and Theoretical Chemistry
 Inorganic Chemistry
 Organometallic Chemistry
 Organic Chemistry
 Polymer Chemistry
 Engineering
 Safety and Toxicity
 Uses and Applications of Chemicals
 New Products and Processes
 General Interest
 Hercules Publications

Each entry is coded for computer production of the bulletin. For example, a = analytical chemistry, ci = inorganic chemistry, and co = organic chemistry. Within each classified section, references are arranged alphabetically by the primary subject term.

Indexing is by the Multiterm concept, an indexing system that relates and associates subjects, as in the following example:¹⁴

C/R/P/A//

in which C is a chemical prepared from reactant R by process P using catalyst A. The virgule or oblique stroke following each term is part of the computer wrap-around algorithm to produce the following additional Multiterms:

R/P/A//C/

P/A//C/R/

A//C/R/P/

The double virgule indicates to the user the order or precedence chosen for the initial input Multiterm.

Figure 1 illustrates a reference as it appeared in the JLB. In the first line, co indicates that the reference was classified under the organic chemistry section of the bulletin, and the number 57 in the second line means that the reference is the 57th item in the bulletin. The journal containing this reference can be requested by circling 57 on the Request Form, the last page of the bulletin. It is quite apparent that the Multiterm for this reference not only gives as much information as the title, but is considerably easier to read. For most references, the Multiterm is considerably more informative than the title of the paper. Multiterms, in general, are shorter than titles, thus reducing the area to be searched by either the reader or the computer. In the next to last line, the first item is the

location of the author(s), which immediately follow(s).

Terms in a Multiterm are entered both generically and specifically in harmony with the needs of users. Generic-specific relationships allow browsing, such as in the following examples:

Chromatography, Gas
Chromatography, Gas-Liquid
Chromatography, Liquid
Chromatography, Thin Layer

Polymer: Acrylic
Polymer: Ethylene
Polymer: Methacrylic
Polymer: Olefin
Polymer: Propylene
Polymer: Styrene
Polymer: Vinyl Acetate

Spectroscopy, AA (Atomic Absorption)
Spectroscopy, E (Emission)
Spectroscopy, IR (Infra Red)
Spectroscopy, M (Mass)
Spectroscopy, UV (Ultra Violet)

Without the above generic-specific relationship, the terms would be scattered throughout the alphabetic arrangement from A to Z. Most importantly, selection of terms in each Multiterm is oriented to Hercules R&D personnel and the programs and disciplines in which they work.

MULTIPLE PRODUCTS FROM ONE INPUT^{15,16}

Processing the input for the JLB via computer allows us to produce the following outputs:

1. Multilith masters for the JLB arranged as described above.
2. Cumulative indexes with complete information as given in the JLB: (a) subject—with as many entries as terms in the Multiterm for each reference; (b) location of author(s); (c) author; (d) codes. The editor, on selecting articles for the JLB, assigns codes to those which relate to a mission of science, an R&D project, or a group's interest not readily definable by a generic subject. These codes are for the production of periodic printouts, usually quarterly and cumulatively, in areas such as polymer additives, textile chemicals, pesticidal chemicals, etc., i.e., in a package of maximum benefit to a group of users.
3. Requests from the JLB. Requests for both journals, as mentioned above, and 5 × 3 cards containing the information in the bulletin for each reference are processed via computer from the JLB Request Form.
4. Routine journal circulation. Duplicate copies of the journals are available to anyone on the technical staff via routine circulation. Every technical person receives periodically a computer printout of the journals on routine circulation and the ones he or she has requested with the choice of adding or deleting journals. The list of journals and those requesting them are matched in the computer with printouts of cards for each of the duplicate copies by the journal title, copy number, and a list of people grouped by building number and floor. The number of names on the list is limited so that each person may receive his requested journals reasonably promptly.
5. List of journals received by the library. Twice each week a list of the journals received and routed to the JLB editor is sent to those who wish to know promptly the availability of journals for reading in the library or for overnight reading at home.
6. Evaluation for determining renewal of subscriptions and number of copies needed. Inasmuch as the preceding five services are tied into one computerized database, it is relatively

easy to derive a statistical analysis of the demand for each subscription. The subscription purchase order for each publisher or agent is also produced from our computer processing.

INTEGRATION WITH OTHER INFORMATION SYSTEMS

Information needs in an industrial environment are not restricted to types of documents. Although we segregate input information by document type, such as journals, patents, Hercules reports, and correspondence, our input design and programs for outputs are similar. Consequently, to produce an output based on selected subjects or subject areas, authors, companies, or coded R&D programs is a matter of simply processing the master tapes of each database for the combined printout as required. Eventually, we hope to have this facility on-line.

