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INVESTIGATING OPPORTUNITIES FOR COMPLEX USE OF WASTES IN DASHKASAN FIELD

Abstract:

Many mining companies operating in Azerbaijan produce different types of waste. In some of these facilities, the waste is still not protected. These wastes are formed by opening rocks, side rocks accompanying ore masses, ore masses and enrichment factories waste. The research shows that most of the wastes emerge in facilities can be regarded as mineral raw materials and have the potential to be used in other industries.

Keywords: Azerbaijan, iron ore, waste, complex use, mineral row materials, enrichment

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ИСПОЛЬЗОВАНИЕ ВОЗМОЖНОСТЕЙ ДЛЯ КОМПЛЕКСНОГО ИСПОЛЬЗОВАНИЯ ОТХОДОВ ДАШКЕСАНСКОГО МЕСТОРОЖДЕНИЯ

Аннотация:

Многие горнодобывающие компании, работающие в Азербайджане, производят различные виды отходов. На некоторых из этих объектов отходы все еще не защищены. Эти отходы состоят из вскрышных пород, вмещающих пород на контакте с рудным телом, некондиционной горной массы и отходов обогащения. Исследования показывают, что большинство отходов, производимых предприятиями, могут рассматриваться как минеральное сырье и могут использоваться в других отраслях.

Ключевые слова: Азербайджан, железная руда, отходы, комплексное использование, минеральное сырье, обогащение

Introduction

Azerbaijan's iron ore deposits are mainly located in the Dashkasan ore region (Dashkasan, South Dashkasan and Demirvar). These deposits have long played a key role in the mineral resource base of our country. In the former USSR, Azerbaijani Ore dressing enterprise operated on the basis of these deposits, and the obtained iron concentrate was sent there to meet the needs of Rustavi Metallurgical enterprise of the Georgian Refinery [1].

The Azerbaijani Ore dressing enterprise is an iron ore deposit, which plays an important role among mining companies in our country. During the operation of the plant at its full capacity, three types of wastes were included in the factory landfill:

1) opening rocks and loose rocks at ore removal,
2) blast-furnace wastes caused by enrichment,
3) agglomeration wastes resulting from the enrichment of iron ore concentrate.

The volume of waste in the landfill was up to 9,240,000 tons per year. The size of agglomeration wastes is less than 0.2 mm during the enrichment process at the Dashkasan enrichment plant. The mineral content is composed of granite, quartz, iron hydroxide, sulfide and carbonate minerals. The amount of iron in the waste varies from 12.8 to 18% [2, 3, 4 p.2].

The volume of agglomerated waste collected in the landfill is greater than that of the waste. About 35% of the ore processed in the refinery is converted to agglomeration waste.

Aims. More than ten million tons of blast-furnace wastes generated in the factory landfill during the ore enrichment process from the Dashkasan iron ore deposit. It contains 12 to 20% iron, including cobalt, copper and zinc components. It is known that obtaining metal from technogenic fields is much cheaper than obtaining metal from natural deposits [5-10,

p.3]. That is why the cost of capital invested in the implementation of the appropriate technology-based method will pay off in a short period of time.

Materials and methods

Both blast-furnace and agglomeration wastes occurring in the mine are considered to be complex raw materials for the production of high-grade concrete, for the construction and repair of highways, as well as for obtaining iron, cobalt, copper and zinc. Therefore, recycled waste after the extraction of iron and non-ferrous metals can be used in the manufacture of building bricks, silicate bricks and other ceramic products. However, more recent technological and semi-industrial tests should be conducted to address the problem.

The ore from two quarries is being processed at the mine enrichment plant. More than 70% of the ore processed here is removed from the North West. About 75% of the ore extracted from that area is rich and about 25% is poor. At the refinery there are two different types of products: blast-furnace concentrate of 28-12 mm granularity and agglomeration concentrate of 0.2 mm. Before enrichment, the ore needs to be grained in three stages. The finely grained ore is transferred to a two-drum separator and blast-furnace concentrate is obtained with more than 50% iron content by means of dry enrichment.

Blast-furnace iron ore of 12-18 mm is collected in the landfill near the waste site. This blast-furnace consists of tuffs, scarned hornstones, granite scarns, quartz-magnetite ores (table. 1)

The size of blast-furnace emissions during iron ore processing at Dashkasan enrichment plant is -28 + 12mm. They contain horns, grenades, quartz-magnetite, epidotite-magnetite, magnetite-grenades, and grenade-magnetite scarns. These wastes are very similar to the surrounding rocks in the deposit on their mineral-petrographic composition and physical and mechanical properties, and in some cases they are analogical.

The material content of waste generated at the Dashkasan enrichment plant was determined by means of two trials. The first trial was carried out using a magnet separation method of -28 +12 mm of the enrichment plant, and the second one was taken from agglomeration waste of -1.6 +0 mm. The useful components of iron, cobalt and copper were found in the trials.

