

## Book Reviews

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**MAGNETIC AND ELECTRICAL METHODS OF BENEFICIATION** by V.V. Karmazin and V.I. Karmazin. Nedra, Moscow, 1988, 304 pp., 0.95 Rb.

Following the success of several Soviet textbooks on magnetic separation, this book, written by a father and son team of distinguished Russian ore-dressers represents a treatise considerably updated and extended to include electrostatic separation.

The book is logically divided into chapters on physical principles of magnetic and electrical separation, on electromagnetic properties of ores, review of existing magnetic and electrostatic separators, practical applications of magnetic and electrical separation on Soviet beneficiation plants and principles of design of magnetic and electrostatic separators.

The monograph is written in a typical Russian style. Those western readers who have an ability to read Russian, and who are patient enough to surmount a poorly arranged and difficult-to-survey text will be rewarded with otherwise unobtainable information and with an approach that is different from that common in western monographs on the subject.

Chapter Three, for instance, gives a most useful and detailed description and specifications of a wide spectrum of Soviet magnetic and electrostatic separators. Chapter Four summarizes industrial applications of magnetic and electrostatic separation in a variety of Soviet mining operations. These two chapters provide a wealth of information probably unavailable elsewhere, on industrial aspects of the separation techniques as practiced in the Soviet Union.

The final, fifth chapter gives an intriguing analysis of design of low-intensity dry and wet magnetic separators.

In general, one of the objectives of books of this nature is to provide a reader with information to be able to understand the principles of magnetic and electrical separation. To do this, it is essential first to understand the beneficiation techniques and their role in handling the matter. Second, it is necessary to understand physics - how physical forces acting on a collection of particles accomplish an efficient and selective separation of various components of matter and how these forces can be generated in the most efficient way.

The authors of this textbook certainly meet the first of these goals. There is a wealth of useful information on industrial applications and on a wide range of magnetic and electrostatic separators of Soviet provenance.

Just as certainly, however, the book falls short of the second requirement: the mathematics is quite inadequate, with formulae simply being presented with no derivation and supported by no reference. There are actually no references at all in the book, only a modest list recommended reading.

The quantities entering the equations are given in a mixed system of units, e.g. throughput in ton/h, velocity in m/s, length in m and particle diameter in mm. For many equations the units are not shown at all. Equations often contain one or more empirical constants the values of which can range widely and are frequently difficult to ascertain.

Although the book addresses solely the Soviet readership it could be of considerable interest to international separation fraternity. In contrast to either heuristic description or often impractical academic approach characterizing most western treatises on magnetic separation, the Soviet magnetic separation is based on semi-empirical engineering description with rudimentary physics. Although such a description is often useful for qualitative analysis and for better understanding of the role of assorted physical parameters, its applicability to quantitative description is limited.

As a result of geopolitical and scientific isolation in which the Soviet magnetic separation has grown, the inclusion of western developments, either theoretical or practical, is negligible. A reader will learn nothing about considerable achievements of European and North American scientists and engineers, particularly in HGMS and OGMS. Equipment developed and manufactured by non-Soviet companies is mentioned only briefly and superficially; the information is often taken, at its face value, from company pamphlets and brochures. In this way a considerable deal of disinformation crept in. Little credit is given to non-Soviet achievements; as a stark example, the Frantz isodynamic separator that was patented in the U.S. in 1936 is presented in the book as a Soviet invention.

In spite of these shortcomings, the monograph is well-worth reading; for a western scientist it opens a wide field of new and fresh ideas that ought to be explored in a more sophisticated manner; to a practicing engineer it offers an extensive collection of data and information on separation practice.

J. Svoboda