

APPLICATION OF ELECTROSTATIC AND ELECTROMAGNETIC SEPARATION FOR BENEFICIATION OF ILMENITE ORES FROM VIETNAM

Son H. Le¹, Nadezhda V. Karelina², Bach T. Kieu³, Vladimir A. Karelin⁴ & Ivan I. Zherin⁵

¹ Research Scholar, Institute for Technology of Radioactive and Rare Earth Elements, Vietnam Atomic Energy Institute,
Lang Ha, Dong Da, Hanoi, Vietnam

^{2,3,4,5} Research Scholar, National Research Tomsk Polytechnic University, Lenin ave., Tomsk, Russia

ABSTRACT

The possibility of ilmenite ores beneficiation from the Ha Tinh deposit (Vietnam) by electrostatic and electromagnetic separation methods was carried out. The ilmenite concentrates obtained as a result of beneficiation can be used for further processing to obtain pigment titanium dioxide or titanium metal in a compact or in powder form. The beneficiation processes of ilmenite ores from Vietnam deposits have not been studied enough, therefore, for their beneficiation, the most widely used in industrial practice methods of electrostatic and electromagnetic separation were used, which provide the required results in the ores beneficiation of complex composition, in which the main components is contained both in ilmenite and rutile. It is shown that in order to obtain ilmenite concentrates with a high concentration and beneficiation degree of titanium, electrostatic separation must be carried out at a voltage of 25-30 kV between the separator electrodes. In this case, the main components that make up the original ilmenite ore (titanium and iron) are distributed in the first cells of the separator, and the main impurities of the ilmenite concentrate – silicon, zirconium and aluminum – will be in the last cells. Under these conditions, impurities are separated from ilmenite and rutile. The separation of the beneficiated titanium-containing fraction into individual minerals must be carried out by electromagnetic separation methods. At a current strength of 11 A between the electrodes, ~67 % goes into a magnetic fraction and ~33 % of titanium will be in a non-magnetic product. In the magnetic fraction, the maximum value of η_{ilmenite} reaches ~85 %; therefore, magnetic separation is an effective method for beneficiating ilmenite. As a result, an ilmenite concentrate is obtained with a titanium dioxide concentration of at least 50 % and a beneficiation degree of 49 %. Such a concentrate can later be used in the process of chemical processing to obtain titanium and its various compounds.

KEYWORDS: Beneficiation Degree, Electrostatic and Electromagnetic Separation, Ilmenite Ores, Magnetic Properties, Magnetic and Non-Magnetic Fractions

Article History

Received: 17 Jan 2022 | Revised: 20 Jan 2022 | Accepted: 24 Jan 2022