COST EFFECTIVENESS

Every information system should be examined periodically for its value relative to costs, and particularly for where it stands relative to external services. Such examinations with the JLB have resulted in many changes over its 48-year history to make it a more effective and economical awareness and retrieval tool. The JLB of the 1930s, 1940s, and 1950s could not satisfy the criteria of the 1970s. Before the JLB was computerized in the 1960s, its operation required 2.0 chemists and 2.0 clerk-typists for the production of the awareness bulletin and typing and filing of 5 × 3 cards for retrieval. These were the only two products, yet they were valuable and heavily used tools.

With computerization, input could be designed to make possible a variety of products. Introduction of the Multiterm concept streamlined the indexing operation, and with the greatly increased ease of correcting proof, the editor alone can handle the work with an expenditure of no more than 32 hours per week. Input involves a maximum of 15 hours per week by a terminal operator.

Although economy in the production of an information system is important, cost effectiveness is most meaningful in the real world of the user. For example, an information system that saves one hour per week of a user's reading time, increases productivity of 100 users by 2.5 manyears per year. We know our computerized journal literature system does better than this and at the same time provides a service that is responsive to the information needs of the users.

Readers of the JLB in 1976 returned per month an average of 200 Request Forms requesting 800 journal articles and 200 5 × 3 cards. This is what a current awareness system is all about.

REFERENCES AND NOTES

- (1) C. M. Bowman and M. T. Brown, "The Development, Cost, and Impact of a Current Awareness Service in an Industrial Organization", *J. Chem. Doc.*, **11**, 72-75 (1971).
- (2) B. M. Davis, "Technical Information Service in the Cabot Research Laboratories", *Am. Doc.*, **9** (1), 23-27 (1958).
- (3) H. Friedenstein, "Alerting with Internal Abstract Bulletins", *J. Chem. Doc.*, **5**, 154-157 (1965).
- (4) A. K. Haas, "Internal Alerting with Keyword-in-Context Indexes", *J. Chem. Doc.*, **5**, 160-163 (1965).
- (5) J. B. Haglind and R. E. Maizell, "A Comparison of Title Announcement Publications for Chemical Journals", *J. Chem. Doc.*, **5**, 158-160 (1965).
- (6) B. E. Holm et al., "The Status of Chemical Information", *J. Chem. Doc.*, **13**, 171-183 (1973).
- (7) G. Jahoda, "Special Libraries and Information Centers in Industry in the United States", *UNESCO Bull. Libraries*, **17**, 70-76 (1963).
- (8) B. M. Krower, "Abstract Journals and Bulletins", *J. Chem. Doc.*, **5**, 150-153 (1965).
- (9) J. C. Lane, "Digesting for a Multicompany Management Audience", *J. Chem. Doc.*, **1**, 59-63 (1961).
- (10) R. L. Myer et al., "A Systematic Approach to Current Awareness and

- SDI", *J. Chem. Doc.*, **11**, 19-24 (1971); "User Study of Current Awareness and SDI at Celanese Research Company", *J. Chem. Doc.*, **11**, 24-29 (1971).
- (11) J. W. Mohlman, "Costs of an Abstracting Program", *J. Chem. Doc.*, **1**, 64-67 (1961).
- (12) J. S. Peterson, "Replacement of an In-House Current Awareness Bulletin by Chemical Abstracts Section Groupings", *J. Chem. Info. Comput. Sci.*, **15**, 169-173 (1975).
- (13) G. W. Simmons, "Centralized Abstracting of Petroleum Literature and Patents", *J. Chem. Doc.*, **5**, 166-169 (1965).
- (14) H. Skolnik, "The Multiterm Index: A New Concept in Information Storage and Retrieval", *J. Chem. Doc.*, **10**, 81-84 (1970).
- (15) H. Skolnik and R. E. Curtiss, "A Mechanized Information System for Many Outputs from One Input", *J. Chem. Doc.*, **8**, 41-45 (1968).
- (16) H. Skolnik and J. C. Snyder, "Input/Output Considerations for Large Data Bases", *J. Chem. Info. Comput. Sci.*, **15**, 28-31 (1975).
- (17) W. A. Southern and S. J. Weinstein, "Indexing and Abstracting Services in the Industrial Information Center", *J. Chem. Doc.*, **11**, 70-72 (1971).
- (18) S. W. Terrant and W. H. Weisgerber, "Evaluation of the ACS Single Article Announcement Service", *J. Chem. Doc.*, **14**, 23-25 (1974).
- (19) B. H. Weil, "Some Reader Reactions to Abstract Bulletin Style", *J. Chem. Doc.*, **1**, 52-58 (1961).
- (20) M. E. Williams, "Time Lapse Between the Appearance of Citations in Chemical Titles and Chemical Abstracts", *J. Chem. Doc.*, **12**, 217 (1972).

