

WALLROCK ALTERATION RELATED TO OROGENIC (MESOTHERMAL) GOLD DEPOSITS

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Although commonly showing a strong association with greenschist-facies rocks, orogenic (mesothermal) gold mineralisation may form under sub-greenschist to lower-granulite facies PT conditions. The deposits may be hosted by practically all rock types in an orogenic belt of any age. Despite this variation, there are certain consistent features in their alteration haloes: 1) zoning perpendicular to mineralisation in all cases, 2) rare along-strike and down-dip zoning, 3) carbonation and formation of muscovite or biotite, 4) low-degree of sulphidation, 5) significant enrichment in CO₂, S, K, H₂O, LILE, Au ± Ag, As, Bi, Sb, Se, Te and W, and 6) rare base-metal enrichment. Alteration indices and metal dispersion haloes are useful exploration guides. At sub- to mid-greenschist facies, alteration is characterised by distal calcite-chlorite and proximal sericite-ankerite zones. At upper-greenschist facies, biotite replaces sericite and calcite gradually replaces the other carbonates. At higher metamorphic grades, distal alteration is characterised by biotite, and proximal alteration by calc silicates and calcite. Sulphidation is, generally, most prominent in BIF, and carbonation most intense in mafic and ultramafic host rocks. Significant SiO₂ enrichment is evident from the commonly large volumes of quartz veins. However, silicification *sensu stricto*, that is addition of silica not involving quartz veins, has convincingly been documented only in a few greenschist-facies, metasediment-hosted deposits. Rather, SiO₂ released by alteration reactions is redeposited in host rocks and quartz veins.