

INVESTIGATION OF KINETICS SULPHATIZATION IN THE SYSTEM $\text{MnCO}_3\text{-MnO-FeSO}_4\text{-O}_2$ AS A FUNCTION OF TEMPERATURE

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Kinetic of heterogeneous sulphate roasting process of manganese from manganese carbonate and ferrosulphate composite in oxide atmosphere in isothermal conditions is investigated. Investigations are based on temperature and time influences on manganese sulphatization degree in compact composite with goal to describe the regime of sulphatization process. Kinetic of sulphatization process of manganese is defined using exponential equation which describes sulphatization process regime in wide temperature range (723 K - 1073 K). With mathematical modeling of experimental results from manganese sulphatization process of manganese carbonate ore in function of temperature, calculated values $E_{a1} = 134.71$ kJ/mol and $E_{a2} = 43.97$ kJ/mol show that the process of sulphatization is changed from kinetic to transient area, where same influence on overall process rate is limited from diffusion resistance as well as chemical reaction in reaction area.

The microstructure analysis of the sulphatization process of MnCO_3 with ferrosulphate by electron raster microscopy is done. Results of the sulphatization process on compact composite $\text{MnCO}_3\text{-FeSO}_4$ in temperature range (723 K - 1073 K) show that with temperature increasing, the shape of the crystal grains is changed from polyhedral to granulate. According to the energy specters, also is showed that by increasing of the temperature manganese was transformed from carbonate to sulphate form. Based on these results the kinetics and mechanism of sulphatization process of manganese it can be confirmed.

Key words: manganese carbonate, ferrosulphate, roasting, sulphatization, kinetic, activation energy, microstructure analyses.