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Volcanology

Data on a Complex Study of Toloshi Perlites (Aspindza District) and the Prospects of their Use

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ABSTRACT. A short petrological and technological characteristic of Toloshi perlite deposit is given. The complex study has shown that from the perlite of this deposit swelled perlites may be received through thermal baking. In the article the spheres of using raw materials of perlite are given. They may be used successfully as the filling material of light concrete, for making heat-insulating filter and soil improvers. *© 2009 Bull. Georg. Natl. Acad. Sci.*

Key words: *perlite,ryholites, deposit.*

Many deposits of acid glassy volcanites (ryholites, obsidians, perlites, pekhsteins) are known on the territory of South Georgia. The principal of these deposits are those of Paravani, at the sources of the rivers Sarpderetsqali, Nakalakevi and Khertvisi deposits of obsidians and perlite-marekanites. There are rich materials about these deposits in geological literature [1-4], though some of them are of general-informational character.

This paper deals with the exploration of the complex-technological character of the perlite deposits, found, by us, with the purpose of identifying the possibilities of their use in industry.

The perlite deposit of Toloshi is situated 1-1.5 km to the south of the same village (area 3-4 km^2, visible thickness 5-6 m). Geological research has shown that acid volcanites of the deposit, as well as analogous rocks of the above mentioned deposits, are genetically and spatially connected with the late Miocene – early Pliocene phase of the Neogene-Anthropogenic volcanism and are arranged on the same stratigraphical levels.

The perlites of Toloshi deposit are black rocks. They much resemble coal and therefore the local population call them so. They have a well marked perlite structure, breccia texture and conchoidal jointing. Under the influence of mechanical strength they are decomposed into spherical grains.

The glassy groundmass of the rock makes up 85-90% of the whole volume of the rock and the quantity of the rock-forming minerals reaches 5-6%. By this indication the explored perlites occupy a transitional place between the porphyritic and aphyric structural varieties.

The deposit of the rock-forming minerals in the glassy groundstone does not show any signs of regularity. Rock-forming minerals are mainly represented by the plagioclases of the oligoclase-andesine line, hornblende and - more rarely – by biotite.

Based on the entire silicate analysis data, the explored perlites stand out for high percentage of SiO_2, alkaline oxides and water (SiO_2=71.20%, TiO_2%=0.18%, Al_2O_3=14.20%, ΣFe=1.08%, MgO=0.47%, CaO=1.30%, Na_2O+K_2O=7.85%, P_2O_5=0.07%, H_2O^+=3.46%, H_2O^-=0.31%,).

A comparison between the results of chemical analysis of the explored perlites and those of Paravani, Khertvisi and Nakalakevi revealed great resemblance. This fact, together with the geological investigation, gives us ground to consider them products of one liparitic magma.

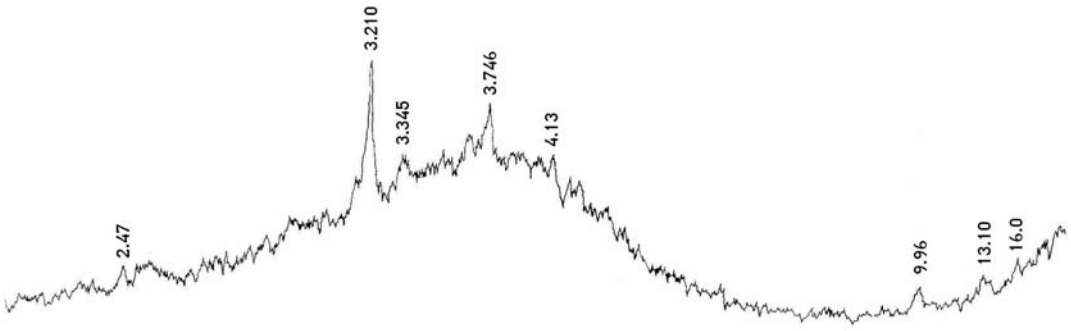

Fig. X-ray diagram of Toloshi perlites

On the X-ray diagram (analysis made by E. Khuchua) the perlites of Toloshi deposit do not have sharp diffraction peaks (Fig.).

As is seen from the diagram, the diffraction reflexes for K-Na feldspars are 4.13 A^o, and 3.34 A^o and 9.96 A^o for quartz and micas respectively. Existence of a small quantity of montmorillonite hydromica mixture is confirmed by the diffraction reflexes 16.0 A^o and 13.0 A^o.

