ACADEMICIA

ISSN: 2249-7137 Vol. 11, Issue 5, May 2021 Impact Factor: SJIF 2021 = 7.492

ACADEMICIA
An International Multidisciplinary Research Journal
(Double Blind Refereed & Peer Reviewed Journal)

DOI: 10.5958/2249-7137.2021.01556.1

STUDY OF ENRICHMENT OF TASHKAZGAN GRAPHITE ORE WITH ORGANIC SUBSTANCE

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ABSTRACT

Work is underway to study the samples of ore from the "Tashkazgan" deposit. The chemical properties and composition of graphite ores were studied in order to provide and supply the industry of the Republic of Uzbekistan with high-quality graphite raw materials to replace imports. The results of the study, the results of dynamic thermogravimetric analysis are given.

KEYWORDS: *Graphite, Metallurgy, Reaction, Flotation Machine, Concentrate, Ore, Ermogravimetric, Dynamics, Diagram*

INTRODUCTION

In modern economic conditions, the key to the operation of all industries and machinery in the Republic of Uzbekistan is the study and discovery of new deposits of minerals, construction of mining and processing enterprises and the production of high quality finished products. In

particular, we consider the processing of graphite ores from the Taskazgan deposit in the Bukhara region, discovered in 1928 by Central Asian geology.

The stone graphite deposit is located in Peshku district of Bukhara region, 9 km from the village of Jongeldi. Most graphite ore bodies are of industrial importance and are located in the south-eastern part of the deposit (ore bodies № 3, 8, 9, 30), in the north-western part [1].

Graphite is a type of material with very high quality requirements. The purity of graphite, like coal, is characterized by the amount of residue after combustion. Graphite is widely used in foundry, metallurgy, oil and gas, electrical engineering, pen industry and others. Graphite is also used as a retarder in nuclear reactions in nuclear boilers, for which graphite must be ideally pure. In this case, the enrichment of graphite ore is very important [2].

The bulk of the graphite ore, of industrial value, is concentrated in the southeastern part of the deposit (3,8,9,30 ore bodies), and two large bodies have been identified in the northwestern part. The body length of industrial ores in the south-eastern part of the deposit is 470-840 m, in the north-western part it is 175 and 450 m. The average thickness of graphite bodies is 10.5m. Depending on the carbon content of graphite, graphite ores are conditionally divided (poor in the calculation of reserves in 1952) with a graphite carbon content of 5-10% (30% of the total ore volume), lower - 10 -20% (40%), medium - 20-30% (20%), higher than 30% (10%) [3, 4].

From the surface (in some ore bodies along the graphite deposits to a depth of 15 m developed an exogenous climatic zone of calcite, gypsum, clay minerals and mica. Free carbon content from 3.1 to 48.5. Thin-layered graphite. High dispersion in the gray part of the concentrate , the absence of fat content and solid additives distinguishes it from graphite from other deposits in the CIS countries [5].

Tashkazgan deposit was discovered in 1928. Central Asian geology The "single" deposit was studied several times from 1928 to 1975. Developed from time to time. Production was carried out in an open pit. Adjustment of the mined ore in accordance with the standard graphite content (25%) was carried out by manual sorting of the ore. The maximum annual productivity reached 1.2 commercial graphite (GOST 17022-71 brand GLS-4) [6].

Graphite ores from the Tashkazgan deposit, which have had a graphite content of more than 25% since 1942, are produced in the form of soil by the Tashkent Agricultural Machinery Plant for the production of paint in the form of dough for rubbing straw, and in the liquid form for painting rods and dry molds. used to increase the durability of the converters.

METHODS

It is taken into account that the graphite reserves approved by the State Balance of the Republic of Uzbekistan are located in the Tashkazgan graphite deposit of Bukhara region. (State balance of mineral reserves). Own. Graphite, 2016). Graphite ore reserves as of 01.01.2016. A + B + Cl 2334.2 thousand T (349.5 tqs. T graphite), S2-3797.4 thousand tons per cat.

In terms of composition, the ore bodies of Tashkazgan are a complex complex of mineral compounds. The main part of the ore consists of kaolin, chlorite, serpentinite in different proportions. [7, 8].

The total prospective reserves are 25 million tons. Graphite belongs to a group of materials that are in great demand in terms of quality. Its use depends in many respects on the structural properties of the ores, the carbon content of the graphite in them, the ability of fine grinding of graphite, and so on. Graphite is most commonly used in metallurgy, foundry, oil and gas industry, electrical engineering, pen production and others. Graphite is also used as a moderator in nuclear boilers, nuclear reactions, for which it must be ideally pure [9].

Due to the planned construction of a nuclear power plant in the Republic of Uzbekistan, the issue of enrichment of graphite ore at the Tashkazgan deposit in Bukhara region is urgent.