Annual Report of the ACS Committee on Nomenclature for 1976

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Nomenclature committees, both national and international, were very active in 1976, resulting in substantial progress in many different fields. The ten more important meetings and accomplishments are summarized.

1. The ACS Committee on Nomenclature held its annual meeting at CAS in November. Progress of the work of the divisional committees and international commissions was reviewed. In addition, some decisions regarding the spelling of names of parent hydrides and their radicals were taken. Also, ways of working more closely with ACS Divisions, journal editors and authors, editors of handbooks, as well as general means of promoting good nomenclature were explored. Interest in reviving work on pronunciation of chemical words was expressed. "Notes on Nomenclature", a nomenclature column by Fernelius, Loening, and Adams, started at the instigation of this committee, continues to appear in the *Journal of Chemical Education* (four publications this year; see Appendix II) and to be very well received.

2. K. L. Loening was appointed in the summer as the new chairman of the IUPAC Interdivisional Committee on Nomenclature and Symbols (IDCNS). The reorganized Committee held its first meeting in Oxford, England, in September. An inventory of all IUPAC activities dealing with nomenclature and/or symbols was compiled, and progress of specific projects was reported. A classification scheme for all nomenclature and symbols documents, indicating the various stages of development, was recommended. Specific documents dealing with quantities in clinical chemistry, definitions, terminology and symbols for rheological properties of colloidal systems and surfaces, and initialed abbreviations in the chemical literature were reviewed. General problems dealing with administrative matters and dissemination of IUPAC recommendations were examined at length.

3. The IUPAC Inorganic Nomenclature Commission met in September in Paris, France. Topics under discussion included names for elements beyond 105, ions and radicals, boron compounds, inorganic hydrides, cluster compounds, ligand locants, sulfur compounds, chains and rings, inorganic polymers, and stereochemical designations for coordination compounds. Two documents, "How to Name an Inorganic Compound" and "Names for Ions and Radicals" (Expanded Table II of the Red Book), have been submitted for publication.

4. The IUPAC Organic Nomenclature Commission met in September in Deauville, France. It concentrated its efforts on two main topics: (1) Section G, a structure-based sys-

tematic substitutive nomenclature (formerly revision of Sections A, B, C, and D; this is the project in which Joy Merritt of the CAS Nomenclature Division is carrying out the detailed work under the supervision of Drs. Grunewald, Cross, Powell, and Loening); and (2) Section H, nomenclature for isotopically modified compounds. Work on Section G is on schedule, to be completed in 1977. Work on Section H has been completed and the document should be in print in 1977. Some progress has also been made on nodal nomenclature, a general new nomenclature system.

5. The IUPAC Macromolecular Nomenclature Commission met in June in Dorking, England. Work on the updated version of "Nomenclature of Regular Single-Strand Organic Polymers" has been completed and the document has been submitted for publication in *Pure and Applied Chemistry*. The Commission is continuing its work on (1) stereochemical definitions and notations for macromolecules, (b) nomenclature and symbolism of copolymers, (c) subsidiary definitions of terms relating to polymers, (d) definitions for physical properties of polymers, (e) definition and nomenclature of ladder polymers, (f) nomenclature of inorganic polymers, (g) classification and family names of polymers, and (h) interpenetrating polymer networks. Of these items, (a) and (b) are at the most advanced stage with tentative recommendations expected to be issued in 1977.

6. The IUPAC-IUB Commission on Biochemical Nomenclature (CBN) met in New York in the spring. As usual, the Commission has issued a number of nomenclature recommendations in 1976 (see Appendix I). Work is progressing in the area of enzymes, tetrapyrroles, carbohydrates, biochemical phosphorus compounds, lipids, prostaglandins, and other special fields.

7. A joint IUNS-CBN meeting on vitamin nomenclature was held in May in Rochester, N.Y., under the chairmanship of K. L. Loening. Differences in nomenclature practices regarding vitamins, especially tocopherols, of chemists, biochemists, and nutritionists were largely resolved.

8. The IUPAC Interdivisional Committee on Machine Documentation in the Chemical Field held its annual meeting in Lenzerheide, Switzerland, and voted to dissolve itself.

9. All ACS Divisional nomenclature committees were active in 1976 to varying degrees. These are the ones of the Division