gases, and the effect of low temperatures upon physiological action. The volume is a clear, well considered, and reasonably full statement of our present knowledge on the liquefaction of gases. E. G. LOVE.

QUALITATIVE ANALYSIS FOR SECONDARY SCHOOLS. By CYRUS W. IRISH, A.B. New York: American Book Company. 100 pp.

The usual college course in qualitative analysis is simplified by omitting oxalates and phosphates, and determinations other than spectroscopic for sodium and potassium. The test for chromium is made more striking by oxidation with hydrogen dioxide and subsequent precipitation as lead chromate; the alternative method by fusion is also given. Preliminary experiments on bases are the customary ones, all bearing directly on qualitative separations, but they hardly carry out the author's prefatory claim of a study of descriptive chemistry of bases by laboratory methods. A praiseworthy effort is made to keep alive the student's interest in general descriptive chemistry by a considerable number of questions on that subject. Questions are put also on the experiments performed. Uniformly these call into play only the student's power of observation, and it would seem well to ask some questions beginning with "why"; questions to bring out reasons for steps taken. Observations of the form of precipitate, whether flocculent, crystalline, etc., are omitted. Likewise omitted, are directions for careful manipulation. An unsatisfactory condition of mind and knowledge must result from this statement regarding the solubility of freshly precipitated zinc sulphide in hydrochloric acid: "To confirm the presence of Zn add conc. HCl, when ZnS, if present, will be dissolved, but S in suspension will not dissolve. A partial solution, on addition of conc. HCl, also indicates ZnS." This should be a satisfactory manual in the hands of a good teacher. It will not compel good teaching.

H. M. ULLMANN.

THE ELEMENTS OF BLOWPIPE ANALYSIS. By FREDERICK HUTTON GETMAN, F.C.S. New York: The Macmillan Company. 1899. Small 12mo. 77 pp. Price, 60 cents.

The book begins with cuts of blowpipe apparatus, poorly executed, some important ones omitted, while that of the blowpipe itself shows an antiquated form very seldom used.

Chapter I describes in a fragmentary manner the common apparatus and reagents, omitting some of the most useful. The recommendation to use for blowpiping a Bunsen flame one centimeter high with air supply cut off, is unfortunate. Half a dozen other devices are better.

Chapter II gives a general outline of blowpipe analysis, following the six primary tests of Berzelius. Here, several of the most valuable blowpipe tests, such as examination in an open glass tube, are omitted altogether. The tests given are only partially described, many details necessary for successful practice being omitted.

Chapter III, giving reactions for the detection of the elements, arranged alphabetically, is very unsatisfactory. The reactions given are, in general, those of the oxides only, and misstatements are numerous. Chapter IV, giving the behavior of some of the principal metallic ores, is little better.

There are in the book at least a score of downright misstatements, and another score which are inaccurate because of their incompleteness. The omissions are startling,—gold, selenium, tellurium, molybdenum, titanium, tungsten, uranium, and vanadium not being even mentioned in any connection.

What is correct in the book is well expressed, and the type is clear, but the book as a whole does not deserve a place in blowpipe literature.

JOSEPH W. RICHARDS.

A TREATISE ON THE KINETIC THEORY OF GASES. By S. H. BURBURY, M.A., F.R.S. J. and C. F. Clay at the University Press, Cambridge. New York: The Macmillan Company. 1899. vii + 157 pp. Price, eight shillings.

The object of this book as expressed by the author is to apply to the kinetic theory of gases a method of analysis different from that generally employed. Previous writers have always started with the fundamental assumption that with regard to their relative motion the molecules of a gas are independent of one another. To express this independence the law of distribution of momenta assumes the form E^{-hQ}, and the expression relating to the translation velocities becomes, $Q = \Sigma m(u^2 + v^2 + w^2)$, m being the mass and u, v, and w the component velocities. Boltzmann deduces his H theorem and the theorem of the equality of