Table 1

Directions for waste utilization in the Dashkasan field

Waste		Waste characteristics	Areas of waste utilization
Wastes genertd by ore extraction (opening rocks)	North-East quarry	Scarned horn stones of various sizes, grenade scarns without ore, scarned porphyrites, hor- ned limestones, hematitized tuffs, diabase porphyrites, tuffs, tuff sandstones	In gravel production: 1) As a filler for high-grade heavy concrete 2) Construction and repair of roads 3) For ballast layer in the construction of railways 4) As concrete filler for reinforced concrete and concrete pipes
	North-Western quarry		
Fluctuations that occur during ore enrichment	Blast–furnace waste	Different scarns of 12-28 mm size, casade imagnetites, hema tized rock fragments	1) As a complex raw material for obtaining iron, cobalt, copper and zinc 2) For the production of building materials before and after the extraction of complex metals 3) To obtain building bricks and other ceramic products 4) To prepare artificial porous fillers for wall silicate products
	Agglomerate waste	Grenade, carbonate, magnetite, sulfide minerals and porphyrite granules of 0.2 mm in size	

In these two trials, there are cobalt (represented by cobalt mineral), copper and zinc of industrial importance. Iron, in turn, is represented by magnetite and hematite. Gold was not detected in these trials. Research has revealed the prospects for the extraction of rare and non-ferrous metals in the waste and by the magnetic separation of iron.

They are represented by cobalt-cobaltine, copper-chalcopyrite, zinc-sphalerite and they are associated with pyrite. Iron is mainly represented by magnetite. The capacity of cobalt, copper and ore has been determined as a percentage of sulfur content in waste. Therefore, in the enrichment of wastes, it is advisable that at first all the flotation activities should be transferred to the collective concentrate, followed by the purification of black concentrate and cobalt concentrate.

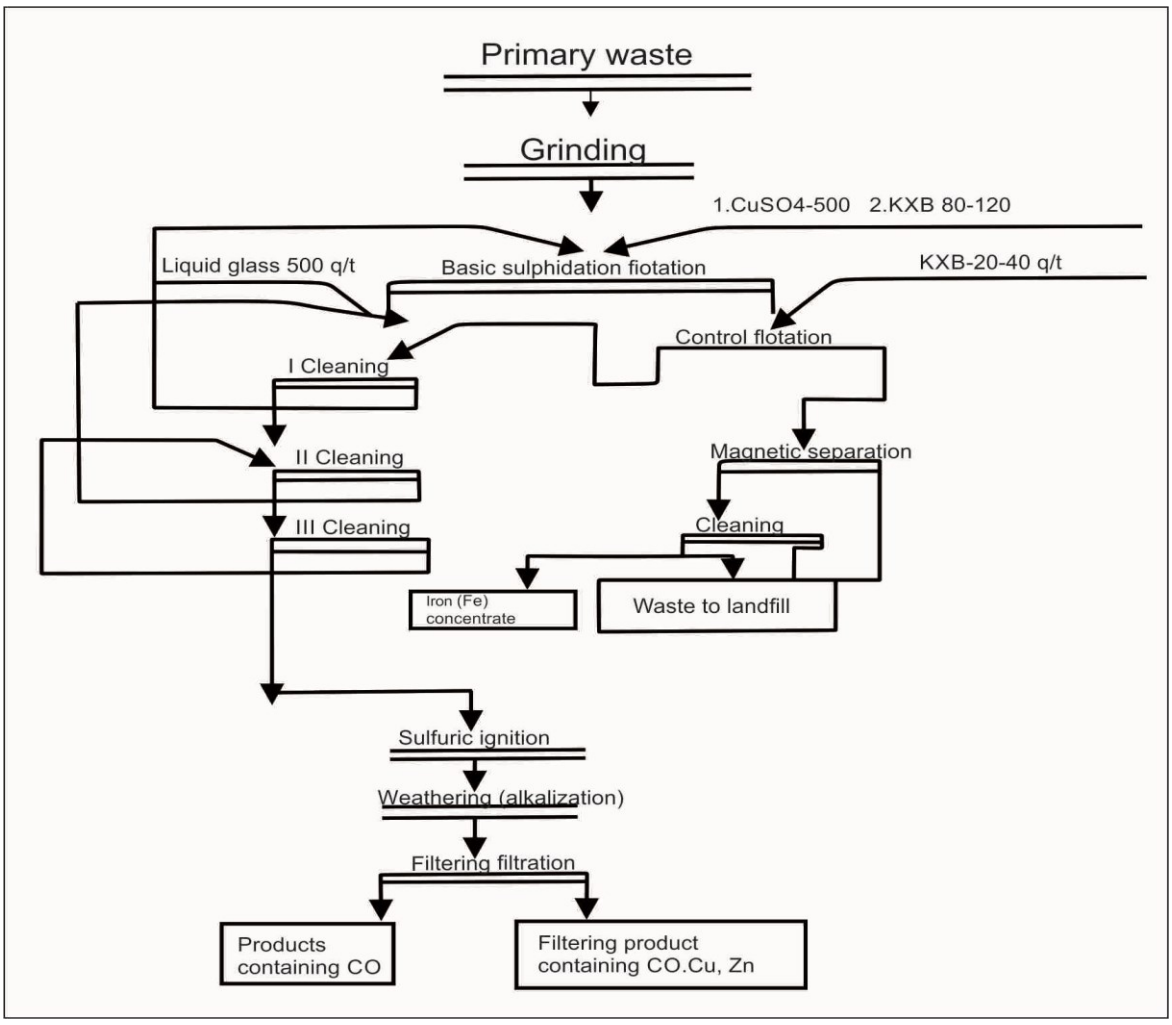

Figure 1. Dashkasan enrichment plant waste treatment scheme

Conclusion

Based on the studies conducted, the following conclusions were drown:

- blast-furnace wastes of the Dashkasan enrichment plant can be used as a bulk filler (gravel) for construction and repair of road and construction works.

- when concrete of 250-300 kg/cm^2 stability is removed from these wastes, the resulting concrete is highly waterproof and frost-resistant. Due to these properties, this concrete can be used for the construction of hydrotechnical installations.

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