

Ore genetic implications of major element and B-isotopic compositions of tourmaline from Rajpura-Dariba SEDEX deposit of Aravalli-Delhi Belt, India

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Ore mineralization in the Rajpura-Dariba (SEDEX) Pb-Zn deposit in Rajasthan is hosted in Proterozoic volcano-metasedimentary rocks of the Aravalli-Delhi Belt. The primary host rocks are graphite-mica schist and calc-silicate rocks. Tourmaline occurs as fine disseminated grains in the graphite-mica schists. Based on texture and composition, two distinct generations of tourmaline (Tur-I and II) are identified. Blue cores (Tur-I) are mantled by brown rim (Tur-II). The close association of Tur-I with stratiform sulfides indicates their syn-genetic nature. Tur-II overgrows Tur-I as well as metamorphic biotite. Tur-I composition ranges between schorl and dravite ($X_{Mg} = 0.14-0.56$), while Tur-II is dravitic ($X_{Mg} = 0.58-0.77$). The $\delta^{11}B$ values of Tur-I and II are indistinguishable and ranges from -18.8 to -16.10‰, and -19.1 to -16.0‰, respectively. The low $\delta^{11}B$ values of syn-ore tourmaline imply that the boron was most likely sourced from non-marine evaporites, underscoring their significance in SEDEX-style Pb-Zn mineralization.