

Maintaining chemistry and maintaining chemical indexes at *Chemical Abstracts*

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Greetings! Evan Jay “E.J.” Crane (1889-1966) here. I spent more than forty years as editor-in-chief of *Chemical Abstracts*, the world’s leading source of information about chemicals and chemistry. (Today, you know this as Chemical Abstracts Service, or CAS, and it’s still going strong.) I supervised hundreds of chemists and editors who abstracted the published chemical literature, organized it under subject headings, and indexed it in an exhaustive, meaningful, useful way.

This was a job that involved a lot of maintaining, which is why I was so excited to join you at The Maintainers II. (Thanks to a mysterious affinity that might have something to do with either our shared industrial-Midwest origin, or shared first name, or maybe our share homespun sense of humor, one of your presenters will be channeling my spirit at the conference.) Anyhow – as I was saying, there was a lot of maintaining going on at Chemical Abstracts. On the one hand, we saw ourselves as maintainers for the whole field of chemical science and chemical industries, all around the world. We help chemists build on the past by putting information about hundreds of thousands of different chemicals in order (that was back in my day – today, the number is north of 100 million!). On the other hand, just keeping Chemical Abstracts going was an enormous job of maintenance in itself. We compiled bimonthly issues of our abstract journal, keeping up with a body of global chemical literature that grew larger and more diverse each year. We compiled an annual index in an enormous end-of-year crunch (“Remember November,” I always used to remind our staff in our quarterly newsletter.) And every ten years, we took extra care to compile an authoritative decennial index, double-checking all chemical names, index terms, cross-references, and author names in an enormous effort involving millions of index cards and miles of proof galley. We had to be extremely diligent in our ongoing maintenance of our own records and processes to make this enormous task possible. The payoff was an index that was an authoritative guide not just to ten years’ worth of *Chemical Abstracts* but to the whole ever-broadening field of chemistry. And now we’re back to the first kind of maintenance.

One of the most important kinds of maintaining that we did had to do with naming chemicals. If you aren’t a chemist, you might think that systematic nomenclature is pretty boring. If you are a chemist, you probably *know* that systematic nomenclature is *very* boring. But it’s important. Not only do rules for naming chemicals and rule-abiding chemical names make it possible for chemical editors to compile our miles of chemical indexes and chemist-readers to search them, they also (so I am told) became the de facto framework for later efforts to put chemical data and information onto computers.

The approaches to chemical naming and chemical information management that we developed at Chemical Abstracts, and the parallel efforts within other organizations, especially the International Union of Pure and Applied Chemistry and *Beilsteins Handbuch* (a German publication specializing in organic chemistry that was just as much of an undertaking as ours), had some pretty big consequences for chemistry today – including for the subjects of chemical regulation and chemical safety, which my fellow panelists will discuss. One of the most important consequences that I want to discuss at the conference is how systematic names and chemical reference books kept chemical information in order in a way that collapsed *historical time* and *chemical space*. What I mean is that:

- a) systematic names served to bring together anything that any chemist had figured out about a chemical substance over the last hundred years or more, and to bring it together on equal footing under an index heading, and
- b) systematic names created a default ontology (if I may use a five-dollar word that seems to be fashionable among you people nowadays) that lumped or split information about chemical substances to fit into a standard-sized hole, so to speak. That is, while chemists might have had lots of different ways of determining when chemical substances were effectively the same or different, what counted as a unique chemical substance for us index-makers was determined by conventions for drawing two-dimensional chemical diagrams called structural formulas. These conventions dated back to the nineteenth century, and they still determine the shape of chemical information systems today.

Again, each of these consequences followed from the approach that my fellow chemical editors and I worked out to make our work of maintenance – both kinds of maintenance, maintenance of our indexes and maintenance of the field of chemistry – possible.

I did a lot of writing about my work at Chemical Abstracts, and there are a few quotations that I'd like to share by way of introduction to the themes that I'll be picking up in my presentation in Hoboken:

On maintenance and indexing:

The entries that have gone into previous indexes also exert an influence on the selection of subjects and on the arrangement of the selected information to fit in with the pattern of these indexes. There is a reluctance to start new headings unnecessarily. Old headings are made to do in some cases by wording the information in a slightly different manner. This is good indexing practice, for it prevents the starting of many headings which would complicate index searching more than they would help. This fitting of new information into the pattern of old – that is, the maintenance of a certain rigidity of structure-serves a very useful purpose in simplifying searches back through a series of indexes. This rigidity of index-heading structure must not be so great that changes in the meaning of words or the introduction of new, useful words cannot be accommodated or assimilated.¹

On rules:

In the conduct of our work here we have a number of basic rules but we go on the theory that rules are sometimes to be ruled instead of always to apply. Perhaps I should say that rules are sometimes considered here to be overruled by circumstances.²

¹ C. L. Bernier and E. J. Crane, "Indexing Abstracts," *Industrial & Engineering Chemistry* 40, no. 4 (April 1, 1948): 725–30, on 728–729, doi:10.1021/ie50460a037.

² Crane to Leech, 26 Oct 1937, William A. Noyes Papers, 15/5/21, University of Illinois Archives, Urbana, IL, Box 14.

Finally, to give you a little bit of a sense of what's it's like to work at *Chemical Abstracts*, let me share a few thoughts from one of the assistant editors, Miss Janet D. Scott:

Because of the many fields covered by *Chemical Abstracts*, a broad training seems more desirable than specialization in any one branch of chemistry, except for the job of organic indexing, which involves particularly problems of nomenclature probably not taught in any course. At least a certain amount of training in all branches of chemistry, including biochemistry and chemical engineering, is advisable, and also a bibliographical or library (literature research) course. Some acquaintance with almost every branch of science would be of value, but particularly physics, biological science (physiology, biology, or zoology), mineralogy, and crystallography. Fully as important as the scientific training, however, is that in English and foreign languages. Technical or critical writing courses with careful attention to sentence structure, clarity, brevity, and correct use of words would be the best type. A reading knowledge of German and French is essential; from the former some Dutch can be made out and from the latter some Italian and Spanish. Since the volume of scientific work in Russian is increasing by leaps and bounds, some knowledge of Russian would be of great help; this would also be a key for unlocking some of the mysteries of other Slavic languages. Enough Latin and Greek to aid in working out the derivations of words would also be desirable without being essential.

Among personal characteristics for this type of work accuracy perhaps should rank highest, and with that conscientiousness, patience, a meticulous attentiveness to detail (without a loss of perspective of relative values, since a great deal of work has to be turned out, at times under considerable pressure), power of concentration, good judgment, and interest in words as words, a love of puzzles and of guessing and digging out elusive ideas, meanings, words, and formulas. An interest in things rather than people is likely to lead to greater satisfaction in this type of work, since the opportunities for personal professional contacts outside the office are relatively few. The analytical rather than the creative type is probably best suited to this kind of work. Good eyes (at least strong ones) are absolutely essential, while the ability to sit hour after hour without much relief is a requirement not to be laughed off. Work of this nature is not for the overly energetic or restless person.³

³ Janet D. Scott, "The Chemist at Work. XIV. My Work with Chemical Abstracts," *Journal of Chemical Education* 15, no. 6 (June 1, 1938): 271–75, on 274–75 doi:10.1021/ed015p271.