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CHEMICAL CLASSIFICATION OF MAIN VOLCANOGENIC ROCKS IN BERKUTTAU, DUSHEBULOK AND SHEIKHDJEYLI AREAS OF NORTH SULTANUVAYS MOUNTAIN

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ABSTRACT

This article discusses the main vukanogenic rocks found in the Berkuttau, Dushebulak and Sheikhdjeyli sections of the northern Sultanuvays Mountain, and their practical significance. In addition, the requirements of the companies SATBIC (CSR) and Georgia 137-84 for the production of continuous basalt fiber and the chemical composition of basaltoids in Berkuttau, Dushebulak and Sheikhdjeyli, SATBIC (CSR) and Georgia 137-84 to what extent they meet the requirements of the companies.

Keywords: *Basaltoid, SATBIC (CSR), raw materials, paraamphybolites, Sultanuzdag, suite, quality, porphyry, chemical analysis.*

ХИМИЧЕСКАЯ КЛАССИФИКАЦИЯ ОСНОВНЫХ ВУЛКАНОГЕННЫХ ПОРОД БЕРКУТТАУСКОГО, ДУШЕБУЛОКСКОГО И ШЕЙХДЖЕЙЛИСКОГО РАЙОНОВ СЕВЕРНОГО СУЛТАНУВАЙСКОГО ГОРА

АННОТАЦИЯ

В данной статье рассматриваются основные вуканогенные породы, обнаруженные в участках Беркуттау, Душебулак и Шейхджейли северной части горы Султанувайс, и их практическое значение. Кроме того, требования компаний САТБИК (КНР) и Грузия 137-84 на производство непрерывного базальтового волокна и химический состав базальтоидов в Беркуттау, Душебулак и Шейхджейли, САТБИК (КНР) и Грузия 137-84 насколько они соответствуют требованиям компаний.

Ключевые слова: *Базальтоид, САТБИК (КНР), сырье, параамфиболиты, Султануздаг, свита, качество, порфирит, химический анализ.*

ШИМОЛИЙ СУЛТОНУВАЙС ТОГИНИНГ БЕРКУТТАУ, ДУШЕБУЛОК ВА ШЕЙХДЖЕЙЛИ УЧАСТКАЛАРИДАГИ АСОС ВУЛКАНОГЕН ЖИНСЛАРИНИНГ КИМЁВИЙ ТАСНИФИ

АННОТАЦИЯ

Ушбу мақолада шимолий Султонувайс тоғидаги Беркуттау, Душебулоқ ва Шейхджейли участкаларида учрайдиган асос вуканоген жинслар, уларнинг амалий ахамияти келтириб утилган. Бундан ташкари SATBIC (ХХР) ва Грузия 137-84 компанияларининг узлуксиз базальт толаси ишлаб чикаришдаги талаблири ва Беркуттау, Душебулок ва Шейхджейли участкаларидаги базальтоидларнинг кимёвий таркиби келтириб утилди, ушбу курсатгичлар SATBIC (ХХР) ва Грузия 137-84 компанияларининг талабларига кай даражада мос келиши солиштирилди.

Калит сўзлар: *Базальтоид, SATBIC (ХХР), хомашё, параамфиболитлар, Султануздаг, свита, сифат, порфирит, Кимёвий таҳлил.*

INTRODUCTION

At present, more and more attention is being paid to the issues of saving metal and replacing it in a number of industries with less scarce and more resistant materials. Saving metal provides for the widespread introduction of its substitutes into production. One of its substitutes is stone casting, from which more than 800 types of wear-resistant and acid-resistant industrial products are made.

In addition, stone casting products practically resist the effects of all acids, alkalis and salts and replace such protective materials as iron, lead, other non-ferrous metals and their alloys.

Recently, the demand for CBF (continuous basalt fiber) has increased dramatically.

Basalt fibers are distinguished by unique technological properties, the use of which only in the construction industry gives a huge economic effect. The service life of basalt-plastic pipes is approaching a century, i.e. an order of magnitude more steel pipes. The use of 1 kg of basalt plastic reinforcement allows saving 9 kg of steel. In the future, it is planned to use basalt fiber as a substitute for asbestos in all industries and construction.

