active proponents of quantitative organic analysis in the Soviet Union.

Korshun modified and replaced the classical Pregl methods of organic elemental microanalysis, largely on the basis of the technique of pyrolytic combustion, which involves the use of an "empty tube" rather than the packed tubes that are characteristic of the Pregl methods. This approach allowed the development of rapid methods for the simultaneous determination of several elements in a single sample.

The publication of the present volume is timely in view of the major transformation that is taking place owing to the demand for automatic methods of quantitative elemental organic analysis, as exemplified in the recent introduction of automatic apparatus for the determination of oxygen and of nitrogen and for the simultaneous determination of carbon and hydrogen, and of carbon, hydrogen, and nitrogen.

The critical factors in the development of satisfactory automatic apparatus for organic elemental analysis involve, first, the rapid and analytically complete conversion of the organic compound to simple volatile compounds and, second, the analysis of the reaction product mixture with the requisite precision and accuracy. Apparently the use of gas chromatography will provide a more or less satisfactory solution to the latter problem. However, the first step still needs study; investigators concerned with this problem will profit from the suggestive approaches to rapid combustion which are described in the present volume.

The 56 papers in the volume, which are written from the viewpoint of the specialist, constitute Korshun's own research papers plus a few written by some of her students. Four of the papers were originally published in Czechoslovakian journals between 1959 and 1961; with one exception, a paper published in 1941, all of the rest were published between 1946 and 1960, and were published in Russian journals. Thirteen of the papers deal with the determination of carbon and hydrogen, and 25 with the simultaneous determination of carbon, hydrogen, and one or two other elements of the group: nitrogen, halogen, phosphorus, sulfur, silicon, and mercury. Three papers are concerned with the determination of oxygen, four with nitrogen, four with halogen, and four with the simultaneous determination of pairs of elements (oxygen and halogen, silicon and halogen, nitrogen and sulfur); three deal with miscellaneous topics. The quality of the translation is quite satisfactory.

The volume, by its nature, is primarily a practical book. It is a collection of useful methods and, more importantly, of suggestions, precautions, and hints on techniques, which will be of value not only to the practicing organic microanalyst, but, as indicated, to the chemist interested in the development of automatic methods for the elemental analysis of organic compounds.

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Physics

Investigations into Electrical Discharges in Gases. B. N. Klyarfel'd, Ed. Translated from the Russian edition (Moscow, 1958) by D. Cossutta. T. R. Foord, Translation Ed. Pergamon, London; Macmillan, New York, 1964. xii + 283 pp. Illus. $12.

This is an English translation of a Russian book, with essentially the same title, that was published in 1958. The 12 articles that make up the book are original research papers and theses that appear to have been presented in a symposium conducted by Klyarfel'd. Material from some of the papers has been published, at least in part, in other Russian literature.

In the foreword, V. G. Biryukov correctly points out that the papers fall roughly into three categories—(i) papers on the appearance of initial stages of a self-sustaining discharge; (ii) those on the formation of an arc discharge in a metal surface, with particular reference to the surface of mercury; and (iii) those that consider the development of methods for the measurement of the dynamic gas density in the presence of an electrical discharge. With the exception of parts of the first group of articles, the material is much more specific than the book title implies. In fact, the book is strongly directed toward studies of phenomena associated with mercury-arc rectifiers, and the physical problems of high-voltage rectification receive special attention. It is not a general book on gas discharges.

In the sections on breakdown, "On discharge striking in polyatomic gases at $pd < (pd)_{min}$" and "Discharge striking in non-uniform fields at low gas pressures," most of the emphasis is on extending data to the very low values of pd—that is, far below the Paschen minimum. These data are taken to pd of the order of 0.035 torr-centimeter where breakdown voltages in excess of 100 kilovolts are observed. Fairly good verification of the similarity law is found for mercury to at least as low as $pd = 0.1$ torr-centimeter.

The spreading of the low-pressure discharge plasma into essentially inactive areas is studied in the article entitled "The spread of plasma from a discharge." A short article entitled "Formation of a self-sustaining discharge at a negative electrode in a plasma" is essentially a study of the negative portion of a probe characteristic with sufficiently negative voltage to cause the production of electron emission by positive-ion bombardment. The obvious transition of this discharge to an arc was not demonstrated. The characteristics discussed in "Recovery of breakdown strength after a spark discharge" are similar to those published elsewhere. In "Extinction of an auxiliary arc" interesting new material is presented on the effect of a very rapidly decreasing arc current causing an auxiliary arc to be extinguished by loss of cathode spot. Three articles cover the production, nature, and behavior of mercury droplets generated by cathode spots and the backfires that they cause. The last two articles cover the development and use of methods of measuring the dynamic vapor pressure in the presence of a discharge, and present a study of the current-density distribution over the surfaces of various types of rectifier anodes.

There is clearly an error in the label of the pressure parameter in Fig. 7 (p. 104). In some cases the author, or the translator, has been careless in the abbreviation of units on figures and tables—for example, the use of μsec for "rate of decrease of discharge current."

The articles contain about 100 references, mostly to Russian literature. Only about 7 percent of the references cite Western literature published since 1945. This is only in part due to the lack of pertinent published material. Within the limited field covered, this book is a very useful addition to the literature of gas discharges.

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