

Shadow spectral filming: A method of investigating electrothermal atomization: Part 2. Dynamics of formation and structure of the absorption layer of aluminium, indium and gallium molecules

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Abstract

The shadow spectral filming method suggested in Part 1 of this paper is used to study the dynamics of formation and structure of the absorption layers of Ga, In and Al molecules. The molecules of these elements are confined to the central part of the graphite atomizer and their distribution is strongly non-homogeneous with a pronounced decrease in concentration near the graphite walls. The cross-sectional distribution of these molecules, along with other experimental evidence, suggests that the molecular species recorded were Ga₂O, In₂O and Al₂O. During the atomization of In, Ga and especially Al, these suboxides and their heterogeneous reactions with the graphite surface play an important role. The process of vaporization of aluminium-containing salts consists of two pronounced stages. Firstly, the sample is vaporized as a gaseous suboxide and secondly, the suboxide is oxidized to form finely dispersed, condensed alumina, Al₂O₃(S,l). The cloud of condensed alumina has a 'doughnut' structure that mimics the inner surface of the graphite tube.

Keywords

Graphite furnace, Molecular distribution, Shadow spectral filming