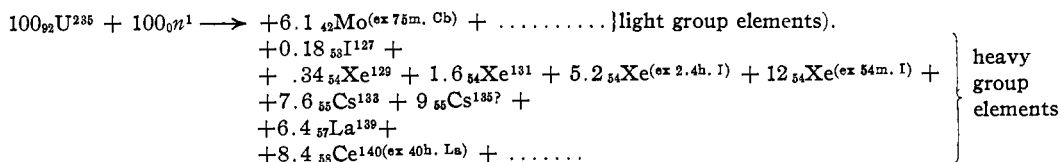

 COMMUNICATIONS TO THE EDITOR

THE INSTABILITY OF SILVER PERCHLORATE

Sir:

Silver perchlorate was lately (October, 1938) prepared for an electrochemical experiment in the following manner. Purified silver oxide was treated with an equivalent amount of a good grade of 60% perchloric acid. The neutral solution was evaporated to the appearance of crystals, cooled, and filtered. The salt was recrystallized twice from dry benzene and stored for fifteen hours in a desiccator held at 10 mm. pressure. The resulting salt was superficially dry, but caked. While breaking the cakes by gentle pressure in a mortar, a sample detonated with extraordinary violence. Other portions withstood this treatment, and were unaffected by flying debris from the exploded sample.

The detonation involved the benzene addition compound of silver perchlorate, the occurrence of which has been reported.¹ Investigations^{1,2,3} of the systems, silver perchlorate-organic solvent-water, have been completed successfully, and these frequently involved manipulation at rather extreme conditions of temperature. The author has recently learned⁴ of an explosion, under nearly identical circumstances, involving the ethyl alcohol addition compound of silver perchlorate, which occurred in connection with some further



work attempted by the investigators whose articles are cited. In the course of these unpublished investigations, it was also found that under some circumstances, violent decomposition of perchlorates dissolved in organic solvents may take place.

In view of these various experiences, the author is impressed by the unpredictable nature of the instability of silver perchlorate. Until the nature

- (1) Hill, *THIS JOURNAL*, **44**, 1163 (1922).
- (2) Hill and Macy, *ibid.*, **46**, 1132 (1924).
- (3) Hill, *ibid.*, **47**, 2702 (1925).
- (4) Ricci, private communication.

of the conditions affecting the violent decomposition of perchlorates is known, it is evident that investigations involving these substances must be attended by extreme caution.

STERLING CHEMISTRY LABORATORY
 YALE UNIVERSITY STUART R. BRINKLEY, JR.
 NEW HAVEN, CONNECTICUT

RECEIVED OCTOBER 7, 1940

THE EQUATION OF URANIUM-235 FISSION

Sir:

Although substantial qualitative information is now available on the chemical elements produced by the slow neutron induced fission of U²³⁵, practically no data on the quantities of each element produced are available.

In a joint investigation with E. Fermi and H. L. Anderson an attempt has been made to fill this gap.

The known fission products fall into two groups: a *heavy* group with atomic weights from about 125-150 and a *light* group with weights ranging from about 80-100. At first effort was concentrated on the elements of the heavy fission group and the fission probabilities of nine of twelve known fission series determined.

The present results may be expressed in the form of a *fission equation*:

In those cases where the atomic weight of the individual stable isotope is as yet unknown the element has been characterized by the half period (h. = hours, m. = minutes) of its parent substance.

As can be seen this equation is as yet incomplete, for the fission of 100 atoms of U²³⁵ will produce 100 atoms of elements of the heavy group and simultaneously 100 atoms of the light element group (in addition to neutrons and energy). It indicates that the discovery of additional fission fragments is to be expected.

The complete description of this work is to appear in the *Physical Review*.

Indebtedness to the John Simon Guggenheim Memorial Foundation for the grant of a fellow-

ship is acknowledged.