In order to establish the regularity of distrubution of some microelements in Toloshi perlites, an approximate spectral analysis has been done for the perlite-bearing rhyolites and perlites of Khertvisi (the analysis was conducted by the scientific firm "Gamma") (Table 1).

We can see that there is no essential difference between the content of microelements in the analyzed glassy volcanites. This fact proves once again their common origin and their connection with the same magmatic hearth.

Toloshi and Khertvisi perlite deposits were explored in the technological department of the Caucasian Institute of Raw Materials (analysts N. Gegia and N, Skhirtladze) to establish the swelling capacity and swelling coefficient of the rocks. The samples were treated by thermal process in 960-1000^{O}C interval. The samples were divided by the size of grains into 5 classes (fractions) (Table 2).

The reviewed results indicate the swelling capacity of Toloshi perlites. Regrettably, Khertvisi perlites are devoid of this ability. For Toloshi perlites the swelling coefficient changes with 3-5 interval. We consider that the change of the swelling coefficient within such narrow limits may be caused by: somewhat high quantity (5-6) of rock-forming minerals, the regime of thermal treatment, the degree of porosity of the analyzed rocks, etc.

Thus, the data on the complex study of Toloshi perlites give us ground for recommending their use in industry. We must also take into account the fact that Toloshi deposit is situated in favourable georgraphical and economic conditons.

Table 1

Content of some microelements in the acid glassy volcanites of Toloshi and Khertvisi

#	Si %	Al %	Mg %	Ca %	Fe %	Mn %	Ni %	Co %
2079	> 10	> 10	>1	>1	>1	0.1-0.3	< 6	< 6
2080	> 10	> 10	>1	>1	>1	0.06-0.1	< 6	< 6
3479	> 10	> 10	>1	>1	>1	0.1-0.3	< 6	< 6

Ti %	V g/t	Cr g/t	Mo g/t	W g/t	Sn g/t	Cu g/t	Pb g/t	Hg g/t
0.3-0.6	10-30	< 30	3-6	<100	<1	5-10	10-30	<0.5
0.3-0.6	10-30	< 30	1-3	<100	<1	5-10	10-30	<0.5
0.3-0.6	10-30	< 30	3-6	<100	<1	5-10	10-30	<0.5

Bi g/t	Sb g/t	As %	Zn g/t	Cd g/t	Ga g/t	Na%
< 6	<100	<0.06	<100	<60	10-30	>1
< 6	<100	<0.06	<100	<60	10-30	>1
< 6	<100	<0.06	<100	<60	10-30	>1

Table 2

Technological characteristics of swelling of Toloshi perlites

Sizes of the class (fraction)	Weight	Volume before swelling, cm^3	Volume of perlites swelled at 960^0 C, cm^3	Volume of perlites swelled at 1000^0 C, cm^3
10-5	10	9.5	20.1	50.0
5-2.5	10	8.5	9.8	44.5
2.5-1.25	10	8.0	25.2	43.0
1.25-0.63	10	8.0	22.0	39.0
0.63-0.315	10	8.0	14.3	21.5

Toloshi perlites can be used with success in food industry to filter wine, beer, fruit juices and vegetable oils, as well as in medicine to filter pharmaceutical preperations, to prepare heat insulating materials, to preserve ground moisture and improve its structure (agroperlite), etc. They can be used as light building material.

ვულკანოლოგია

ტოლოშის (ასპინძის რაიონი) პერლიტის კომპლექსური შესწავლის მონაცემები და მათი გამოყენების პერსპექტივები

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REFERENCES

1. *V.V.Nasedkin* (1981), In: Sb. statei "Perlit", M.: 17-42 (in Russian).
2. *G.A.Alibegashvili i dr.* (1981), In: Sb. statei "Perlit", M.: 136-139 (in Russian).
3. *N.I.Skhirtladze* (1979), In: Petrologo-geokhimicheskie osobennosti porod i tekhnicheskikh kamnei, M.: 160-169 (in Russian).
4. *N.Skhirtladze*, *B.Tutberidze* (1996), In: Proceedings of the 5th Respubl. Scient.Conference Dedicated to the 120 Anivers. I.Javakhishvili, Tbilisi: 130-133 (in Georgian).

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