Structural Chemistry: Techniques

A symposium on the determination of molecular structure, ranging from discussions of classical diffraction techniques to reports on magneto-optical rotation spectra and the Mössbauer effect, was part of the program of the chemistry section of the AAAS at the Philadelphia meeting in December. Eight papers were presented.

A technique which will see wide application in the future is magneto-optical rotation spectroscopy (MOR), described by Victor Shashoua (du Pont Company). This is an extension of the method of optical rotatory dispersion in which the rotation of polarized light by the sample is measured as a function of frequency in the visible and ultraviolet regions of the spectrum. While the optical rotatory dispersion method (ORD) is limited to substances which are naturally optically active, the new method has no such limitation. All substances in a magnetic field rotate the plane of polarized light. Because of this, there are no inert solvents for this technique and considerable care has to be exercised in the interpretation of the results. Working with a magnetic field of 10,000 gauss and temperature control of ±0.1°, Shashoua was able to report a precision of ±0.003° in measuring the rotation.

The spectra obtained are similar in general character to the ORD spectra but often show considerably more detail than ORD shows in compounds which are naturally optically active. Results were shown for a wide variety of substances ranging from inorganic complexes to polypeptides. Among other effects this technique can detect triplet states as well as changes such as those due to complexing and change of *p*H on hemoglobin. More will be heard in the future about this generally applicable technique.

S. S. Hanna reviewed recent work with the Mössbauer effect. Because of the extreme sharpness of the gamma-ray lines, differences in absorption can be achieved by use of the Doppler effect produced by very low relative velocities of source to absorber. Thus, line widths of 10^{-8} electron volts can be measured by use of the drive mechanism on an ordinary lathe bed. The position of the nuclear energy levels is affected by the d-c magnetic field produced at the nucleus by the orbital electrons. Although only electrons in *s* orbitals contribute to the magnetic field at the nucleus, these electrons can be polarized by unpaired electrons in other orbitals. The Mössbauer effect thus is very sensitive to the electronic environment of the absorbing nucleus. Considerable data were presented for absorption by iron atoms in various chemical environments, but no clear relationship with molecular structure has been developed as yet. It appears that the Mössbauer effect is the best test available for the correctness of calculated electron density functions near the nucleus.

Walter C. Hamilton (Brookhaven National Laboratory) considered some of the more recent structural studies in which neutron diffraction techniques are used. Among the works cited was that of the square planar structure of XeF_4 and the linear structure of XeF_2.

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Tongues of Science

The complex of problems which confronts the scientist in his attempt to take advantage of knowledge contributed by his colleagues in tongues other than his own was the subject of the symposium presented by the Information and Communication Section (T) on 26 and 27 December at the AAAS meeting in Philadelphia. The symposium, entitled Other Tongues of Science: Assimilating the Literature of Other Nations, was cosponsored by the National Science Foundation.

The symposium's 26 participants represented government and private agencies, organizations, societies, industries, and institutions actively supporting and carrying on programs to insure the inflow of scientific information into the United States and to make it available to the scientist in usable forms. While estimates vary somewhat, only about 35 percent of the scientific literature, even when it is made available, can be understood in the original by individuals competent to read English alone. Scientists who read Russian in addition to English have access to about 50 percent, or half of the world's scientific literature.

The currently extensive acquisition, translation, and publication activities in all areas and fields of science, costly both in terms of scientific manpower and in funds consumed, must be evaluated. How effective are the present translation programs? How necessary