

CHROMITITES IN MAFIC AND ULTRAMAFIC ROCKS

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Chromitites in mafic layered complexes are usually found near the bases of cyclic units in the lower parts of the intrusions. A popular model holds that the chromitite layers formed by the mixing of primitive melt with the residual fractionated melt occupying the chamber, producing a supercooled mixture in which only chromite is stable. The thick (1 m), massive chromitite layers present in some large intrusions require that the overlying magma bodies were much more than 1000 m thick. In ophiolites, chromitites are best developed in those dominated by harzburgite. Traditionally, they have been interpreted to have formed by magmatic fractional crystallization. However, podiform chromitites are commonly surrounded by haloes of dunite and then harzburgite. An alternative model holds that the sequence formed by reaction of lherzolite wall rock and magma originating in the deeper mantle. The common presence of hydrous mineral and fluid inclusions in chromite suggest that hydrous fluid was also involved in petrogenesis.

No matter what their setting, chromitites contain elevated PGE contents and, compared to adjacent rocks, are enriched in Ir and Os relative to Pt and Pd, reflecting the presence of Ir-Os alloy and laurite inclusions in chromite. Some workers have concluded that these phases are refractory and remained in the mantle after partial melting or crystallized in magma prior to chromite. Experiments and mineral stability relations indicate, however, that the inclusions formed after their host crystals, implying that chromitites commonly experienced textural reequilibration. Textural maturation of chromitite may be universal in slowly cooled rocks.