International Journal of Geology, Earth & Environmental Sciences ISSN: 2277-2081
An Open Access, Online International Journal Available at http://www.cibtech.org/jgee.htm
2023 Vol. 13, pp. 330-334/Samandarova
Research Article

MINERALOGICAL AND TECHNOLOGICAL FEATURES OF GOLD ORES OF THE SARYJOY AREA (BUKANTAU MOUNTAINS, CENTRAL KYZYLKUM)

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ABSTRACT
To determine the mineralogical composition and technological properties of the ores, the ores of the Saryjoy gold ore area in the Bukantau Mountains were studied, and the main productive parageneses of minerals and the main minerals of the ores were identified.

Keywords: *Central Kyzylkum, Saryjoy Area, Gold Mineralization, Oxidized and Sulfide Ores, Gravity-Flotation Enrichment, Mineralogical Composition*

INTRODUCTION
Currently, in geological research, the study of the material composition of various types of minerals, including gold deposits, is particularly important since these studies are mandatory tasks when conducting geological surveys. Moreover, the introduction of innovative technologies and modern methods of mineral processing in this area has made it possible, along with the main components, to separate the accompanying elements, which contributes to a more efficient use of minerals (Garkovets *et al.*, 1979).

MATERIALS AND METHODS
During the research, a gravity table was used to extract the enriched concentrate, an "XFD Single-Chamber Flotation Machine" was used to determine the content of heavy minerals during flotation enrichment to separate the resulting material into monofractions, the composition of ore minerals was studied using an optical microscope "Nikon ECLIPSE LV100N POL", and analytical studies (atomic absorption analysis) were also carried out to determine the chemical composition of the samples.

The studied Sarijoy prospect area is part of the South Bukantau structural-formational zone, the folded foundation of which is composed of Precambrian and Poleozoic formations overlain by a platform cover of Meso-Cenozoic sediments (Bazarbaev 1971; Karabaev, 2012).

To study the composition of primary and oxidized samples of gold ores from the Saryjoy area and determine their technological properties, control tests were carried out to enrich samples weighing 3 kg with a particle size of 0.5 mm in a concentration table and in a centrifugal concentrator (Fig. 1a). At the same time, gravity concentrate (168 g/t), intermediate products (1541 g/t) and tailings (1041 g/t) were added to the primary ores. In the oxidized samples, 483 g of tail, 1946 g of intermediate product and 148 g of gravity concentrate were isolated. The primary ore samples contain the following elements: 0.1 g/t gold and 1.94 g/t silver. Gold and silver were more common in the oxidized samples than in the primary samples, with average amounts of 3.79 g/t gold and 46.78 g/t silver, respectively. Control experiments were also carried out on the sample enrichment using the flotation method. The enrichment flotation scheme includes one main and two control flotation processes (Fig. 1b). The traditional flotation reagents used were soda ash as a medium, copper sulfate as an activator, potassium butyl xanthate (PBX) as a collector, spindle oil as an apolar collector, and the T-92 reagent as a foaming agent (Abramov, 2004).

RESULTS AND DISCUSSION

As a result of this research, the minerals that make up the ores were divided into two types: hypogene and supergene. The main ore minerals of the hypogenic minerals are native gold and silver, kustelite, argentite, pyrite, pyrrhotite, arsenopyrite, sternbergite, chalcopyrite, chalcocite, coveline, sphalerite, galena and febore; the main nonmetallic minerals are quartz, plagioclase, sericite, chlorite and carbonates.