According to the data of the former Gossnab, up to 200 tons of basalt fiber were imported to Uzbekistan in the 1990s, in addition, 450-500 thousand m^3 of mineral wool were consumed.

The quality of basaltoids, according to the results of analyzes obtained from the laboratories of the State Committee of Geology, was evaluated in accordance with the specifications: Georgian firm 137-84, Ukrainian firm - 410-86 - Raw materials from rocks for the production of staple superthin fibers, the requirements of SATBIC (CSR) "Raw materials for the production of continuous fiber".

According to the Ukrainian laboratory, 1990, the industry requirements for basalt raw materials for the production of fibers are as follows:

- raw materials must be fusible, homogeneous in terms of structure and texture;
- stable in material composition;
- practically does not contain silica minerals, iron-containing and magnesian minerals, as well as minerals rich in phosphorus and sulfur.

Analysis of the quality of the tested raw materials showed:

- the best are aphyric weakly crystallized basalts with basic plagioclase (albitization is excluded);
- hydrothermally altered rocks are not suitable as raw materials (quartz, carbonates are not allowed, because the presence of free quartz slows down the melting process, and carbonates, as well as secondary chlorite, epidote, cause strong gas release during fiber production;
- the content of MgO should not exceed 7.5%, because its increase worsens the crystallization properties of the melt due to the increase in the upper limit of crystallization;
- high losses on ignition are not allowed, i.e. the rock must be relatively fresh,

this affects the rate of its melting.

For the first time, a group led by A.A. Popovich, 1964 At the occurrence of amphibolites Sultanuizdag, 8.5 km north of the village of Saxonbir, on an area of 60.0 km^2. amphibolites formed as a result of metamorphism of basic effusive rocks, and orthoamphibolites formed from metamorphosed gabbro were studied. As petrurgical raw materials, paraamphibolites developed by effusives were recommended; in terms of the chemical composition of raw materials and casting, they are close to basaltoids and metagabbro. In paraamphibolites after tuffs of medium-basic composition, an increased content of CaO was found - more than 13%.

DISCUSSION AND RESULTS

The results of technological tests of paraamphibolites showed their suitability in all respects for stone casting, and without charging additives. Metagabbro, due to the low mechanical strength of stone castings, turned out to be unsuitable for this production.

Paraamphibolites of the Sultanuzdag ore occurrence with an area of 10 km^2 are available for open mining, their predicted resources at a depth of 20 m are 200 million m^3.

Later, basaltoid rocks as a raw material for the production of composite materials (super-thin, continuous and staple fibers and basalt plastics) were studied in the western part of the Sultanuvais Mountains (V.K. Sotiriadi et al., 1990). Three outcrops of volcanogenic formations, isolated from each other, were searched, on each of them diabase bodies 35x70 in size were found; 3.0x0.3 km; 32.0x0.5 km. According to the results of chemical analyzes, the authors considered a promising area of 3.0x0.3 km, located in the NE part of the Sultanuvais Mountains. However, judging by the composition of the rocks, along with basaltoids, ultramafic rocks were also sampled, as well as pyroclastolites saturated with carbonate matter and altered (silicified and sulfidized) rocks. The laboratory-technological sample was also taken incorrectly, which was studied at the Research Institute of Biomedical Medicine of the Ukraina. As a result, conclusions were drawn about the unsuitability of Sultanuvais diabases for fiber production and the inexpediency of further work on the Sultanuvais site.

In the last decade, the basalt raw materials of the Sultanuvais mountains were studied by R.A. Khamidov and others (journal. Geology and mineral resources, №6, 2002). Based on the results of his research, paraamphibolites of the Karakuduk Formation (metabasalts and metabasaltic porphyrites) developed in the Aschenyntau tract (samples №. 709,731,740a,740b, s-882) are recommended as petrurgical raw

materials. In all respects, they meet the technical requirements of the industry (Khodzhaev N.T. et al., 2011).

When studying the databank on the chemical composition of basalts, basaltic andesites, andesites and their tuffs developed in the Sultanuvais mountains, the authors of the project identified and recommended the Duschebulakskaya area, as well as the Sheikhdzheili and Berkuttau areas for exploration for petrurgical raw materials.

