N E W S
OF THE NATIONAL ACADEMY OF SCIENCES OF THE REPUBLIC OF KAZAKHSTAN
SERIES OF GEOLOGY AND TECHNICAL SCIENCES
ISSN 2224-5278
Volume 3, Number 429 (2018), 182 – 188

UDC 669.027.32/33

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DEVELOPMENT OF TECHNOLOGY FOR CHROMITE CONCENTRATE FROM THE SLURRY TAILINGS OF ENRICHMENT

Abstract. The exploration results of manmade residues retreatment – slurry tailings of chromite ore enrichment of Donskoi Ore Mining and Processing Plant of the Republic of Kazakhstan are performed in the article.

The technology of chromite concentrate extraction by chemical enrichment and centrifugal separator methods has been developed. The technology includes preliminary activation processes of chromite-containing tailings in sodium hydro-carbonate solution, leaching in ammonium bisulfate solution and gravity concentration in a centrifugal separator. The preliminary activation process is required to increase enrichment degree of chromite-containing tailings when leaching by means of accompanying elements removal – magnesium, silicium, ferrum. Quantitative composition of samples is changed insignificantly as a result of activation. At the same time, the phase composition of samples is changed, calcium oxides phases and ratio of magnesium-containing phases are disappearing.

Prime results through researches when choosing reagent to slurry tailings leaching have been achieved by using 30%NH_4HSO_4solution. Out of data of X-ray phase and chemical analysis, follows that when leaching slime tailings, the rock-forming minerals mainly go to solution, while chromium and chromite-containing minerals, kaolinite and amorphous silica remain in the cake-the rough concentrate.

Chromite concentrate has been received at rough concentrate treatment using centrifugal separator KNELSON consisting of chromite mineral - $(Fe_{0.52}Mg_{0.48})(Cr_{0.76}Al_{0.24})_2O_4$ with Cr_2O_3 59,2% content when ejecting Cr_2O_3 into 86,8% concentrate. Technology engineering of chromite slurry retreatment contributes to solve an environmental problem and also to increase chromite concentrate production.

Key words: slurry tailings, activation, ammonium bisulfate, centrifugal separator, and chromite concentrate.

Introduction. Processing of accumulated and newly formed manmade waste, including chromite tailings, is an actual task of the present.

The importance of solving the problem of involving in the processing of wastes of enrichment products is associated not only with ecology but also with the need to increase the production of chromium. For the period from 2005 to 2012, the world production of chromium, according to the International Chromium Development Association (ICDA), increased from about 18 million tons to 24 million tons [1].

Donskoy Ore Mining and Processing Plant is the enterprise that extracts and enriches chromium raw materials in Kazakhstan. Gravitational technology for chromium ore enrichment makes it possible to obtain a chromium concentrate from large and medium fractions. At the same time, the fine-grained tailings are practically not enriched because of the difficulty of separating complex minerals into chromium concentrates and empty rock [2, 3].

Research in Physics and Chemistry. Slurry tailings of chromite ores enrichment of the Donskoy Plant were used in the work. Chemical analysis of slurry tailings is given in table 1.

The results of X-ray diffraction analysis of slurry tailings of the Donskoy Plantare presented in table 2.