Geological Characteristics and Petrogenesis of Syenites in Bengge Gold Deposit, Yunnan

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The Bengge gold deposit is located in the south of Yidun arc, on the eastern of the Tibetan Plateau. For a long time, it was considered as alkaline-rich porphyry related to strike-slip shear caused by India - Asia continental collision. The ore body is mainly gold-bearing quartz vein and tectonic breccia-altered rock, controlled by NW and NE trending fracture. Veinlets and disseminated Mineralization develop in the altered syenites, which have undergone variable degrees of silica, quartz-sericitic, propylitic and carbonate alteration. Alterations and mineralization of Bengge gold deposit can be divided into four stages: I quartz-feldspar veins stage, II white quartz-pyrite veins stage, III polymetallic sulfide veins, IV late carbonate stage. The mineral assemblage of sulfides is characterized by arsenopyrite + pyrite + chalcopyrite + tetrahedrite + sphalerite + galena + bournonite. Based on hydrothermal alteration and mineral assemblage, we consider the Bengge area as intrusion-related gold deposit.

The Bengge alkaline complex is composed of ultrapotassic biotite pyroxene syenite, biotite syenite, quartz syenite porphyry syenite and pegmatite syenite. The zircon LA-ICP-MS U-Pb ages of biotite pyroxene syenite, biotite syenite and pegmatite syenite dike are 216Ma±1.9Ma, 218Ma±4.7Ma and 214Ma±4.5Ma. There is an age information of Proterozoic in porphyritic biotite syenite. The zircon of quartz syenite is divided into two types as the 206Pb/238U age of about 215Ma for one and upper Cretaceous to middle Jurassic for the other.

The SiO₂ contents of biotite pyroxene syenite and biotite syenite range from 53.81 to 57.02. They have high Mg # (47.68-56.22), Cr(55.5-106) and Ni(20.3-32.6) and low TiO₂(0.76-1.13). High K₂O(6.57-9.55wt%) suggests they are shoshonitic. They display enriched LILE and depleted HFSE (Nb,Ta, Hf,P, Ti ). They appear that the syenites have very high Sr(717-1787 ppm) and low Y (12.8-20.6 ppm), as well as high Sr/Y ratios (48.12-139.61). It is considered that the subducted sediments also contribute to the formation of the magma. Major and trace element trends of quartz syenite can be explained by the switch from pyroxene-, biotite-dominated crystallization to K-feldspar-dominated crystallization, with minor hornblende, controlling the biotite pyroxene syenite to quartz syenite. This magmatism, resulting most likely in an extensional setting, seems to provide time constraints on the major geodynamic transition from convergence to extension at the south part of Yidun arc. We propose that Bengge alkaline complex formed by slab break-off of west-dipping Garze-Litang subducted plate.

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References

