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SIGNIFICANCE OF STUDYING COMPOSITION OF OSMONSOY BASALT

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Abstract
About 70% of the Earth's surface is made up of basalts, which are igneous rocks formed when the magma on the planet's surface cooled and solidified. Products made by melting rocks have a large market and are regarded glass-forerunners ceramic's technology. These substances have the potential to transform inexpensive natural raw materials into goods with superior mechanical, thermal, and chemical qualities. This article will provide a general review of the comparison of basalts of Uzbekistan and other foreign countries. Meanwhile, this article sheds the light on the information about basaltic glass-ceramic products which can be made of basalts, namely Osmonsoy of Uzbekistan as well as information on their characteristics, uses, and future prospects.

Keywords: basalt, glass,olivine, x-ray, mineral,actinolite.

Аннотация: Около 70% поверхности Земли состоит из базальтов, которые представляют собой магматические породы, образовавшиеся при остывании и затвердевании магмы на поверхности планеты. Изделия, изготовленные путем плавления горных пород, имеют большой рынок сбыта и считаются предшественниками стеклокерамической технологии. Эти вещества могут превратить недорогое природное сырье в товары с превосходными механическими, термическими и химическими свойствами. В данной статье будет представлен общий обзор сравнения базальтов Узбекистана и других зарубежных стран. Между тем, данная статья освещает информацию о базальтовых стеклокерамических изделиях, которые могут быть изготовлены из базальтов, а именно Осмонсой Узбекистана, а также информацию об их характеристиках, использовании и перспективах на будущее.

Ключевые слова: базальт,стекло, оливин, рентген, минерал, актинолит.

Introduction

Basalt is a tough, dense, and widespread volcanic igneous rock that is found around the planet. (Al-Baijat, 2008) [1]. A typical type of volcanic rock is basalt. Due to its quick crystallization as lava on the Earth's surface, it is often fine-grained. The most common type of basalt is crushed rock utilized in building, as well as in industrial and highway infrastructure. [2]. Over the past ten years, basalt has become a contender for composite fiber reinforcing. Compared to other types of fiber, such as glass and carbon fiber, these fibers perform better. Plagioclase, pyroxene, and olivine are three silicate minerals found in basalt. Numerous triclinic feldspars made of sodium and calcium silicates are referred to as pyroclase. Magnesium, iron, or calcium are the three metallic oxides that can be found in any two of the crystalline silicates known as pyroxenes. Magnesium and iron are combined to form the silicate mineral olivine $(Mg,Fe)_2SiO_4$ [3] China, Germany, and other Eastern European nations have developed technologies for processing basalt to create basalt fiber, casts, and ceramics. Basalt rock reserves in Indonesia totaled more than 1 billion tons. It is present in several Indonesian provinces, including Sumatera, Java, Kalimantan, Sulawesi, and Papua. Basalt rock may be found in the East Lampung district's subdistricts of Mataram Baru, Jabung, Bumi Agung, Marga Tiga, Sukadana, and Labuhan Maringgai in the province of Lampung. More than 10 million m3 of resources are available in total [4]. The potential of Osmonsoy basalt has not been used optimally in many manufacturing fields of Uzbekistan although its reserve amounts for 25 million tons. As it has been used for producing plastic fittings for concrete road slabs : soft and rigid thermal insulation materials ; drainage filters for hydraulic structures; substitute for asbestos in the production of building materials. However, it has not been used to produce decorative glass. Therefore, the main aim of the research is to study compositions of Osmonsoy basalt deeply to be able to produce decorative glass rather than other materials as other scientists did. For example; as Luiza Felippi de Lima_, J.E. Zorzi, R.C.D. Cruz cited how to get Glass-ceramic products from melting and heat treatment of rocks with illustrations and compositions in the article.[5]

