

disjunction, *i.e.*, pesticide or anthelmintic or bactericide or biocide or fungicide or insecticide or miticide or herbicide, and organic phosphorus compounds. A patent would be identified if any one of the utility terms and organic phosphorus compounds were mentioned.

The use of pyrethrins as synergists in insecticidal compositions to be used against mosquitoes was described in U. S. Patent 3,101,296 which was identified by matching the pyrethrins, synergist, insecticide, and mosquito.

Of course, the searching for specific compositions of matter to be used as a specific pesticide other than insecticide is carried out in the same manner as described above, *i.e.*, by associating the terms which seem to bear directly on the problem. If the search is made with the mechanized version of the UNITERM INDEX TO U. S. CHEMICAL PATENTS, after the patents complying with the search terminology have been found, one may perform a reverse search and ask the system to print out all the terms used to

index each patent. This facility will suggest new search terms or reveal other disclosed compounds or actions which may bear on the project which stimulated the original search.

CONCLUSION

In summary, patents constitute the most compact and easily identifiable technical literature resource available in which cause and effect are shown with a minimum verbiage. The U. S. Patents concerned with any subject associated with pest control can be of use to the practicing chemist who synthesizes new materials and to the biologist or phytologist who must evaluate them. The compatibility of agents and adjuvants or carriers is frequently revealed only in the pertinent patents and does not get into the usual journal literature.

Transcription of Technical Information*

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One step in the documentation process is so down-to-earth that little space has been devoted to it in the published literature. This step, "technical transcription," is performed by secretaries and stenographers. Since all written technical information must be typed at least once, typists must be able to handle complex technical terminology if this work is to be smooth and efficient.

At the Chemstrand Research Center, typists receive technical material from the originator by way of oral dictation or dictaphone belts about one-third of the time. For the remainder, typists are confronted with handwritten drafts which, more often than not, are relatively difficult to read. Experience has shown that typists must be able to recognize and to transcribe either spoken or poorly written technical information over half of the total time they spend on transcription.

While this problem had long been recognized at Chemstrand, until recently no determined effort had been made to solve it. As an experiment, therefore, Chemstrand's

Technical Information Section planned and presented a course for typists who deal with technical information designed to increase their knowledge of and interest in the fundamentals and terminology of those technical fields of particular interest to Chemstrand—namely, general chemistry, polymers, and textile fibers. Since the course was well received, and since the response to a questionnaire indicated that the course was successful in helping typists handle technical information, its general and specific aspects are reported here.

GENERAL

The course consisted of ten weekly sessions of one hour each. A total of 21 typists attended regularly. The general approach was to study the fundamentals and terminology of a specific field of interest, then to conduct practice sessions in dictation until most of the class members had mastered the terminology in that area. Usually, the technical terms were selected from the thesaurus which is used in indexing Chemstrand's reports. Time was also spent on drilling in the handling of chemical equations.

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Appropriate portions of elementary textbooks in the various fields were used as a basis for classroom discussion.^{1,5} Just enough of the fundamentals were considered to create an interest in the field and to teach enough to provide a framework for an understanding of the terminology. The goal was not only to transfer specific knowledge, but also to create inquisitive minds. The hope was that each typist would consult her handbooks and ask more questions in order to do a more accurate job.

Usually, two dictation sessions were necessary in each field studied. The first test was retained by the class members, who made their own corrections while the correct answers were written on the board and explained. The second test was collected; on the basis of its results a decision could be made on whether to proceed to a new field or to continue testing in the old field.

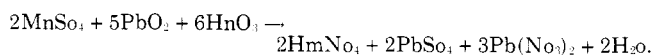
DETAILS

After a preliminary general session on chemistry, the remainder of the time was divided into one or two sessions on each of the following subjects: inorganic chemistry, organic chemistry, polymers, and textile fibers. The ninth period was devoted to teaching the approved method of writing citations and to briefly reviewing the reference books most helpful to typists involved in transcribing technical information. The last session of the course was reserved for a tour of the laboratory. Some of the significant details of the sessions follow.

