METHODS OF MINING AND PROCESSING MINERAL RESOURCES

Abdirazakov Akmal Ibragimovich
Associate Professor, Karshi State Technical University,
Karshi city, Republic of Uzbekistan
E-mail: akmal/abdirazakov@bk.ru

Introduction

Minerals are solid, liquid and gaseous substances extracted from the earth's interior for human use . Solid minerals, in turn, are divided into combustible (peat, shale, coal) and non-combustible, which are: agronomic (apatite and phosphorite), non-metallic (quartz, barite, etc.) and metallic (ores of ferrous and non-ferrous metals).

Beneficiation of minerals is a set of processes of mechanical processing of mineral raw materials with the purpose of extracting valuable components and removing waste rock and harmful impurities that are of no practical value in the given technical and economic conditions. As a result of beneficiation, a concentrate is obtained from the ore, the quality of which is higher than the quality of the ore.

Main part

Methods of mineral extraction and their comparative efficiency.

The production of final products in industry is a complex process, which is determined by the type of raw materials, the conditions of their processing and other circumstances. In different branches of industry it has its own specifics. However, regardless of this, it can be presented in general terms in the form of the following diagram (Fig. 1).

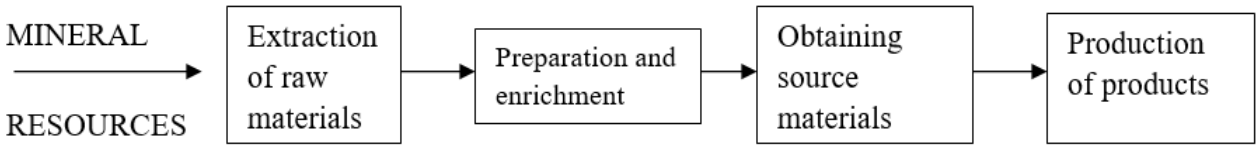

Fig. 1. General scheme of the production process in industry

Therefore, minerals constitute the primary , basic foundation of industrial production. In order to obtain the final product, natural resources must be extracted from the depths to the surface. This primary stage of industrial production is called extraction.

The wide development of open-pit mining is restrained by a number of circumstances. Firstly, the developments are more dependent on natural conditions (climatic, mining and geological, etc.). It is enough to note that the extraction of minerals in this way, especially at the current level of development of scientific and technological progress, is limited to depths of up to 500 m. Secondly, the significant

impact on the environment, which can be so negative that it makes the environmental factor the main one in determining the methods of raw material extraction. However, the current level of development of scientific and technological progress makes it possible to reduce the impact of these circumstances on the development of resources by open-pit mining.

Open-pit mining is used to extract all raw materials for the production of building materials, most of the iron, chromium, and copper ores, a significant proportion of manganese, shale, coal, and other minerals.

The production process of open-pit mining is much simpler than that of underground resource development. It consists of preparatory, stripping and cleaning operations.

During the development process, each layer takes the form of a ledge, a step. Its end part is called a face.

Hard rock is first destroyed by blasting and then moved mechanically. The excavated rock is transported to waste dumps – specially designated areas that can be located either in the mined-out space (internal waste dumps) or outside it (external waste dumps).

Enterprises that represent a set of mine workings and equipment for open-pit mining are called quarries, and in the coal industry – open- pit mines.

To assess the efficiency of open-pit mining, the stripping ratio is used, which represents the ratio of the volume of waste rock to the amount of extracted mineral .

Underground leaching is used for the development of uranium ores, salts, and non-ferrous metal ores. Underground leaching is based on the properties of ores to dissolve in water and acids. With this method, the deposit is opened by wells equipped with a concentric arrangement of pipes according to the pipe-in-pipe scheme .

Underground leaching is a more economical and environmentally friendly process. The use of special solvents allows extracting only the useful component, and leaving all other substances , which can make up more than 9/10 of the rock mass, in the subsoil. As a result, less waste is formed on the surface.

Enrichment of raw materials and fuel is the initial stage of their processing. It is carried out in cases where it is impossible or economically inexpedient to obtain the required product directly from the raw material. Almost all non-ferrous metal ores, non-metallic raw materials of the chemical industry, the majority of iron ores, and about half of coal are subject to enrichment. Its essence lies in separating the useful component from waste rock, harmful impurities, or in separating the useful substances of the raw material in order to increase their content.

The peculiarity of enrichment of solid minerals consists in preliminary preparation of raw materials. The essence of this stage is crushing and sorting of raw materials with the purpose of the most complete disclosure of useful substance from

waste rock.

The enrichment of raw materials is based on the use of various physical and chemical properties of the constituent components of the rock : specific gravity, size and shape of rock particles, friction coefficient, color, magnetic properties, etc. The variety of properties of minerals determines various enrichment methods .

The above enrichment methods are of secondary importance. The main methods are flotation, gravity separation of ore, electromagnetic and electrostatic separation.

CONCLUSION

The technical and economic specifics of enrichment are characterized by a significant consumption of ore per unit of concentrate due to the low content of useful substances in the raw materials. This determines the high material intensity of production. Transporting unenriched rock over a significant distance is also unprofitable, which requires additional costs. Concentrate, as a product with a high content of useful substances, is more profitable to transport than ore. Therefore, mining and processing plants, or mining and processing plants - this is the name of the enterprises where ore is enriched, are located in areas where minerals are mined.

List of references:

1. V. V. Nekrish . Extraction and enrichment of minerals. - Belarus Publishing house "Geography"

2. V.B.Kuskov, M.V.Nikitin . Enrichment and processing of minerals: Textbook . p special St. Petersburg Mining Institute (Technical University). St. Petersburg, 2002. 84 p .

3.A.A.Abramov. Processing, enrichment and complex use of solid minerals: textbook : - M.: MSTU, 2004. - 2 volumes

4, I.A. Morozov. Beneficiation of minerals: a textbook – Perm : Publishing house of Perm National Research Polytechnic University , 2019. – 271 p .

5, V.M. Avdokhinyu Fundamentals of mineral processing . in cheb. for universities: - M.: Publishing house of Moscow State University of the Humanities, 2006. - 417 p .