A study on the quartz reef textures and their relationship to copper mineralisation in the Bundelkhand Granitoid Complex, India

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Mineralised quartz reef trending northwest–southeast, approximately 1.2 km long and up to 15 m thick, is emplaced in porphyritic syenogranite of the Western Bundelkhand Granitoid Complex (WBGC) near Devpur–Nimoda, Madhya Pradesh. The reef predates regional propylitic alteration (chlorite–epidote) of the host rock and represents multiple hydrothermal pulses. The earliest generation of quartz veins (Qz1) is massive and cryptocrystalline, shows hydrothermal breccia with granite clasts, and contains disseminated pyrite. The later generation reef (Qz2) consists of cross-cutting veins displaying epithermal vein textures, including comb, zoned, crustiform, colloform, druzy, and composite intergrowths. Copper mineralisation (chalcocite ± chalcopyrite ± covellite) is observed in Qz2 domains. Chalcocite ± chalcopyrite occurs as vein fillings and disseminations, whereas malachite forms secondary coatings, and covellite develops as a replacement mineral. Ferruginisation of sulphides has led to the formation of goethite and hematite along fracture planes. The sequence of events recorded is syenogranite emplacement, propylitisation, multiphase quartz veining, sulphide deposition, and subsequent ferruginisation and sulphide replacement by covellite. These features indicate that copper mineralisation in WBGC is a shallow-crustal, low-sulfidation epithermal phenomenon.

Keywords: Bundelkhand Granitoid Complex, chalcocite, copper mineralisation, low-sulfidation, quartz texture.