All three areas: Sheikhdzheylinskaya (5.3 km^2), Duschebulakskaya (11.7 km^2) and Berkuttauskaya (1.6 km^2), in total 18.6 km^2, are located within the outcrops of Paleozoic volcanic rocks of the basalt-andesite-dacite-rhyolite association. Basalts and basaltic andesites of the productive strata in effusive, subvolcanic, and pyroclastic facies form the earliest underwater volcanic structures exposed in the lower sedimentary-volcanogenic section. Among volcanic rocks, lenses of marbled limestones are observed.

According to modern paleogeodynamic constructions (Savchuk et al., 1999), the Duschebulak and Berkuttau sites are included in the complex of carbonate-siliceous-volcanic D1 (?) formations: (Karakuduk - 800 m, Berkuttau - 500-650 m, Tebinbulak - 250-750 m suite).

The Karakuduk formation, according to T.S.Shayakubov and co-authors (1988), is composed of lavas of basalt, andesite-basalt and andesite composition (up to 80%), pyroclastites of basaltoids (no more than 5%), subvolcanic acid rocks (up to 15%) and quartzites up to 800 m thick. Z.A.Yudalevich et al. (1993) note that in terms of the amount of alkalis, the figurative points of rock compositions turned out to be enclosed in a lime-alkaline field, and in terms of potassium content - in a low-potassium one, i.e. a slightly increased total alkalinity of rocks is mainly provided by the sodium content in rocks. The titanicity of rocks varies from low (less than 0.5% TiO_2) to moderate (up to 1.5% TiO_2). It is characterized by increased magnesia (more than 6.0 and up to 17.0% MgO) and wide variations in alumina contents (from 11.5 to 21.5% Al_2O_3). Petrochemical data determine the boninite petrochemical trend of the formation, which is close to the volcanites of the young island arcs in terms of composition features (predominant development of basalts and andesite-basalts, increased magnesia and alumina content, moderate titanicity).

The Berkuttau formation is also included in this formation, developed in the north of the Sultan-Uwais mountains. In the north-eastern exits, A.A.Kulesh observed the following structure of the section (bottom-up):

1) almond-stone basalts with interlayers of diabases, tuff sandstones and gravelites - 250 m;

2) interlayer of dacites and basalts - 150 m;

3) interlayer of basalts and their tuffs, andesites and volcanomictic gravelites - 100 m.

According to S.S. Schultz, (1972), the section of the north-western exits is somewhat different. Andesites and their tuffs are common here, which are in interlayer with almond-stone diabases. The section is interspersed with interlayers of tufoconglomerates, tufogravelites, tuffites, limestones-siliceous and siliceous shales, lavobreccia, ash horizons with volcanic bombs and lapilli. Visible power - 650 m.

From the petrochemical features of the Berkuttau formation, Z.A.Yudalevich et al. (1993) note that this complex is extended in silicicity, continuous from basalts to rhyolites. This is a significantly calcareous-alkaline, low-titanium, low- and moderate-magnesium, high alumina series, which is characterized by a generally direct correlation of the sum of alkalis and potassium with SiO2 content and an inverse correlation with this component of MgO and TiO_2

The compositions of basalts, andesite-basalts and andesites, in terms of the total content of alkalis, sometimes deviate to subalkaline, and in terms of potassium content - to low-potassium (tholeiitic). These rocks are associated with siliceous, calcareous-siliceous sediments, clastic facies of volcanites, which indicates a complex volcanic relief of the accumulation area corresponding to the regime of modern encymatic island arcs, with their wide range of facies environments from deep-sea to coastal-marine.

The volcanogenic rocks of the Sheykhjeyli formation by T.Sh.Shayakubov, T.N.Alimov, V.A.Arapov et al. (1988) were attributed to the sodium basalt-rhyolite formation (Sheikhjeyli site). According to Z.A.Yudelevich et al. (1993), the diagrams with the participation of SiO_2 clearly show the continuity of the evolution of the composition of rocks from basalts to rhyolites, their calcareous-alkaline, low-potassium and low-titanium character. Basaltoid compositions are characterized by a reduced content of MgO, characteristic of basalt of the andesite formation type, the position of the figurative points of rock compositions on the Al_2O_3-FeO-MgO diagram also emphasizes their correspondence to the lime-alkaline series. According to Z.A.Yudalevich, the petrochemical features and submarine conditions of the formation of volcanites indicate their compliance with island-arc formations.