Today, research work on the enrichment of graphite ore is being carried out in the Republic. Experimental work was carried out, in which graphite ore was passed through a sieve of 0.07 mm and weighed 167 grams. The resulting ore was mixed with 4 drops of UGK organic matter and 100 ml of water was added to the mixture to bring it to the dark phase (thick state). The resulting substance was placed in the chamber of the flotation machine and filled with 0.9 liters of water. The process of burning and enriching the flotation machine was observed.

The foams formed during the first enrichment process were fine-grained and dark gray in color. By the end of the process, the foams had become very large and pale. The first enrichment process lasted 16 minutes. During the second enrichment, 2 more drops of UGK foam were added to the mixture and the enrichment process lasted 14 minutes.

During the second enrichment process, the foams formed fine and flowing colors, and in the middle of the process, the foams began to turn light brown. At the end of the process, the foams became large and pale and the second enrichment process was completed. During the third enrichment process, 1 drop of UGK foam was added and the enrichment process lasted 9 minutes. During the enrichment process, the foams formed fine and white, at the end of the process the foams turned yellow and the enrichment process was completed.

The concentrate and waste from the enrichment process were dried on a gas stove at a temperature of 100 0C for drying.

Products from the enrichment process:

Concentrate obtained during the first enrichment - 60.8 grams -50.0%

Concentrate from the second enrichment process - 52.4 grams -13.5%

Concentrate from the third enrichment process - 13.8 grams - 8.2%

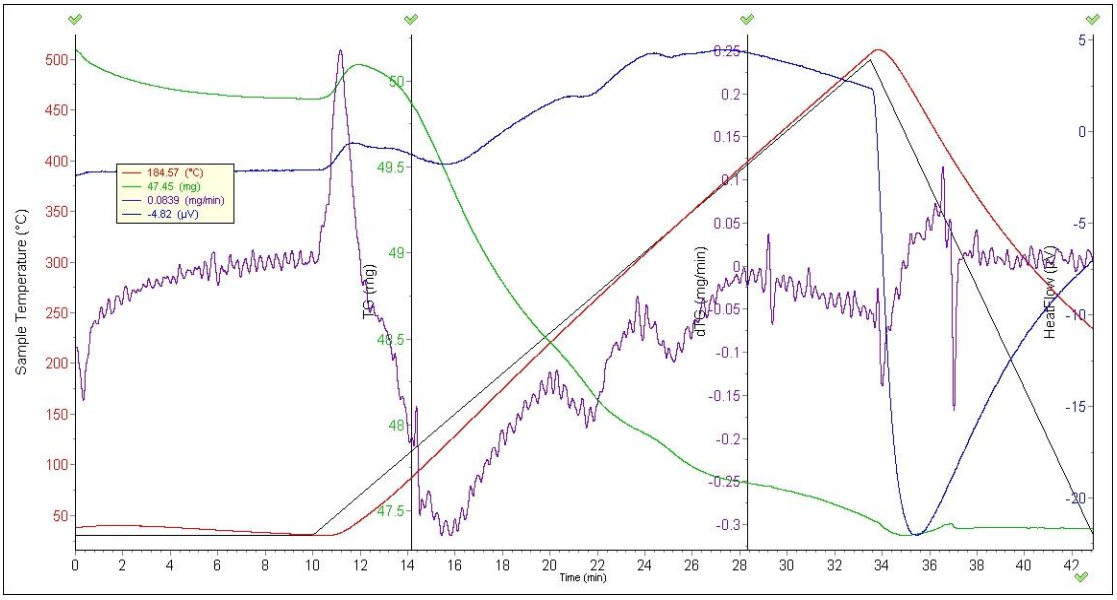
Waste - 21.5 grams - 12.8%

The amount of reagent used in the enrichment process is 6 drops of burette UGK 9 foaming organic matter. The duration of the enrichment process is 39 minutes.

Enriched graphite was given for chemical analysis.

RESULTS

The resulting derivatogram is shown in the figure, which consists of 4 curves. Analysis of the dynamic thermogravimetric analysis curve (DTGA) (curve 2) shows that the DTGA curve occurs mainly in the 1 intensive decomposition temperature range. This range corresponds to a temperature of 60-405 0S.



1-Temperature curve; 2- dynamic thermogravimetric analysis curve (DTGA); 3- product of dynamic thermogravimetric analysis curve (DTGP); 4-DSK curve.

Figure 1. 60.8 gr. 1-sample derivatogram

The analyzes show that an intensive decomposition process takes place in the 1st decomposition interval. During this interval, the amount of decomposition, i.e., 5.175% of decomposition, takes place.

A detailed analysis of the dynamic thermogravimetric analysis curve and the DSK curve is given in the table below.

