INTRODUCTION

By R. S. Kelly,[1] Personal Member, ASTM

High-temperature alloys are of vital importance to modern technology primarily because of their ability to maintain high strength at elevated temperatures. Some examples are their use (*1*) in several components of jet aircraft engines, (*2*) on leading edges of supersonic Mach 2.5 aircraft, and (*3*) as structural components of aerospace vehicles.

Present chemical methods for the analysis of these alloys involve anion-exchange separation techniques. A complete analysis requires a great deal of time and effort because of complex compositions of the alloys. Spectrochemical methods largely are limited to furnace quality control and employ either X ray or optical emission techniques. Customer analyses are, in the majority of cases, performed chemically.

What is needed, therefore, is a general spectrochemical method of sufficient precision and accuracy to satisfy customer requirements and which is versatile enough to serve as a referee between producer and consumer. The importance of such a method to industry as a whole should be obvious.

Heretofore, extreme complexity of composition, matrix diversity, and a lack of standard specimens discouraged any positive approach to a general method for the analysis of high-temperature alloys. The recent availability of selected standards from the National Bureau of Standards, however, has laid the groundwork for such a method, although they cover only the better known, most used alloy types.

Two methods which take a giant step in closing the standards gap and cope with the wide variety of matrices and their complexity are presented in this publication. They should fulfill the analytical requirements for general methods with respect to efficiency, accuracy, and precision for both major and minor elements and with no really rigid metallurgical history or specimen form required.

[1] Specialist engineer, Republic Aviation Corp., Farmingdale, Long Island, N. Y.