AUTOIONIZING TRANSITIONS IN ATOMIC ABSORPTION SPECTRA AND THIER ANALITICAL APPLICATIONS

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The presence of autoionizing transitions in atomic absorption spectra practically for all the elements is established.The short lifetimes of these states and related wide resonances together with a high intensity of lines and assimetry of profiles make them an interesting objects for practical applications especially for atomic absorption spectral analysis. Some of resonances ,e.g. in the absorption spectra of gallium , indium or ittorbium [1] have halfwidth up to several dozen of Angstroms The unique peculiarities of autoionizing resonances in the atomic absorption spectra let us set and solve substantially new analitical problems , e.g. make the atomic absorption analysis using instuments with a low spectral resolution, not taking into accountthe influence of the spectrometer apparatus function as well as broadening collisions or Doppler broadening . The sharp maximum and minimum on an absorption line profiles allow for precise measurements of the concentration of absorbing atoms with a stirous absorption or emission of any other atoms or molecules.

All mentioned peculiarities can be illustrated by the profile of the tallium resonance $s^2p\ ^2P^o_{1/2}$ - $s\ p^2\ ^4P_{1/2}$ with absorption maximum 200.7 nm (Fig 1)

Extremly high intensity of the absorption resonances together with significant halfwidth of peaks give a possibility reliably identify $s^2p\ ^2P^o_{1/2}$ - $s\ p^2\ ^4P_{3/2}$ transition of tallium in analitical signal . Well known atomic constants for the 200.7 nm line in TL I spectrum permit precisely define of the concentration of tallium in analitical measurements.It is essential that registration procedures exclude using vacuum spectrometers and all analitical measurements can be made with routine spectrometer for UV region.

The opportunities to use the modern spectroscopy tecniques for sistematic study of the autoionizing transitions in atomic absorption spectra are discussed.

References:

1 M.G.Kozlov, Absorption Spectra of Metal Vapours in the VUV, M . Nauka,1981