

Liquid Mineral Assemblages and Its Significance for the Wengeqi PGE Deposit's Origin, Inner-Mongolia, China

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The Wengeqi PGE (Platinum Group Element) deposits are located in Guyang County, Inner Mongolia, China. Three PGMs (Platinum Group Minerals) were identified in the deposits: sperrylite (PtAs₂), sudburyite (PdSb), and kotuskite (PdTe). The wengeqi complex comprises amphibolites, pyroxenites, biotite pyroxenites, amphibole pyroxenites, and gabbros. Zircon SHRIMP dating of pyroxenite suggests the age of the complex is about 399 Ma. Liquid Mineral Assemblages (LMAs) were found in the complex. The LMAs are a new type of mineral assemblages different from that in metamorphic rocks and igneous rocks. A typical LMA in the complex is ferropargasite + epidote + albite + calcite + apatite. The boundaries between all these minerals are straight, which suggests that all these minerals were in textural equilibrium.

Trace element analysis of ferropargasite shows higher total LREE (light rare earth elements) and lower total HREE (heavy rare earth elements). It also suggests a higher degree of differentiation between LREE and HREE. The ration of LREE to HREE ranges from 9.2 to 13.6, with an average of 11.8. The (La/Yb)_N values range from 10.7 to 14.4, with an average of 12.6. The δEu values range from 0.87 to 1.04, with an average of 0.96. Large ion lithophile elements (such as Rb, Sr, Ba) and Pb are enriched. Transitional elements Zr and Hf are enriched as well. These features imply that The LMAs may be related to hydrothermal activity.

The geochemical characteristics of PGE show that the origin of PGE mineralization is related to magmatic-hydrothermal activity. The LMAs may have formed during the same stage as the PGE being mineralized.

Key words: Liquid Mineral Assemblages; hydrothermal fluids; Wengeqi PGE deposit, Inner Mongolia