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Dissolution kinetics of vanadium from manganese pyrovanadate in water solutions of sodium carbonate

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Abstract

For the converter slags of the Nizhny Tagil metallurgical plant that burnted without any alkaline additives, the main phase is vanadium-contaning manganese pyrovanadate. The solutions of sodium carbonate with concentrations of Na_2CO_3 up to 150 g/dm^3 were used as leaching reagent for vanadium. Manganese pyrovanadate was synthesized and this material was used for a disc fabrication by melting technique. The studying of vanadium dissolution kinetics of manganese pyrovanadate in solutions of sodium carbonate were carried out by spinning disc method. It was established that the rate of vanadium dissolution is dependent on the mass exchange intensity (speed of disc rotation), solvent concentration, and temperature. All aforementioned with regard to the value of process activation energy are indicators of diffusive character of dissolution. It is recommended to use relatively high concentrated sodium carbonate water solutions 1.1-1.4 mol/dm^3 (120-150 g/dm^3) at 368 K and intensive pulp stirring should be provided to determine the optimal regimes of vanadium leaching of slags.

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