REVIEW

X-RAY EMISSION SPECTROGRAPHY IN GEOLOGY

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X-RAY EMISSION SPECTROGRAPHY IN GEOLOGY by Isidore Adler, volume four in the series *Methods in Geochemistry and Geophysics*. Published by Elsevier Publishing Co., Inc., New York, 1966, xii + 258 p., $16.00

An excellent and detailed table of contents of 6 pages, a bibliography of 151 entries, an 8 page index, and all of this "directory" material supplemented by 82 figures, 4 plates, and 33 tables indicates the wealth of data included within this text which the author believes "stands alone in supplying an account of X-ray analysis expressly for the earth scientist."

The author writes in a clear, concise style although with a definite weakness for split infinitives. Assuming that the reader is a geologist well trained in that field but with minimal training in physics and mathematics, he begins with a discussion of atomic theory, generation of electron and X-ray spectra, interaction of X-rays with matter, absorption, etc. leading to more detailed studies of refraction and fluorescence. Since these last are properties of particular significance in X-ray spectroscopy, the reader is brought to a familiarity with the big picture before the author retraces his steps for a much more detailed review of the individual parts of the process . . . the parts that are necessary for "method" for the reader to be able to put this knowledge to use.

The next chapters, beginning with a simplified flow diagram of an X-ray spectrograph, stress the division of analysis into sequential steps of excitation of spectra, separation of lines for measurement, detection and recording of appropriate lines, and reduction of data to chemical composition. It is so straight forward and simplified an approach that it seems anyone should be able to follow this almost as easily as a recipe for plum pudding; unfortunately, the practice is not quite as easy as would seem to be indicated. What is lacking for the experimenter is personal experience. A generalized discussion of power supplies, primary X-ray tubes, electronic detectors, threshold voltages, discriminators, amplifiers, spectrographs, etc. can never replace working with these instruments for a few days or weeks. But the author, through his physicist's knowledge of this equipment and his really unusual knack for clear explanation of difficult material, has made it possible for the non-physicist to follow and feel at home in a new environment; now the actual laboratory experience will be doubly meaningful.

He states that the electron-probe X-ray microanalyzer "offers the petrographer and mineralogist the most exciting development since the petrographic microscope." The sensitivity is so great that a sample of the order of 1 μ^3, weighing as little as 10^{-14} grams, may be non-destructively analyzed *in situ*. As an analytical tool, it is second to none for speed and reliability. With this usefulness, and increasingly widespread application so that the equipment is being manufactured almost as "stock" items by commercial suppliers, perhaps a complete outfit may be reduced from its present $80–100 thousand price range. Certainly, regardless of price, soon no modern geology or petrology laboratory can function suitably without it. Dr. Adler has gone a long way toward providing an understanding of what has been done in this field of emission spectroscopy, what is being done, how we can use this knowledge both generally and specifically, and where it may lead us. It is a book which will be a "must" for a geologist abreast of his times, whether he now knows the term spectroscopy or little realizes that he needs to know. In this reviewer's opinion, this is one of the most significant books in a long time in quantifying a field of geological knowledge.