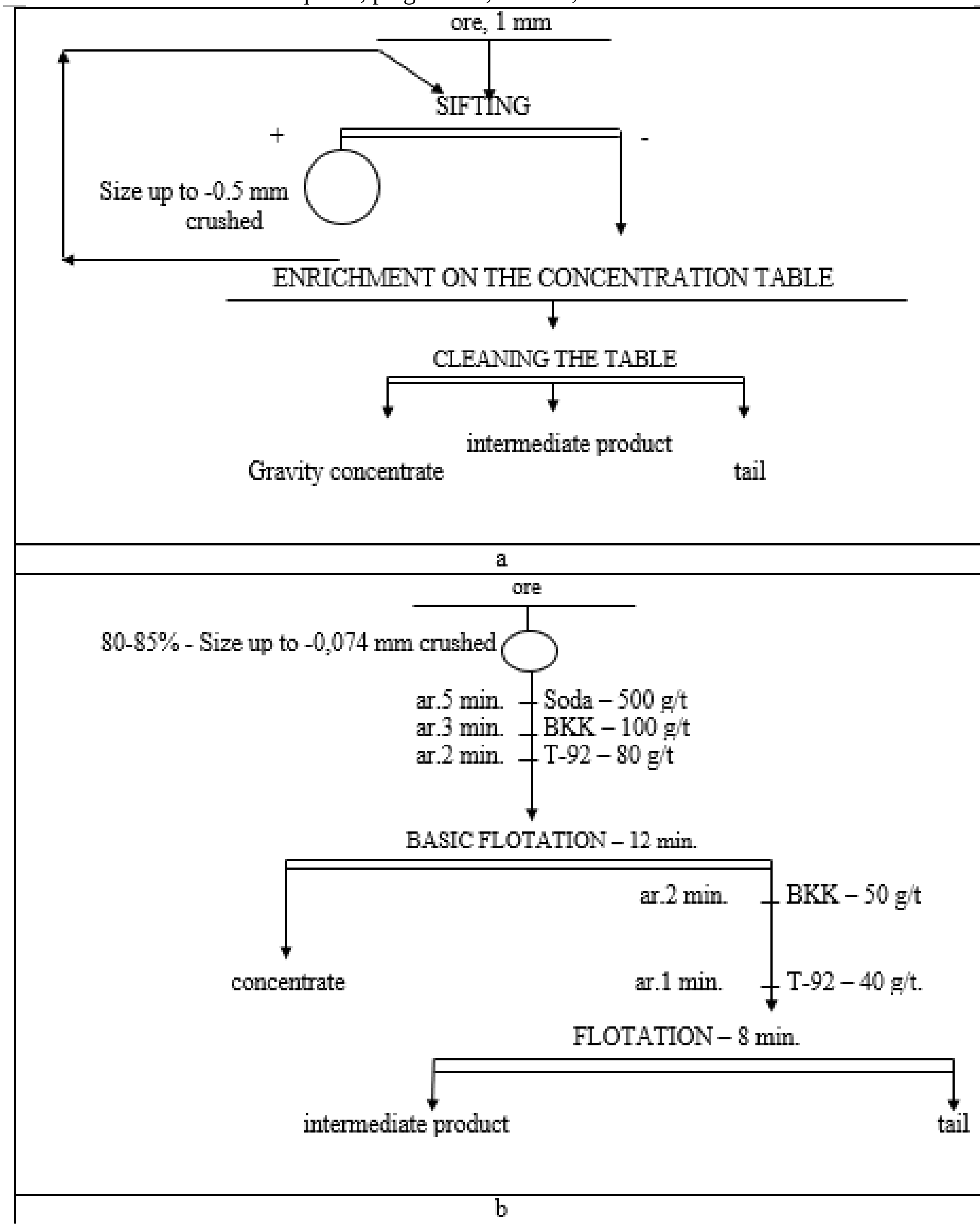


Figure 1. Schematics of gravity (a) and flotation (b) ore enrichment

Small dispersed particles of native gold and silver components were found in almost all the samples enriched on a gravity table and during flotation, and the fineness of native gold in the enrichments was observed in three different groups: high, medium-high and relatively low. Of these, the qualitative indicator of gold in high- and medium-high-fineness ores is somewhat more widespread. The shapes of the gold grains are short, prismatic, oval, veined, needle-shaped, figured and irregular (Fig. 2). The sizes ranged from 0.0013 mm to 0.0052 mm. Native silver is also found in round, veined and figured forms—sizes from 0.001 mm to 0.02 mm. Based on the results of atomic absorption analysis, it was established that the amount of gold and silver in primary samples is greater than that in flotation enrichment products; i.e., in the gravity concentrate, 0.76 g/t of gold is used, 14.91 g/t of silver is used, 0.66 g/t of gold is used, and 9.59 g/t of silver is used (Fig. 3).

