A Potential Hazard in Flame Photometry

THE necessity of a clean source of air or of adequate filtering to prevent cationic contamination of compressed air used in flame photometry has frequently been stressed. Recently we had an experience with a type of contamination that affects the operator rather than the results.

One day, shortly after the burner of our flame photometer was lighted, an acid odor, as of nitric or hydrochloric acid, began appearing in the room and one of the technicians developed a headache. No contamination of the instrument with acid could be found, and the odor continued even after thorough rinsing of the atomizer system. The effluent gas from the burner chimney rapidly produced the acid color on moistened indicator paper, and this effluent had a strong acid smell. The compressed air going to the instrument was noted to have a somewhat oily odor but none of the acid smell. When a change was made from the central air line to a small compressor in the room, the acid odor disappeared from the chimney and the effluent gas no longer caused a change of the color of the indicator paper. Consultation with the engineers regarding possible contamination of the air supply disclosed that nothing had been done to the air compressor or lines. However, on the day previous, during the search for a leak in the refrigeration equipment, some Freon-12 (CCl_2F_2) had been lost. Since this was in the same room with the air compressor and its intake, some of the Freon had entered the compressed air tank. This gas was decomposing in the burner of the flame photometer, liberating irritating gases such as HF, HCl, chlorine, and phosgene. When the central compressed air supply was vented outside for a time, a later test no longer showed it to produce acid. Thus, obviously care must be taken to prevent access of Freon or other halogenated hydrocarbons to the air supplied to gas burners, to avoid the formation of irritating toxic products.

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Book Reviews

Modern Radiochemical Practice. G. B. Cook and J. F. Duncan. New York: Oxford Univ. Press, 1952. 407 pp. Illus. + plates. $8.50.

This book has been written for the purpose of providing a detailed guide to radiotracer methodology. It is directed toward students and research workers who have taken a beginning college course in radiochemistry and who have an elementary knowledge of nuclear structures and properties. For members of these groups who wish to learn more about the practical problems of methods and instrumentation which must be mastered for successful work in radiochemistry, this text will be extremely helpful.

Dr. Cook and Dr. Duncan have divided their text into seven chapters. The first chapter is an outline of the scope of radiochemistry and familiarizes the student with the principal operations involved in the separations of mixtures of radioisotopes, and with the many ways in which such isotopes are used in chemical investigations. The second chapter reviews, in considerable detail, the types of radiations emitted by radioisotopes, the laws of radioactive decay, and the methods used for determinations of energies and half lives. The third and fourth chapters describe the various types of equipment employed to measure radiation, their construction, operation, and advantages and disadvantages for a given type of radiation. Chapter five reviews the methods used for the production of radioisotopes (with particular attention to the very important nuclear reaction of slow-neutron capture), the choice of target material, calculations of yields, and the separation of radioelements by the Szilard-Chalmers reaction. Chapter six describes the techniques and errors involved in comparative and absolute counting of β activity in solids, liquids, and gases. In chapter seven the authors describe the laboratory designs and the health precautions necessary for the safe handling of radioisotopes. A final section (67 pp.) of the book presents 30 experiments designed to acquaint the student with some of the important techniques and concepts of radiochemistry. These experiments are very well designed and comprise a fine manual for a laboratory course.

An example of the authors' excellent presentation of the practical aspects of radiochemistry is the inclusion (in chaps. IV and V) of tables which show the common faults observed in the performances of Geiger counters, preamplifying units, scalers, and power packs. These tables list systematically the symptoms of, the possible causes of, and (most important) the remedies for these various faults.

The book is very readable, both from the standpoint of clarity of presentation and of the typography, and it is remarkably free from typographical errors. The only technical error noticed, and it is of small consequence, is that the value of E_{max} for C^{14} is given as 0.158 Mev on page 157 whereas on pages 222 and 254 it is given as 0.14 Mev. This book should be of considerable value to anyone interested in the subject of radiochemistry.

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