

Palladium tellurides and their solubility of Ag, Pb, Sn – an experimental study

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Among palladium tellurides there are known four minerals: kotulskite (PdTe), merenskyite (PdTe₂), telluropalladinite (Pd₉Te₄), and keithconnite (Pd_{3-x}Te). Pd-tellurides are generally found in Cu-Ni-PGE mineral deposits, associated with mafic and ultramafic igneous rocks. Kotulskite and merenskyite are the most abundant minerals of the system Pd-Te, commonly found together among other platinum-group minerals and Cu-Ni-Fe sulphides. These minerals are also reported from porphyry copper systems, epithermal gold deposits or black shales.

We have experimentally investigated palladium tellurides and studied the solubility of silver, tin and lead at 400°C. The evacuated silica tube method was applied for the purpose of this study. The experimental products were examined with X-ray powder diffraction, reflected light and electron microscopy. The following binary phases were observed to be stable at 400°C: Pd₁₃Te₃, Pd₂₀Te₇, Pd₇Te₃, Pd₉Te₄, Pd₃Te₂, PdTe, and PdTe₂. The mineral kotulskite (PdTe) forms an extensive solid solution dissolving up to 45 wt.% Pb; it can also dissolve up to 20 wt.% Sn. Kotulskite does not dissolve Ag. The mineral keithconnite that we equate with the synthetic phase Pd₂₀Te₇ dissolves up to 3.5 wt.% Ag; it can also dissolve up to 9 wt.% Pb, and up to 4.6 wt.% Sn. Merenskyite (PdTe₂) dissolves up to 4 wt.% Sn. Telluropalladinite (Pd₉Te₄) dissolves up to 4 wt.% Pb. The phase Pd₁₃Te₃ dissolves up to 2 wt.% Ag. Lead and tin is substituted for tellurium in the crystal structure of palladium tellurides, whereas silver substitutes for palladium.