TABLE 1 ANALYSIS OF THE RESULTS OF THE DTGA AND DSK CURVE OF THE 1ST PROBE

№	Temperature, °C	Lost mass, %	Decomposition rate of the substance, mg / min	Amount of energy consumed (µV * s / mg))
1	50	0,825	0,137	1,45
2	100	1,385	0,465	2,88
3	200	2,025	0,453	2,01
4	300	3,235	0,087	3,02
5	400	4,985	0,147	1,02
6	500	5,169	0,455	2,03

As a result of these derivatograph studies, it is seen that the main mass loss occurs in the range of 50-412 oC, in which 5.173% of the basic mass, ie 2.6 mg of the mass is lost. No change is observed after 415 oC. The mass remains unchanged.

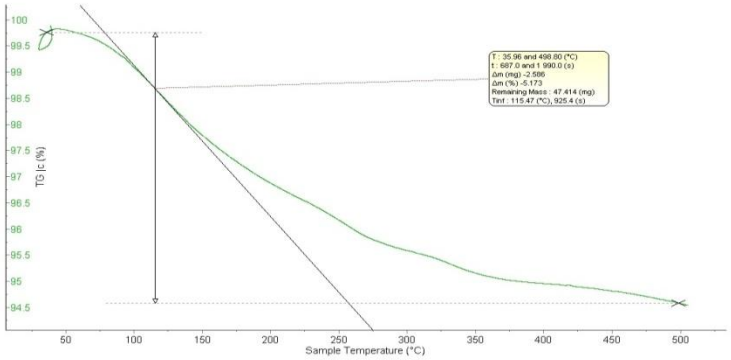


Figure 2. 1 probe thermogravimetric line

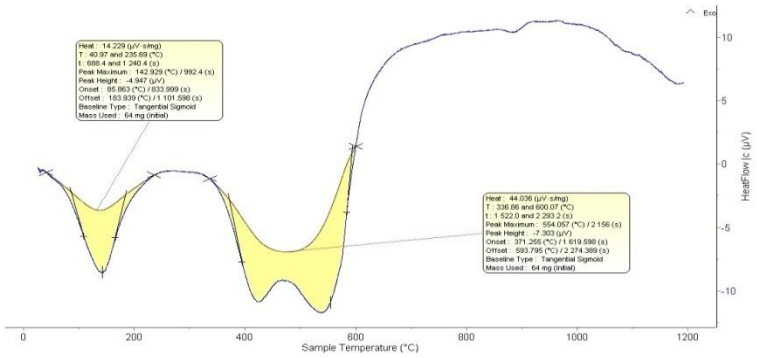
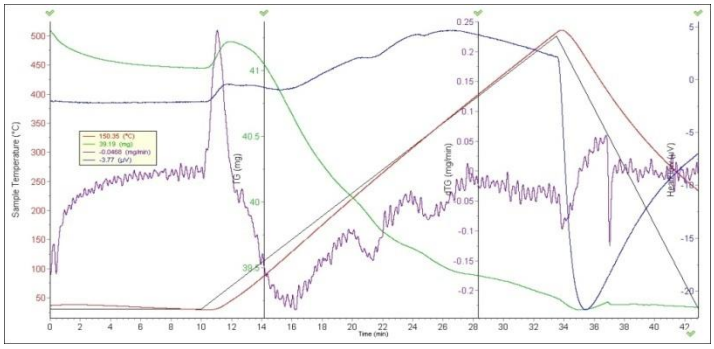


Figure 3. 1-sample DSK analysis

The resulting derivatogram is shown in the figure, which consists of 4 curves. Analysis of the dynamic thermogravimetric analysis curve (DTGA) (curve 2) shows that the DTGA curve occurs mainly in the 1 intensive decomposition temperature range. This range corresponds to a temperature of 63-424 0S.



1-Temperature curve; 2- dynamic thermogravimetric analysis curve (DTGA); 3- product of dynamic thermogravimetric analysis curve (DTGP); 4-DSK curve.

Figure 4. 52.4 gr. 2-sample derivatogram

The analyzes show that an intensive decomposition process takes place in the 2nd decomposition interval. In this range, the amount of decomposition, i.e. 4.8% of decomposition, takes place. A detailed analysis of the dynamic thermogravimetric analysis curve and the DSK curve is given in the table below.

TABLE 2 ANALYSIS OF DTGA AND DSKEGRI LINE RESULTS OF PROBE 2

№	Temperature, °C	Lost mass, %	Decomposition rate of the substance, mg / min	Amount of energy consumed (μV * s / mg))
1.	50	0,725	0,136	1,46
2.	100	1,385	0,555	2,54
3.	200	1,555	0,653	2,21
4.	300	2,135	0,487	3,22
5.	400	3,685	1,147	2,02
6.	500	4,469	0,455	3,03

As a result of these derivatograph studies, it is seen that the main mass loss occurs in the range of 60-422 oC, in which 4.486% of the basic mass, ie 1.864 mg of the mass is lost. No change is observed after 425 oC. The mass remains unchanged.

