

sistency are purgative processes and so can only be applied to existing concepts and formulations.

According to Metcalfe, there are two basic ways of retrieving things (page 22.) The first is by placing them in a known order and then selecting the correct subdivision in which to look. The second is by sorting through all things which have been kept and, by individual perusal, determining which is wanted. Any kind of known order will do, from an arbitrary one, such as the alphabet, to a meaningful one, such as a classification system. This is the core of librarianship—the choice and application of a known order to a collection of records.

Sorting through any but the smallest collection is an awkward and arduous process for human beings. Fortunately, some machines seem to be quite good at sorting. But, interestingly enough, machine limits for efficient sorting are soon reached, and known order becomes relevant again.

Again according to Metcalfe, there are two main costs in running a retrieval system: (i) that of "compilation"—of input, of adding new material to the system, and (ii) that of "consultation"—of output, of providing reference service upon request (page 26). The frequency and variety of types of consultation should determine the nature of the input. It is only advisable to concentrate on the compilation phase if the needs and resources of a search system are not only well known but relatively stable. Metcalfe admits that lower compilation costs are probably possible in the documentation systems but suspects that the original economy may be offset later by the need for "extra indexing" tools (pages 172–5 and 201–8). "Extra indexing" identifies combinations of terms, whether on a generic or other basis, which lead to fruitful searches in a particular collection. There are two answers to this argument. One is that so far most uniterm or descriptor installations have not required such an addition. The second is that if "extra indexing" seems useful, the mechanized systems are in a particularly good position to provide such extras at a minimum cost. C. L. Bernier of *Chemical Abstracts* has been presenting some good arguments for utilizing such printouts from mechanized systems instead of waiting until a particular question arises before going to a machine [C. L. Bernier, "Correlative indexes," *Am. Document.* 7 (Oct. 1956), and later issues].

Readers may find the structure of the book unusually complex and Metcalfe's style of writing difficult, but none will find him dull or wishy-washy. He raps sharply so many knuckles that one cannot resist pointing out one of his own *non sequiturs*, that of subsuming the

Zatocode system of Mooers, for which he has a 1951 reference, under the Coordinate Indexing system of Taube, for which he uses 1953 and 1954 references. Not only is this chronologically incorrect, but it is instructive to see in what respects Coordinate Indexing has increasingly deviated from the Zatocode original.

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Gmelins Handbuch der Anorganischen Chemie. System No. 3, sec 3: *Oxygen*. xi + 518 pp. Illus. \$67.92. System No. 42: *Zirconium*. xxxvii + 448 pp. Illus. \$63.84. System No. 43, supplement: *Hafnium*. ii + 23 pp. Illus. \$5.28. System No. 45, supplement: *Germanium*. xlv + 576 pp. Illus. \$80.88. Verlag Chemie, Weinheim/Bergstrasse, Germany, 1958.

The recently published sections of *Gmelins Handbuch* have several new features which make it easier for the chemist to use this valuable treatise. On the inside covers the chemical elements are listed by system numbers. These numbers are not the atomic numbers of the elements of the periodic chart, but are designed to arrange the elements in a way that permits systematic and comprehensive treatment, in one place, of all the major anionic groups for each cation-forming element. As a result, all major compounds of an element are classified systematically in the volume pertaining to that element. For example, the volume of iron (59) contains all known combinations with elements from system No. 1 (rare gases) to 58 (cobalt).

A desired compound or combination will be found in the volume with the highest system number. The compound Fe_2O_3 is listed in the volume on iron (59), but not in that on oxygen (3). On the other hand, Pt_3Fe will be found in the volume on platinum (68).

Within a volume, a compound of three or more elements is grouped with the system number next lower than that of the volume element. For example, rubidium chlorobromide will be found in the rubidium volume (24) under rubidium and bromine; and rubidium bromoiodide, under rubidium and iodine. The system numbers of chlorine, bromine, and iodine are 6, 7, and 8, respectively.

With an addition compound, such as $\text{FeBr}_2 \cdot 4\text{C}_5\text{H}_5\text{N}$, the compound is listed in the volume on iron under iron and bromine. With an ammonium-type compound, such as $\text{C}_5\text{H}_5\text{N}[\text{FeBr}_4]$, the compound is listed under iron and ammonium and not under iron and organic bases.

Chemical reactions are generally de-

scribed under each reaction component and also under the reaction products.

The directions for using *Gmelins Handbuch* are given in both German and English and are illustrated by examples. New departures designed to make the *Handbuch* more easily consulted are the bilingual index and, in the case of the supplementary section on hafnium, there are catchwords in English on the page margins.

Oxygen. This new volume is devoted to elementary oxygen and covers the preparation of oxygen, separation and enrichment of oxygen isotopes, physical properties, and electrochemical reactions, and reactions in hydrogen-oxygen mixtures. The literature is covered through 1949.

Zirconium and Hafnium. The zirconium volume and the hafnium supplement to the hafnium volume published in 1941 complete the treatment of subgroup 4B (Ti, Zr, Hf, Th) in the 8th edition of *Gmelins Handbuch*.

The volume on zirconium covers the history of the element, its occurrence, ore dressing, metallurgy, technology, properties, analysis, and its major compounds with other elements in the preceding system numbers, ending with titanium. The literature search was carried through 1949.

The supplementary section on hafnium brings the information on this element through 1949.

Germanium. The volume on germanium is a supplement to the volume published in 1931 and covers the literature from 1931 to 1953, and, in the case of the optical, electrical, and photoelectric properties, to the end of 1954.

Due to the interest in germanium in recent years, a considerable amount of material has appeared. This is reflected in the fact that the supplementary volume is over 9 times the size of the original volume.

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Sherrington. Physiologist, philosopher and poet. Lord Cohen of Birkenhead. Thomas, Springfield, Ill., 1958. 108 pp. Illus.

In 1948, when Charles Scott Sherrington was 90, the University of Liverpool created a lectureship in his honor in recognition of his great and distinguished contributions to physiology and medicine. Among those who, in addition to other designations, are now known as Sherrington lecturers, we note E. D. Adrian of Cambridge, John F. Fulton of Yale, Geoffrey Jefferson of Manchester, and Wilder Penfield of Montreal. To this brilliant company is now added Lord