The quality of porphyrites was evaluated in accordance with: with technical specifications: Georgian firm 137-84 and SATBIC (CSR) "Raw materials for the

production of continuous fiber".

Comparative table of the results of chemical analysis of basalt rocks of the Berkuttau, Dushebulak, Sheykhjeyli site, suitable as raw materials from rocks for the production of continuous fiber (CBF).

Indicators %	Georgian 137-84	SATBIC (CSR)	Average values of oxides for all three sites		
			Berkuttau	Dushebulak	Sheykhjeyli
SiO_2	47,5-52,5	52,0-54,5	53,0	50,9	52,2
Al_2O_3	14,0-18,0	14,0-16,3	14,6	14,2	15,7
FeO	7,0-13,5	4,5-5,5	-	-	-
Fe_2O_3*		3,5-4,5	8,6	10,0	8,9
CaO	8,0-11,0	8,0-9,0	6,7	9,0	8,0
MgO	3,5-8,5	6,5-7,5	3,9	7,9	4,8
K_2O	2,5-6,0	0,7-1,6	1,7	0,5	1,0
Na_2O			3,9	3,1	2,3
TiO_2	0,2-2,0	1,3-1,6	0,7	0,9	0,9

* Note: the sum of FeO + Fe_2O_3 oxides is given for the Berkuttau, Duschebulak and Sheykhjeyli sections, the total amount of iron meets the requirements of the technical specifications of SATBIC (CSR).

The analysis of rock-forming oxides in samples from all three sites showed the following: the average silicon oxide contents in general for the Berkuttau and Sheykhjeyli sites correspond, and for the Duschebulak site as a whole do not meet the requirements of the technical specifications of the SATBIC (CSR). Therefore, when delineating the useful thickness of the Soulful section, only those intervals were taken into account, the contents of which, according to the results of chemical analysis, corresponded to the above requirements for all rock-forming elements.

Also, in general, the content of CaO = 6.7% and MgO = 3.9% is not enough for the requirements of the technical specifications of SATBIC (CSR) 8-9% and 6.5-7.5, respectively, 1.9% and 2.5% are not enough, which will require the addition of calcium oxide in the production of continuous basalt fiber (CBF), as well as additives magnesium oxides. But within the contoured blocks where the network was condensed, the contents met these requirements, which made it possible to count

them by category C_2.

The same is true for the Sheykhjeyli site with a magnesium oxide content of 4.8%.

Therefore, the delineation of useful strata in all areas was carried out taking into account the above, and in the calculation of reserves and forecast resources, only those intervals were taken that showed, according to chemical analysis, the required content of rock-forming oxides.

Chemical analyses were carried out in the State Enterprise "Central Laboratory", the laboratories of the State Enterprise "Central SGE and the State Enterprise "East Uzbekistan GDFE".

The material composition of the rocks for each site and the petrographic description are given in detail. The geological structure of the work area, which provides the results of chemical analysis of basaltoid rocks by sites, according to which the contours of useful strata are revealed within them, in accordance with the requirements of SATBIC (CSR) for the chemical composition of raw materials and for which the calculation of forecast resources for category P_1, and in them - promising blocks, with the calculation of geological stocks by category C_2.

Below are the results of a complete chemical analysis, obtained from the results of recalculations of chemical analyses for all three sites.

Table of average contents of rock-forming oxides according to chemical analysis data for three sites

Metal oxides	Berkuttau,%	Dushebulak, %	Sheykhjaili, %
SiO_2	53,0	50,9	52,2
AI_2O_3	14,6	14,2	15,7
$FeO+Fe_2O_3$*	8,6	10,0	8,9
TiO_2	0,7	0,9	0,9
CaO	6,7	9,0	8,0
MgO	3,9	7,9	4,8
K_2O	1,7	0,5	1,0
Na_2O	3,9	3,1	2,3
d.l.t	6,9	4,0	6,3

* Note – the sum of Fe_2O_3 + FeO oxides is given.

It should be noted that the basalts of the studied three sites, which were not included in the calculation, as raw materials for the production of CBF, can potentially be considered as raw materials for the production of cement and inert materials.

CONCLUSION

In conclusion, it should be taken into account: all the oxides that make up the melt have different effects on its crystallization. That is why it is necessary to adhere to the reference formula.

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