Elemental Analysis by Optical Emission Spectrography

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53–1 INTRODUCTION

Practical spectrochemical analysis by optical emission methods began about 1860 with the works of Kirchhoff and Bunsen (Meggers and Scribner, 1941), and is used extensively in the metallurgical field. However, during the past two decades, procedures, techniques, and equipment have been developed that broaden the applications of spectrochemistry to include many diverse areas of investigation such as geological materials, petroleum and ceramic industries, criminology, medicine, nutrition, and agriculture. In agriculture, the most noteworthy applications have occurred in the field of plant nutrition and soil investigations.

53–2 PRINCIPLES

Quantitative spectrochemical methods are of greatest value where routine determinations of several elements are made on a large number of samples of similar materials. Simultaneous determination of several elements, use of small quantities of material, and ease and speed in handling samples are features that make optical emission spectrochemical methods attractive for use in mineral nutrition and soil investigations.

In optical emission spectrography, material emits light as a result of atomic excitation produced by application to the sample of either thermal (high temperature) or electrical (high voltage) energy. Flame photometers, for example, use only thermal energy, but spectrographs use both thermal and electrical energy. Direct-current (d-c.) arcs provide mostly thermal

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