General Chemistry.—Chemistry was defined, and the rest of the hour was spent in discussing the kinds and structure of matter. Definitions and examples were given of elements, compounds, mixtures, atoms, molecules, valence, and radicals. The concept of the formula as a chemical shorthand was brought out, and some time was spent in studying simple chemical reactions.

Inorganic Chemistry.—The next two classes were devoted to elementary inorganic chemistry. After explaining the difference between inorganic and organic chemistry, the properties of acids, bases, salts, and oxides were discussed. Two simple demonstrations were made, one involving a substitution reaction in which magnesium was attacked by hydrochloric acid, with resulting evolution of hydrogen gas, and the other illustrating the precipitation of barium sulfate. Some time was spent in differentiating the suffixes "ic", "ous", "ate", and "ite".

In the first dictation test, the typists were asked to spell such compound names as "ferrous ferrocyanide" and "manganous pyrophosphate." They were also asked to write certain chemical equations. In connections with the latter exercise, it was evident that only a few typists were able to write chemical formulas because they were not sufficiently familiar with symbols for the elements and did not know whether to capitalize letters or not. It had been pointed out that the second letter of chemical symbols was not capitalized. This made such an impression on one student that she capitalized every other letter, no matter what the formula. One of her equations was written



The patterns of error on the first dictation test were thoroughly explained, and a retest was made using

different but similar names of chemical compounds and reactions. The results showed much improvement.

Organic Chemistry.—Organic chemistry was taken up in sessions 4 and 5. This branch of chemistry was defined, and it was stated that the properties of organic compounds are related to: (1) the number of carbon atoms in the molecule, (2) the type of bonding, and (3) the kinds of functional groups. After showing examples of single, double, and triple bonds, some time was spent on functional groups, especially emphasizing the spelling of such groups as "methyl", "butyl", "chloro", "aldehyde", "ketone", "nitrile", etc. Recognition of prefixes was considered important in transcribing the names of organic compounds. Those denoting number were studied, including "di", "tri", "tetra", "penta", "bis", "tris", and "tetrakis".

The writing and meaning of "o", "m", and "p" and "α", "β", and "γ", were also covered. When the novice is given the word "diethylaminoacetonitrile", she must be able to grasp quickly the integral parts: "di", "ethyl", "amino", "aceto", and "nitrile". Some of the other components learned were "cyclo", "iso", "cyano", "mercapto", "pseudo", and "phthalo". Then the names of some common organic chemicals were studied—"acetaldehyde", "aniline", "glucose", "pyridine", and "xylene". How numbers are separated from words by the use of the hyphen was explained and also how commas separate individual numbers in a series.

Two dictation tests were required before the class as a whole was able to recognize and to write correctly compounds such as "3,5,5-trimethyl-2-cyclohexen-1-one" and "trimethylamine-α,α',α''-tricarboxylic acid", but it was rewarding to find out that in the space of one hour the principle of dividing the word into simple recognizable portions could be learned by a group that had had no prior training in organic chemistry. One student, however, insisted on "carbicyclic" instead of "carboxylic".

Polymers.—Sessions 6 and 7 were devoted to the fundamentals and terminology of polymers. A linear polymer structure was demonstrated by a chain of paper clips. Cross-linked polymers were shown as several chains of paper clips held together here and there by paper-clip bridges. Also, a three-dimensional molecular model of nylon was shown to the class. The meaning and spelling of some of the terminology of polymers were then presented, since it was essential to recognize such words as "monomer", "copolymer", "terpolymer", "initiator", "stereoregular", and "atactic".

The important polymers used in Chemstrand products were described. It was shown, for example, that acrylonitrile polymerizes with itself to form an acrylic chain. Similarly, the chemistry involved in polymerization reactions for nylon, polyester, and spandex was presented. Admittedly, this chemistry was quite advanced for the class, but it was felt worthwhile to expose the class to important chemicals basic to Chemstrand's work.

The dramatic "nylon rope trick" demonstrated the principle of interfacial polymerization.⁶ In this experiment, a laboratory technician carefully poured a water solution of hexamethylenediamine on top of a layer of a tetrachloroethylene solution of sebacoyl chloride. The web of polymer formed at the interface was then gathered together in the center to form a "rope," and the latter

was wound up on a cylinder. New polymer was continuously formed at the interface as the old was removed. The class was quite fascinated and various members vied for the opportunity of winding the cylinder.