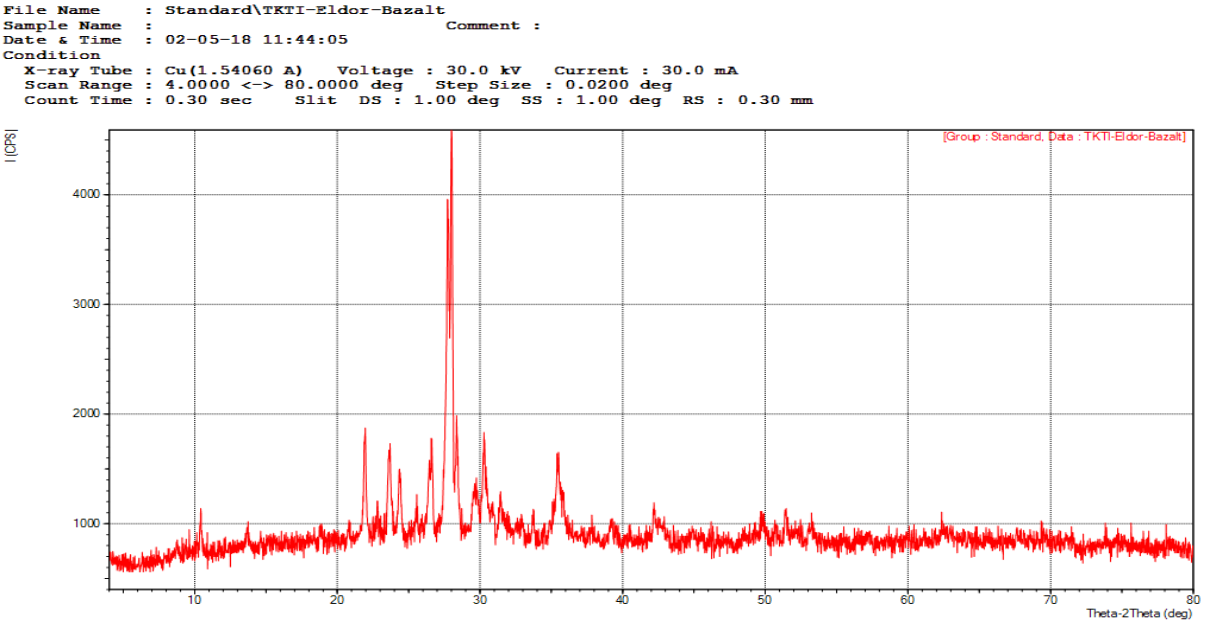
Methodology: The samples of rock basalt of Osmonsoy were taken from different sites of Osmonsoy which is situated in Forish district, Djizzak region in Uzbekistan to study its compositions. Big rock stones were grained in the grinding mill of the laboratory within 20 hours until it became basalt powder. After that the analysis of X-

ray were experimented under basalt powder in the defractometer XRD-6100(Shimadzu, Japan).

It was carried out under the influence of CuKa radiation (β-filter, Ni, λ=1.54178Å, X-ray tube voltage 30 mA, 30 kV). In this case, the constant rotation speed of the detector was 4 deg/min with a step of 0.020 (ω2θ-linking), and the scanning angle was taken from 4° to 80°. The samples were analyzed in a rotating chamber with a rotation speed of 30 rpm.

The results and Discussions

The given pictures give information about Osmonsoy basalt and compare it with the other rock basalts from other foreign countries. First picture illustrates data regarding X-ray of Osmonsoy basalt stone and the percentages of minerals of basalt stone in the table 1 were given as lines in the picture 1. The percent of Plagioglaze type anorthite $CaAl_2Si_2O_8$ shows the highest percent, (86.21), whereas the rest demonstrates lower percents, Actinolite $Ca_2(Mg_{5.0\text{-}4.5}Fe^{2+}_{0.0\text{-}0.5})Si_8O_{22}(OH)_2$ (4.33), Hornblende $(Ca,Na)_{2-3}(Mg,Fe,Al)_5(Al,Si)_8O_{22}(OH,F)_2$ (4.61), Magnetite $FeO{\cdot}Fe_2O_3$ (4.83) respectively. After that the composition of Osmonsoy basalt is compared with other basalts which are given in the table 3. It is visible from two tables that the percentage of oxides of Osmonsoy basalt is almost similar to other basalts from other different regions of the world.