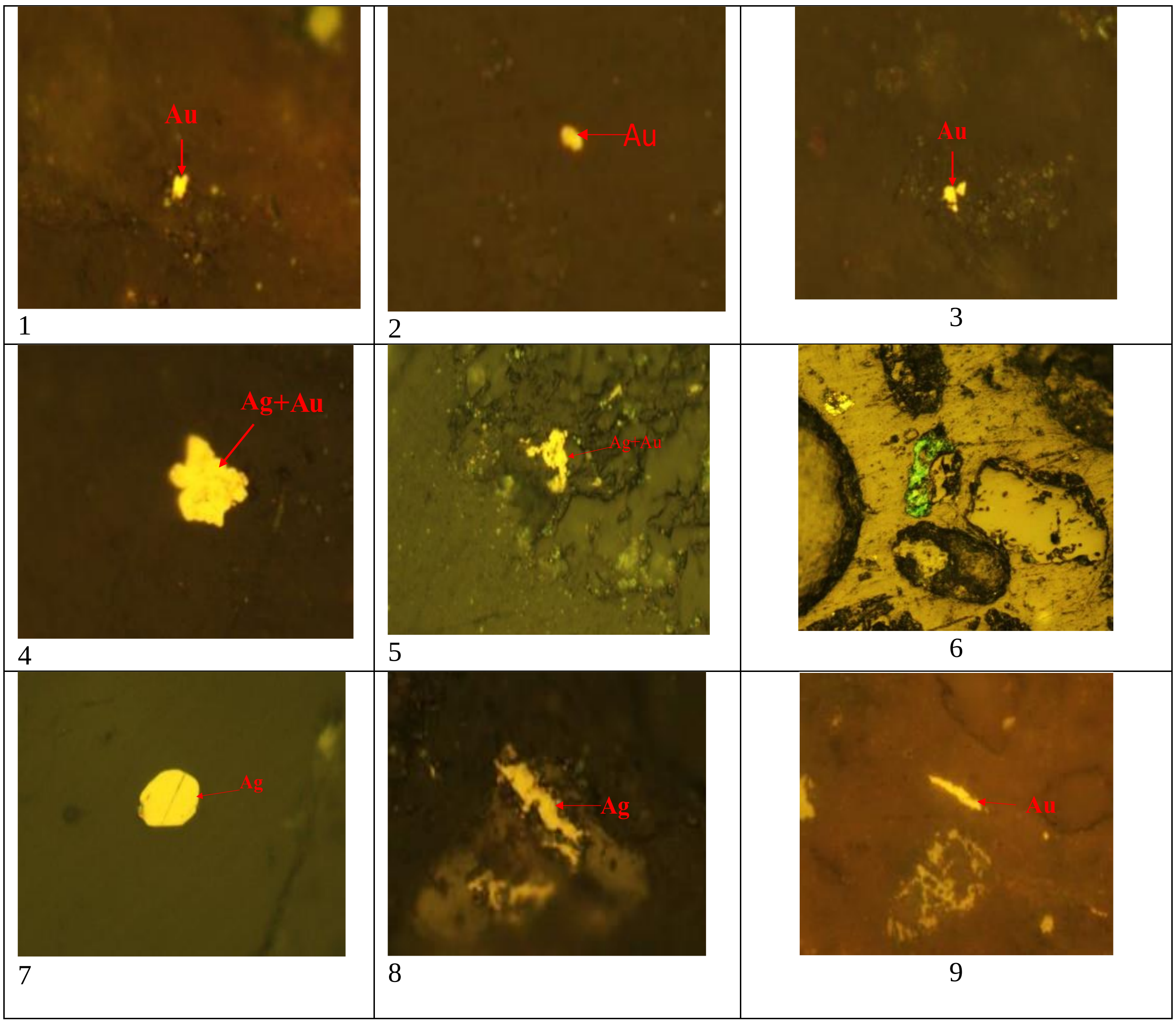
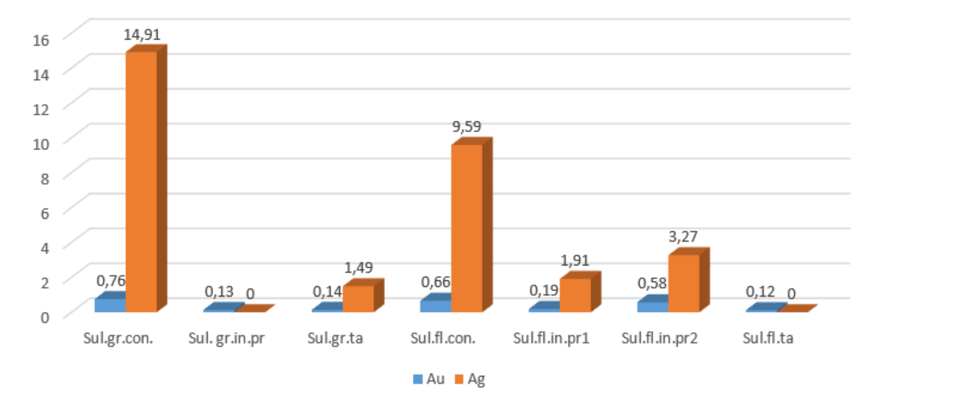
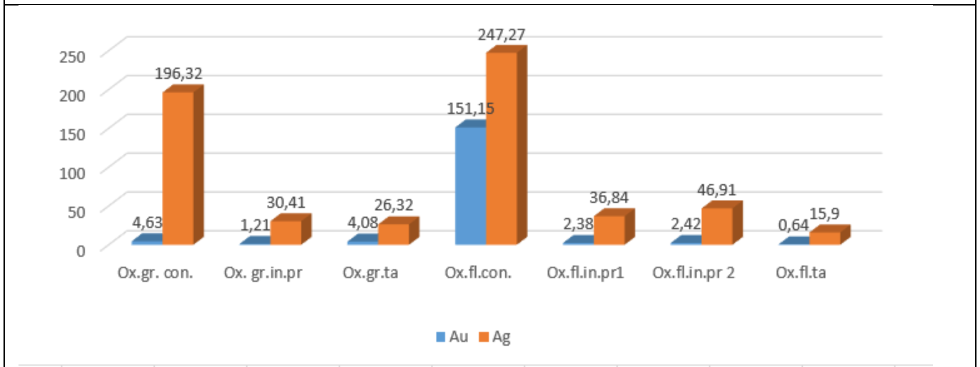


