Mineralogical studies of apatites of Gara-aghaj deposit from mineral processing viewpoint

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Abstract: Gara-aghaaj deposit located 36km northwest of urumieh is one of the titanium-phosphorous resources in Iran. The previous exploration studies indicated that there is 102Mt phosphorous ore deposit with average grading of 2.3% P₂O₅. In this research, the mineralogical studies of collected representative samples were performed by XRD, XRF, optical microscopy and SEM equipped by EDX. These studies indicated that ilmenite, magnetite and apatite are the main valuable minerals. The gangue minerals consist of the silicate minerals such as pyroxene, olivine, plagioclase and some secondary minerals. Analysis of apatite by EDX showed the presence of fluor-apatite in the ore. From textural viewpoint, apatites is mainly interlocked with ilmenite, magnetite and some gangue minerals with 60 microns liberation degree but there are some inclusions of apatite inside ilmenite and magnetite. The heavy liquid separation tests indicated that the first type of apatites, with density of 3, is mainly concentrated in tailing of gravity separation methods. This type of apatites is recoverable by flotation method. So, apatite concentrate can be obtained as a by-product of ilmenite concentration process by gravity methods.

Key words: phosphate; titanium; apatite; ilmenite; flotation.