Picture 1. X-ray of Osmonsoy basalt stone.

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Table 1. The result of x-ray. The percentage of minerals of Osmonsoy basalt.The composition of mineralogical Osmonsoy rock stone.

No.	Minerals	Mass, %.
1	Plagioglaze type anorthite $CaAl_2Si_2O_8$	86.21
2	Actinolite $Ca_2(Mg_{5.0\text{-}4.5}Fe^{2+}{}_{0.0\text{-}0.5})Si_8O_{22}(OH)_2$,	4.33
3	Hornblende $(Ca,Na)_{2-3}(Mg,Fe,Al)_5(Al,Si)_8O_{22}(OH,F)_2$.	4.61
4	Magnetite $FeO{\cdot}Fe_2O_3$	4.83

Table 2. Chemical composition of Osmonsoy basalt

No.	Raw Materials	Mass, %									
		SiO_2	Al_2O_3	Fe_2O_3	CaO	MgO	Na_2O	K_2O	TiO_2	Cr_2O_3	P_2O_5	Mn_2O_3
1	Osmonsoy basalt	45,8	20,82	8,31	8,93	4,94	3,38	0,43	0,78	0,046	0,07	0,18

Table 3. Chemical composition (wt.%) of basalts from different regions of the world

Table 1 – Chemical composition (wt.%) of basalts from different regions of the world.

Oxide (wt.%)	Typical basalt [29]	Thrace region, Turkey [36]	Southern Anatolia, Turkey [37]	Arkhangelsk Oblast, Russia [38]	SGF, Brazil [39]	Vrelo-Kopaonik, Serbia [40]	Vrelo-Kopaonik, Serbia [41]	Egyptian basalt, Egypt [42]
SiO_2	48.3	45.91	43.18	45.83	51.42	56.21	49.33	48.39
Al_2O_3	13.03	12.16	13.15	15.34	13.81	18.61	16.13	13.98
Fe_2O_3	6.84	10.74[a]	13.49[a]	1.52	7.36	1.15	3.81	12.63[a]
FeO	7.72	–	–	9.16	5.83	2.97	2.68	–
CaO	10.91	9.12	9.67	7.72	10.45	7.78	8.87	9.16
MgO	5.46	12.16	8.48	6.78	6.29	3.40	6.48	6.92
K_2O	0.51	4.25[b]	2.78	1.33	0.70	3.37	2.70	0.79
Na_2O	2.34	–	4.27	3.37	2.45	4.73	3.30	2.50
TiO_2	2.59	2.93	3.34	7.61	1.37	1.11	1.94	–
MnO	0.23	–	–	0.21	0.20	–	0.14	–
P_2O_5	0.26	–	0.96	–	0.14	–	–	–
H_2O	1.42	–	–	–	–	–	1.57	–
CO_2	0.49	–	–	–	–	–	–	
LOI[c]	–	2.72	–	–	–	–	–	5.32

[a] $FeO + Fe_2O_3$.
[b] $K_2O + Na_2O$.
[c] Loss on ignition.

(This table is taken from the article of "Basaltic glass-ceramic: A short review" by Luiza Felippi de Lima_, J.E. Zorzi, R.C.D. Cruz.Programa de Pós-Graduac¸ão em Engenharia e Ciência dos Materiais (PPGMAT), University of Caxias do Sul, R. Francisco Getúlio Vargas,1130, 95070-560 Caxias do Sul, RS, Brazil)

Conclusion

According to the results of research, it has been known that Osmonsoy basalt has been claimed as one of the most significant components to produce decorative glass, and glass ceramic materials. It has been deduced based on the researches of other scientists who synthesized glass-ceramic materials [5]. Synthesizing glass and glass-

ceramic materials from Osmonsoy basalt has found as theoretically and practically important and there will be experiments under it in upcoming researches.

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