

SYMPOSIUM ON SPECTROSCOPIC EXCITATION

INTRODUCTION

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Some 13 years ago, a Symposium on Spectroscopic Light Sources was held at the ASTM Annual Meeting in Buffalo, N. Y. At that Symposium the characteristics of the major excitation sources—arcs, and sparks—were examined in detail, primarily with respect to the physical phenomena involved. The papers and discussion given at that Symposium were printed in *ASTM STP* No. 76 and still constitute authoritative information on sources of basic importance to excitation. We may consider the present Symposium to supplement and extend its forerunner.

In much of the thinking of that earlier day, it was believed that high reproducibility of electrical or temperature parameters would result in corresponding improved reproducibility in spectral excitation. To a considerable extent this is true, and modern sources have been designed that offer highly reproducible patterns of discharge or uniformity of excitation. However, even 13 years ago it was realized that none of the excitation problems can be divorced entirely from the over-all problem of correlating the observed intensity ratios with the actual composition of the sample.

In a lecture at the University of Florida in 1954, J. H. Enns gave a

realistic picture of the situation in excitation for analytical purposes when he said, "Standardization in excitation practices has always been difficult because of the diversity of samples. The analyst is usually not interested in the composition of the excited vapors. Instead he wants to find the composition of some solid or liquid from which vaporization was obtained. The production of discrete spectra from solid and in some cases from solution samples is thus a dual mechanism of vaporization and excitation. The two functions are not altogether independent. The principles of physics which govern excitation are fairly exact and have had considerable success in explaining excitation mechanisms for thermal, chemical, and electrical energy sources. Far less is known about mutual effects between elements during vaporization from solid mixtures." In recent years, the problems of excitation of spectra for analytical purposes, over and above the perfection of the excitation source used, has become of paramount interest.

The present Symposium is aimed at a consideration of some of the major effects on excitation caused by the sample itself, the so-called matrix effects, and by the environment in which excitation occurs—the gaseous atmosphere. These effects encompass a wide variety of phenomena, and it will, of course, not be possible to treat all of

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them. However, the intention is to bring out some major causes and effects and to examine ways in which deleterious effects may be minimized or corrected in order to improve accuracy of analysis.

Committee E-2, through one of its task groups, is formulating some of the problems facing the spectroscopic an-

alyst. One additional purpose of this Symposium is to bring out the more important problems in excitation so that attention may be directed toward their solution. To accomplish this purpose, searching discussions were considered important, and several authorities kindly consented to present prepared discussions which are given at the end of each paper.