Figure 2. Morphology of the separations of native gold (1, 2, 3) and the xyutelite mineral (4) from tailings of oxidized ore enrichment; kustelite (5) and chalcocite (6) from an intermediate product of sulfide ore enrichment; native silver (7-8) from tailings of flotation enrichment of sulfide ores; native gold from flotation tailings of oxidized ores.



a



b

Figure 3. Results of atomic adsorption analysis of primary samples from the Saryjoy area: a - primary ores; b – oxidized ores

In oxidized ores, the flotation enrichment results are slightly greater than those of gravity enrichment products. For example, 4.64 g/t gold and 151.15 g/t silver were found in the gravity concentrate, and 196.32 g/t gold and 247.27 g/t silver were found in the flotation concentrate. As a result of the paragenetic analysis of minerals, i.e., analysis of the features of their joint occurrence and quantitative distribution, productive parageneses were identified that are highly important for the formation of ores in the Saryjoy area: gold-silver-quartz-pyrite-chalcopyrite and silver-gold-quartz-pyrite-arsenopyrite.

In the ore zones of the deposit, supergene minerals are represented by copper oxides, iron oxides and hydroxides, of which cuprite, goethite, hydro goethite and jarosite are common. When dividing the graviconcentrate enrichment of oxidized samples into mono-fractions, needle-shaped crystals of pure gold aggregates were formed in the crevices of iron oxides and hydroxides, and grains of silver were also released; sometimes, gold was observed in the crystal lattices of silver.

The main ore-forming minerals of the primary samples are pyrite and arsenopyrite, which are predominantly euhedral and hypidiomorphic in rare cases of xenomorphic structures.

Pyrite is the most common mineral among ore formations. Along the edge of the polished section, pyrite disseminated, as did the quartz veins. The mineral often forms veins, nests and heaps in association with arsenopyrite and chalcopyrite. Such phenomena are especially characteristic of contact areas between vein quartz and host rocks. The pyrite grains are cubic, pentagondodecahedral and less often oval, ranging in size from 0.02 mm to 0.5 mm. The plant has intergrown with arsenopyrite. The boundaries of the intergrowths are smooth and sometimes sinuous. The pyrite is slightly cataclastic. The cataclastic cracks are healed by later ore and nonore minerals. Chalcopyrite and sphalerite sometimes border the edges of minerals.

CONCLUSION

The ore zones of the Saryjoy area in the Bukantau Mountains are represented by intensely metasomatically altered, silicified and sulfidized volcanic-terrigenous rocks composed of gold-silver-quartz-pyrite-chalcopyrite and silver-gold-quartz-pyrite-arsenopyrite productive associations. Native gold from oxidized ores has a high fineness and contains iron; particles of native gold from primary ores have a lower fineness and contain silver. The main ore minerals are kustelite, argentite, pyrite, pyrrhotite, arsenopyrite, sternbergite, chalcopyrite, chalcocite, covellite, sphalerite, galena and fossils.

REFERENCES

Abramov AA (2004). Processing, enrichment and integrated use of solid minerals. Volume II. Mineral processing technology. M.

Bazarbaev ER (1971). Tectonics of pre-Mesozoic formations of Bukantau (Central Kyzylkum)” dissertation Tashkent.

Karabaev MS (2012). Study of organic matter of sedimentary-metamorphogenic rocks of Eastern Bukantau (Central Kyzylkum)//Vestnik NUUz. Tashkent, Publishing house "University". 2/1. 46-48.

Garkovets VG, Mushkin IV, Titova AP and others (1979). Main features of the metallogeny of Uzbekistan. Tel: FAN. 272.