PERFORMANCE OF BAYARD-ALPERT GAGES IN ALKALI METAL VAPORS

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Measurements and observations of gage performance have been made in cesium and rubidium vapor. For the most part, these observations are restricted to commercial gages run under conditions specified by the manufacturer.

In the apparatus used, high-purity alkali metal was inserted into and sealed within an ionization gage under high-vacuum conditions. The pressure of the alkali metal within the sealed gage was controlled by varying the tubulation temperature, and in turn, the alkali metal vapor pressure within the tubulation. The procedures and techniques used are given in detail in reference 1, as well as the results obtained in the case of cesium.

No permanent gage damage was noted over several months of gage operation, although temporary gage failures were encountered because of the conductive plating of the alkali metals within the gages. This condition was easily corrected by the substitution of gages with suitable shielding of the element penetrations of the envelope.

The response of the gages to changes in alkali metal vapor pressure was inhibited because of condensation on the envelope walls. Pressure readings from the gage required periods of several hours to insure stability. The use of nude gages is the obvious solution to this problem.

Photoelectric currents were observed and measured. For a gage of the RG-75 type, the photoelectric currents were measured to be 2×10^{-8} ampere and less than 1×10^{-9} ampere, respectively, for cesium and rubidium.

Sensitivities for the RG-75 gage were measured to be 13.7 and 9.1 times the gage's nitrogen sensitivity for cesium and rubidium, respectively.

REFERENCE

1. Summers, Robert L.: Effects of Cesium Vapor on Bayard-Alpert Ionization Gages at Pressures Less Than 10^{-5} Torr. NASA TN D-2264, 1964.