Polymer terminology was not difficult. Satisfactory results were obtained on the first and only dictation test given on this subject, although only one person was successful with "micelle".

Textile Fibers.—It may seem presumptuous that the whole field of textile fibers was covered in session 8, but while Chemstrand Research Center is interested in yarn processing, weaving, and knitting, its technical reports are usually restricted to the spinning operation. Use was made of a wet-spinning exhibition kit frequently employed in technical presentations at local high schools. In this demonstration, a dimethylformamide solution of polyacrylonitrile is spun through a regular spinneret into a spin bath, and the yarn is wound up on a cylinder. The thesaurus was searched for important textile terms that might arise in technical reports. Certain abbreviations were studied and explained. For example, "SD" means "semi-dull", "dpf." means "denier per filament", and "tpi." stands for "turns per inch". Diagrammatic flow sheets showing the wet spinning of acrylic fibers, the melt spinning of nylon, and the drawing of nylon were handed to the class. The terminology in the fiber-spinning field was not judged to be sufficiently difficult to warrant a dictation test.

Citations and Reference Books.—Session 9 was divided into two parts. During the first 45 min., the class learned how to write complete and exact citations. It was pointed out that citations should be written accurately and consistently to gain reader confidence and to help the library in ordering articles on interlibrary loan efficiently. Recommended standards were distributed which showed the correct form for citing books, company reports, journal articles, and patents. Practice abstracts were handed out to the class to see if they could unscramble the many different forms of citations that are found in the literature and could rewrite them in the standard form.

The last part of this session was devoted to a brief description of some handy desk manuals known to be helpful to those responsible for typing technical information at Chemstrand. These included Hawley's "Technical Speller"⁷ and three chemical dictionaries—"The Condensed Chemical Dictionary",⁸ Bennett's "Concise Chemical and Technical Dictionary",⁹ and Hackh's "Chemical Dictionary".¹⁰ The important features of each book were pointed out, and it was suggested that each typist ask for one or two of the chemical dictionaries. A recent book by Stafford and Culpepper called "The Science-Engineering Secretary"¹¹ appears to be quite helpful, especially Chapter 11, "Chemistry", which includes instructions for forming structures and line bonds. The Kanegis book, "Chemical and Technical Stenography",¹² was not emphasized because of the relatively little use of shorthand at Chemstrand.

Tour of the Laboratory.—The final session consisted of a tour of selected laboratories which were thought to be of interest to the class members. The tour helped to satisfy their curiosity as to the nature of work being done in the laboratory; possibly, it gave each a feeling of being an integral part of the research effort, which is certainly true.

The following laboratories were visited: Physical Analysis, X-Ray, Spectroscopy, Glass Blowing, Electron Microscope, Nuclear Magnetic Resonance, and Acrilan Spinning. The class was also taken to the Library, where our Librarian gave them a short orientation talk on the location of the various kinds of information.

Opinion Survey.—Two months after the course was completed, a questionnaire was sent to each typist requesting that she answer six questions about the course, using the following numbers: (1) very good or considerably, (2) good or moderately, (3) fair or little, (4) poor or none. Averaged results were as follows:

1. Your general reaction to the course? 1.3 (very good)
2. Did the course increase your knowledge in general chemistry, polymers, and fibers? 1.8 (moderately)
3. Did the course increase your interest in learning more about general chemistry, polymers, and textiles? 1.8 (moderately)
4. Did the course aid you in spelling of technical words? 1.8 (moderately)
5. Did the course increase your interest in learning how to spell technical words and handle formulas? 1.7 (moderately)
6. Do you think the quality and quantity of your work has increased? 2.4 (moderately)

No names were required on the returns, so it seems reasonable to assume that the answers were honest rather than merely polite.

All in all, it would seem that the typist's job of transcribing technical information can be made more meaningful and more efficient by training her in fundamentals such as those described in this paper.

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