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Features of high-temperature oxidation in air of silver and alloy Ag-Cu, and adsorption of oxygen on silver

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Abstract

Thermodynamic calculations are provided for equilibrium in the system Ag-O₂. Kinetics of high-temperature (up to 900 °C) oxidation in air of plates made from pure silver (99.99 mass% Ag) and jewellery alloy 84 at.% Ag-16 at.% Cu are studied by nonisothermal thermogravimetry, and differential and petrographic analyses of the reaction products. Mechanisms are established for the corresponding oxidation reactions confirming the absence of chemical reaction for pure silver with oxygen at $T > 422$ K. The Wagner theory for oxidation of alloys containing precious metals is confirmed by the results. The temperature ranges are determined for van de Waals adsorption and chemisorption of oxygen at the surface of very pure silver powder with a specific surface area $S = 0.4$ m²/g.