chloride, sulfate, oxidizing, and reducing groups. Notes adjoining the procedures point out the application of the theory of ionic equilibriums to the various separations and identifications encountered. Preliminary experiments on the properties of ions are omitted to allow more time for the analysis of "knowns" and "unknowns."

An adequate selection of problems follows six of the chapters on theory, and a set of general questions on the analytic procedures is placed at the end of the experimental section. The appendix contains four tables of equilibrium constants, a four-place log table, and answers to the numerical problems. Some of the values of equilibrium constants are not in agreement with some of the recently published values of Latimer and his colleagues.

The semimicro scale used involves, in general, volumes from 0.2 ml to 10 ml and weights from 1 to 25 mg.

This textbook seems to be appropriate for either the latter portion of a first-year college course or for a separate course in the sophomore year. A section on special procedures for ferro- and high-aluminum alloys may be used to provide additional analytic experience with several cations not usually included in the qualitative analytic scheme.

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Isotopic Tracers. A theoretical and practical manual for biological students and research workers. G. E. Francis, W. Mulligan, and A. Wormall. Athlone Press, London; John de Graff, New York, 1954. xvi + 306 pp. Illus. $7.

Although many excellent books dealing with isotopes are available, it is generally recognized that there exists a real need for a practical laboratory manual in this field. *Isotopic Tracers* is presented as such a manual and is, according to the authors, a full description of the course that they have given, over a period of several years, at the Medical College of St. Bartholomew's Hospital, London.

The book is divided into two parts. Part one, "Theorectical considerations," comprises approximately two-thirds of the volume. There is little in this section that cannot be found in a number of books previously published. Its chief advantage lies in its simplified and condensed presentation, which may be more palatable for students and beginners in the tracer field. Part two, "Practical course," contains detailed presentations of classroom experiments. Typical experiments are: the use of G.M. tubes for measurement of radioactive isotopes; the determination of atom percent excess N^{15} in a sample; incorporation of P^{32} into hen's eggs; calculation of circulating red-cell volume and blood volume based on persistence of injected P^{32} labeled red cells; localization of injected I^{131} in the thyroid; and determination of self-absorption curves. It is this second part that makes the book unique in its field. This part should prove extremely useful to the teacher in planning laboratory assignments and to the research worker as a manual for the indoctrination of newcomers to his laboratory into the proper use of isotopes.

A serious criticism of *Isotopic Tracers* is its limited presentation of C^{14} techniques, which play a most important part in biological applications of isotopes. No laboratory experiments with C^{14} are presented nor is any mention made of the windowless gas-flow counters that have become standard equipment for C^{14} assay, at least in the United States.

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Industrial Stoichiometry. Chemical calculations of manufacturing processes. Warren K. Lewis, Arthur H. Radasch, and H. Clay Lewis. McGraw-Hill, New York–London, ed. 2, 1954. xi + 429 pp. Illus. $7.50.

One of the early courses in the traditional chemical engineering curriculum deals with the analysis of process data through computations based on the laws of mass and energy conservation and chemical combination. A considerable portion of the chemical engineers in this country have cut their professional teeth on *Industrial Stoichiometry* by Lewis and Radasch. The second edition of this book is a completely revised text that retains the purpose and pedagogic viewpoint of the original version.

The case method is again used in developing and illustrating computational procedures. Combustion problems involving gaseous and liquid fuels serve to introduce techniques which are later extended to cases dealing with solid fuels, secondary fuels, and various inorganic chemicals. New chapters on nitrogen compounds, fixed alkalies, and ceramics are included. The material on equilibrium, sulfur, lime and cement, metallurgy, and design has been expanded considerably. In addition to the illustrative examples in the text, a total of 171 problems are included at the ends of the chapters. The problems are largely graded, and answers are indicated in a few instances.

The authors have clearly pointed out some of the problems encountered in analyzing industrial processes and evaluating experimental data. In general, however, the textbook is not meant to describe the whole process of which an illustrative operation or unit is a part. The consideration of energy balances is limited to cases in which the net enthalpy change of the system is equal to the quantity of heat exchanged with the surroundings. A more extensive discussion of energy relationships would be desirable.

As stated in its preface, the book is directed toward plant operating personnel and students just beginning their study of chemical technology. Knowledge of calculus and advanced chemistry is not necessary. The book is well written, but the reader's impression of its clarity and continuity will probably be determined largely by his reaction to the case method of instruc-