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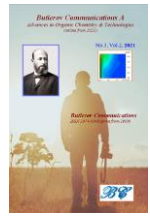

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Regeneration of the leaching agent (nitric acid) during thermal hydrolysis of six aqueous magnesium nitrate

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Keywords: oxidized nickel ores, magnesium nitrate hexahydrate, magnesium oxide, thermal hydrolysis, decomposition, degree of decomposition, rate of decomposition.

Abstract

The process of thermal hydrolysis of magnesium nitrate hexahydrate obtained as a result of complex nitric acid processing of oxidized nickel ores of the Serov deposit, which is not very suitable for pyrometallurgical nickel production, due to the high content of magnesium hydrosilicates, has been studied. Samples of magnesium nitrate hexahydrate were obtained by leaching the crushed feedstock with nitric acid and purifying the acidic nitrate solution from impurities (Fe^{3+}, Al^{3+}, Cr^{3+}, Ni^{2+}, Mn^{2+} ions, etc.). The process of thermal hydrolysis of magnesium nitrate hexahydrate was carried out in a hermetically made installation consisting of a steam generator, a tubular furnace (without stirring devices), a nitrous gas condensation system (a trap flask, a refrigerator, a receiver tank), in an atmosphere of superheated water vapor at various temperatures (from 320 up to 510 °C). The kinetics of the decomposition process was determined by the amount of nitric acid regenerated during the condensation of nitrous gases (NO_2, NO, O_2, H_2O). The identification of the substance used previously dried in a desiccator (magnesium nitrate hexahydrate) and the obtained powdery product of thermohydrolysis (magnesium oxide) was confirmed by chemical, IR spectroscopic and X-ray phase analyzes. Presented are microimages of crystals of initial magnesium nitrate hexahydrate and commercial magnesium oxide. The dependence of the degree and rate of

decomposition of magnesium nitrate hexahydrate on temperature has been established. The optimal temperature regime providing the highest degree of thermal hydrolysis has been determined. It has been shown that nitric acid, regenerated after thermohydrolysis of magnesium nitrate hexahydrate and condensation of nitrous gases, contains no more than 2 wt % nitrous acid and can then be used for leaching preliminarily crushed initial mineral raw materials (oxidized nickel ores).

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