

Some new data on mineralogy of the stibnite-antimonelite series

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Antimony has a very common occurrence as a sulfide in nature, but its selenide, antimonelite, was only recently reported as a new mineral. Transitional members in the stibnite-antimonelite system have been discovered by the authors in stratabound gold deposits at La'erma and Qiongmo in western Qinling, China. By convention in mineralogical nomenclature, this binary system is divided based on atomic ratios of S/(S+Se) into four series: Se-bearing stibnite, selenium stibnite, sulfur antimonelite and S-bearing antimonelite. The selenium stibnite and sulfur antimonelite are varieties between the two end members of stibnite and antimonelite.

The stibnite-antimonelite series were collected from quartz-barite veins in the gold deposits. They occur as micro-veinlets, networks or disseminated grains in the quartz-barite veins in close association with tiemannite, clausthalite, kullerudite, Se-bearing stibioluzonite, native gold and quartz and barite. They are highly variable in size (generally 0.01~0.2 mm, maximum 0.5 mm). The series were formed between 150 and 210°C based on decrepitation temperatures of stibnite and homogenization temperatures of fluid inclusions in quartz and barite.

Micro-hardness of 12 grains of the stibnite-antimonelite series are 68.25 and 131.21 kg/mm² (for 50g load). Representative reflectivities of the four series are (470nm) R_g'=42.62~47.62%, R_p'=30.83~40.55%; (550nm) R_g'=41.84~46.75%, R_p'=31.48~38.85%; (590nm) R_g'=42.25~46.63%, R_p'=30.73~39.46%; (650nm) R_g'=43.30~46.48%, R_p'=30.01~41.56%. The concentration (wt%) ranges of major elements are Sb: 43.25~72.99, S: 0.00~28.76, Se: 0.00~51.94. The variation in Se content in the series is continuous. Based on the averages of microprobe analyses the formulae of Se-bearing stibnite, selenium stibnite, sulfur antimonelite and S-bearing antimonelite can be written as Sb_{2.03}(S_{2.67}, Se_{0.33})_{3.00}, Sb_{2.00}(S_{2.06}, Se_{0.94})_{3.00}, Sb_{1.98}(Se_{1.71}, S_{1.31})_{3.00} and Sb_{1.86}(Se_{2.64}, S_{0.36})_{3.00}, respectively.

The samples of the series are obtained for X-ray powder analyses. Cell parameters obtained from the series samples are calculated to be: a=1.1232nm, b=1.1312nm, c=0.3839nm, V=0.4877nm³ (Sb₂S₃), a=1.1314nm, b=1.1434nm, c=0.3863nm, V=0.4998nm³ (Sb₂(S_{2.5}, Se_{0.5})₃), a=1.1388nm, b=1.1530nm, c=0.3886nm, V=0.5103nm³ (Sb₂(S_{2.0}, Se_{1.0})₃), a=1.1465nm, b=1.1613nm, c=0.3912nm, V=0.5209nm³ (Sb₂(S_{1.50}, Se_{1.5})₃), a=1.1530nm, b=1.1682nm, c=0.3934nm, V=0.5300nm³ (Sb₂(S_{1.0}, Se_{2.0})₃), a=1.1635nm, b=1.1785nm, c=0.3976nm, V=0.5451nm³ (Sb₂(S_{0.5}, Se_{2.5})₃), and a=1.1636nm, b=1.1783nm, c=0.3983nm, V=0.5460nm³ (Sb₂Se₃). As may be seen from the above data, the higher the Se concentration, the bigger the cell parameters.

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