well resolved diagrams are obtained with their help. XRD applications from several fields of materials science like stress measurements, investigations of metallic glasses and fibrous polymers, and environmental problems are described.

One main objective of the XRS part is to evaluate the advantages and/or disadvantages of the WDXRS (wavelength dispersive XRS) and EDXRS (energy dispersive XRS) methods. It is shown that in the most important industrial applications (minerals industry, metals industry) the latter is at an advantage, because it yields results of sufficient precision at lower cost and effort and because the equipment with a radioisotope source and a Si(Li) detector is portable.

The Si(Li) detector needs liquid-nitrogen cooling. As an alternative, for the analysis of high- and medium-Z elements ($Z \gtrsim 30$), a room-temperature mercury iodide (HgI_2) detector can be used. The energy resolution of this detector is poorer (optimum value 380 eV for the 5·9 keV X-rays of Fe 55) than of Si(Li), but sufficient for most of the practical applications in heavy-element analysis. A further comparison concerns the XRF and PIXE (proton-induced X-ray emission) methods; it is shown that for the analysis of samples with strongly varying matrix composition, and for $Z > 20$, PIXE is more suitable because of the smaller matrix corrections.

The papers on XRF techniques mainly deal with measures for increasing the detection limits and reproducibility of the method. This can be achieved, as is shown, by different methods of background reduction (filter, electronics for pulse handling, application of primary scatterers to polarize the radiation) and by optimizing the sample preparation techniques and excitation conditions.

As an alternative surface-sensitive analysis method to PIXE and others, the LEEIXS (low-energy-electron-induced X-ray spectroscopy) method is presented, where soft X-ray fluorescence radiation of light elements B to F excited by low-energy electrons from a cold cathode tube is detected. The method is capable of analyzing samples from such elements qualitatively and quantitatively, of measuring film thicknesses and of gaining depth profiles. The method works in primary vacuum, which is a great advantage in the investigation of industrial research problems over other surface-sensitive techniques.

Finally, computerization of XRS has great importance, as can be seen from most of the papers. In one of them a WDXRS system combined with a minicomputer is presented, which is suitable for a high-speed qualitative analysis of samples within less than half a minute. This is comparable with the speed of computerized EDXRS systems, but the resolution (precision) of the WDXRS system is much higher.

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Quantitative X-ray spectrometry.

By *Ron Jenkins*, *R. W. Gould* and *Dale Gedcke*. Pp. 586. New York and Basel: Marcel Dekker Inc., 1981. Price SFr 160.00

The authors are well known in the field of X-ray spectrometry: R. Jenkins is at Philips, Mahwah, New Jersey, R. W. Gould is at the University of Florida, Gainesville and D. Gedcke is at EG & G ORTEC, Oak Ridge, Tennessee. The book is divided into 12 chapters and seven appendices. The literature has been reviewed till 1977 and many references are given. This book is the only one of its kind to cover both wavelength- and energy-dispersive spectrometers in detail.

The first chapter is a short introduction to the subject; the second chapter explains the physics of interaction of X-rays with matter and is partly the theoretical foundation for chapters 9 and 10. Chapter 3 deals with sources for X-rays and chapter 4 is a long treatise on spectrometer instrumentation. Chapter 5 gives some necessary statistics and chapter 6 comments on general computer applications such as smoothing of spectra, background subtractions and least-squares fitting of peaks. Chapter 7 is called specimen preparation and presents brief information on this difficult subject. Chapter 8 is a well written explanation of qualitative X-ray analysis.

Chapters 9 and 10 are on quantitative analysis. This section starts with the assumption that all samples are rendered homogeneous, so that only matrix effects are to be accounted for. Next it is stated that the analyst has great difficulties in providing good standards, but nothing is said as to where such standards are got or how they are prepared. Many procedures for matrix corrections are discussed, the most sophisticated of which are the fundamental parameter methods or alpha correction procedures. The most useful – but unfortunately not always applicable – double dilution method is explained in detail. Limits of concentration ranges for different correction formulas, as well as examples of not wisely chosen ranges of standard concentrations in a series, are described.

Chapter 11 is on trace analysis and emphasizes the important role of the background for determinations near the lower limit of detection. Chapter 12 is devoted to radiation health hazards from X-rays and protection against them. Some legal aspects of US regulations are described.

This book is a valuable compendium for the practicing X-ray spectroscopist in industry and science or researchers in other fields who have to apply X-ray analysis. It seems doubtful that students could afford to buy such a comprehensive book.

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Books Received

The following books have been received by the Editor. Brief and generally uncritical notices are given of works of marginal crystallographic interest; occasionally a book of fundamental interest is included under this heading because of difficulty in finding a suitable reviewer without great delay.

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Photoelastic and electrooptic properties of crystals. By *T. S. Narasimhamurty*. Pp. xxix + 514. New York: Plenum, 1981. Price US$37.50. A review of this book, by E. H. Turner, has been published in the May 1982 issue of *Acta Crystallographica*, Section A, pages 399–400.