DEPARTMENT OF PHYSICS
COLUMBIA UNIVERSITY
NEW YORK CITY

A. V. GROSSE

RECEIVED OCTOBER 21, 1940

NEW BOOKS

Physico-Chemical Methods. Volume I. Measurement and Manipulation. Volume II. Practical Measurements. By JOSEPH REILLY, M.A. (Cantab.), D.Sc. (N. U. I.), Sc.D. (Dub.), D.ésSc. (Geneva), F.Inst.P., F.R.C.Sc.I., F.I.C. Boyle Medallist, Royal Dublin Society, Professor of Chemistry, University College, Cork, and WILLIAM NORMAN RAE, V.D., M.A. (Cantab.), Sc.D. (Dub.), F.I.C., Professor of Chemistry and Physics, Royal College of Surgeons in Ireland. D. Van Nostrand Company, Inc., 250 Fourth Avenue, New York, N. Y., 1940. xv + ix + 686 + 580 pp. 410 + 436 diagrams and 1 plate. 16 × 24 cm. Price, \$17.50.

This third edition of a well-known work has been increased by more than 50% in size. This has made it necessary to publish two volumes, the first entitled "Measurement and Manipulations," and the second, "Practical Measurements." Most of the material of the second edition has been brought up to date and included together with several new chapters. This new material has dealt with "Measures and Units," a rather detailed chapter on dimensional analysis, "High Pressure Technique," a chapter on "Radioactivity," and several other topics which have been amplified into full chapters.

These volumes will serve as a convenient introduction to a great variety of physical measurements. In the words of the authors, "The temptation to convert the work into an unwieldy encyclopedia has been resisted. Ample references for further reading have been given, but no claim to ponderous inclusiveness is made. Theoretical developments have been avoided. Results of theory are envisaged only on the experimental or mensurational side." This last statement might seem a little too modest since a clear explanation accompanies the description of the experimental procedure. A new feature of this edition is a list of general references for each chapter which should assist greatly those interested in a more detailed treatment.

H. E. BENT

Micro-diffusion Analysis and Volumetric Error. By EDWARD J. CONWAY, M.B., D.Sc., Professor of Biochemistry, University College, Dublin. D. Van Nostrand Co., Inc., 250 Fourth Avenue, New York, N. Y., 1940. xiii + 306 pp. 49 figs. 14.5 × 22.5 cm. Price, \$6.00.

Micro-diffusion methods of analysis have achieved a place of real importance in the microchemical field by vir-

tue of their simplicity and fundamental accuracy. Until the publication of this volume, the literature in this field was scattered and the many advantages of the technique had not been effectively called to the attention of the many laboratory workers who could profit thereby.

The author has arranged the material relative to the micro diffusion technique in two parts, the first dealing with apparatus and principles, the second with the description of methods. To this is added a third part dealing with the error of volumetric analysis, the material being extended to cover not only the application to diffusion methods but to the generalized field of volumetric analysis. In addition to general and theoretical considerations, specific quantitative methods are described for the micro-determination by diffusion methods of ammonia, total nitrogen, urea, anenylpyrophosphoric acid, adenylic acid, adenosine, volatile amines, chloride, bromide, carbonates and bicarbonates and the oxidation rates of organic substances. Qualitative tests for acetone and alcohol are also included. An appendix carries a discussion, valuable to the biochemist, of urea excretion as a renal function test. The somewhat unorthodox views there expressed are so effectively presented as to merit immediate consideration by all workers interested in this subject. The reader must be impressed by the varied applications which have been made of diffusion technique in the short time which has elapsed since it was first described.

Throughout the book the thoroughness of study and treatment is conspicuous. This is especially noticeable in the third part dealing with volumetric error. It would indeed be difficult to find a more complete and systematic treatment of the subject. The fact that all conclusions are dependent on, and expressed in terms of statistical considerations will lessen the value to chemists not versed in this subject, though this may be an argument in favor of wider study of statistics by chemists rather than a criticism of this type of treatment.

Aside from a small number of minor errors such as the use of "outer" instead of the obviously meant "inner" in line 1, p. 76, the most important errors noticed were those dealing with the work of the reviewer. It was cause for chagrin to realize that most of these were due to inadequate original descriptions of that work rather than to lack of care by the author. The buret shown in Fig. 12 has not been employed for years by the reviewer, but rather that mentioned in a single sentence at the end of paragraph 2, p. 53. Likewise, the stirrer shown in Fig. 11 has long since been replaced by a much more efficient and slightly device employing the same fundamental principle.