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Theoretical shapes of Lα_1X-Ray Satellites spectra of $_{40}$Zr, $_{42}$Mo, $_{44}$Ru, $_{46}$Pd and $_{48}$Cd for lead as predicted by HFS calculations. SURENDRA POONIA, Research Scientist (Atomic and X-Ray Spectroscopy) — The X-ray satellite spectra arising due to $2p_{3/2}^{-1}3x^{-1}$-$3x^{-1}3d^{-1}$ (x ≡ s, p, d) transition array, in elements with Z = 40 to 48, have been calculated, using available HFS data on $1s^{-1}$-$2p^{-1}3x^{-1}$ and $2p_{3/2}^{-1}$-$3x^{-1}$,$3x'^{-1}$ Auger transition energies. The relative intensities of all the possible transitions have been estimated by considering cross - sections for the Auger transitions simultaneous to a hole creation and then distributing statistically the total cross sections for initial two hole states $2p_{3/2}^{-1}3x^{-1}$ amongst various allowed transitions from these initial states to $3x^{-1}3d^{-1}$ final states by CK and shake off processes. The calculated spectra have been compared with the measured satellite energies in Lα_1 spectra. Their intense peaks have been identified as the observed satellite lines. The peaks in the theoretical satellite spectra were identified as the experimentally reported satellites α_3, α_4 and α_5, which lie on the high-energy side of the Lα_1 dipole line. On the basis of agreement between the computed spectra and measured satellites, it is observed that the satellite α_3 is observed due to intense transition, $^3F_4$–$^3F_4$, in order of decreasing contribution of intensity. It has been found that the transition $^1F_3$–$^1G_4$ is the main source of the emission of the satellite $\alpha_4$in the elements $_{42}$Mo to $_{48}$Cd. The line α_5, observed in the spectra of elements with Z = 40-48, has been assigned to the $^3D_3$–$^3F_4$, $^3D_2$–$^3F_3$, $^1P_1$–$^1D_2$ and $^1F_3$–$^1D_2$ transitions.

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