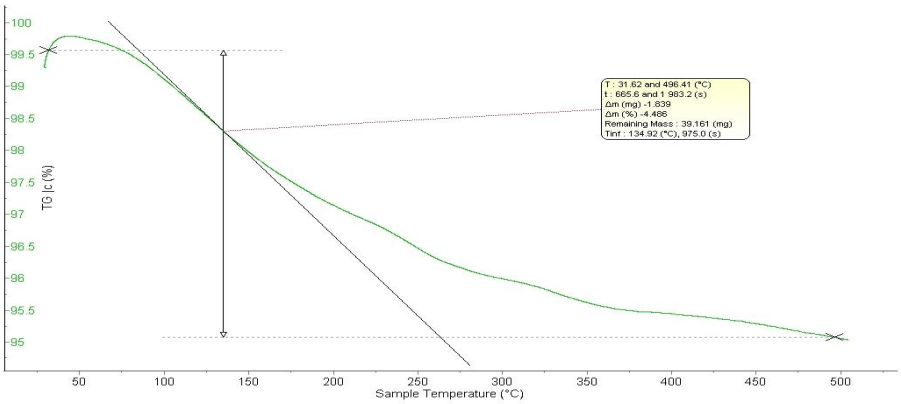


Figure 5. 2-probe thermogravimetric line

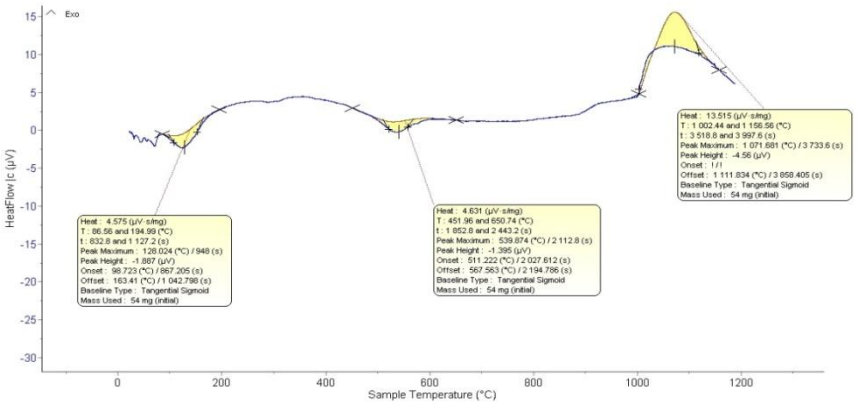
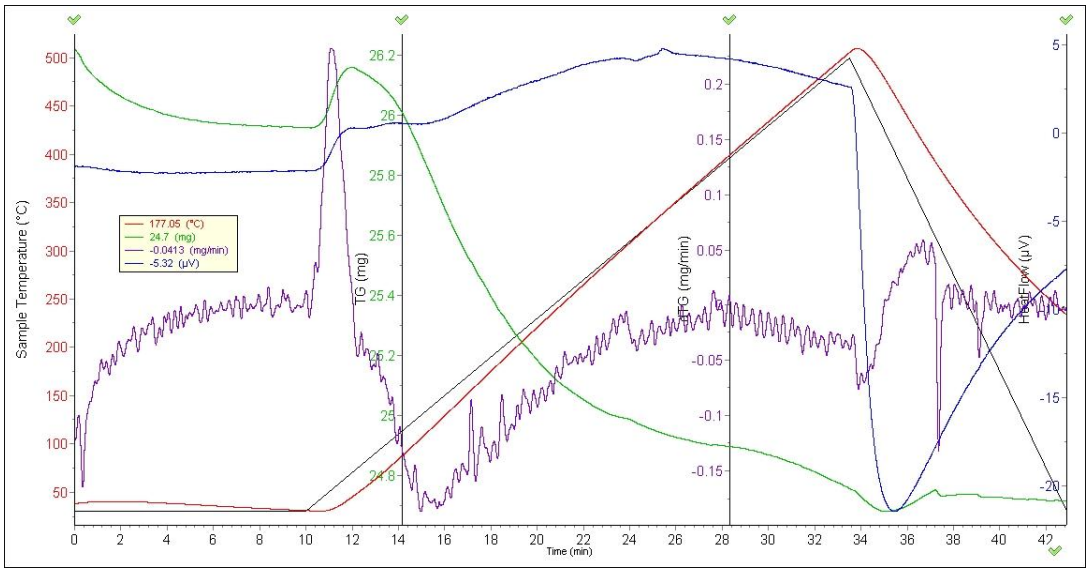


Figure 6. 2-sample DSK analysis

The resulting derivatogram is shown in the figure, which consists of 4 curves. Analysis of the dynamic thermogravimetric analysis curve (DTGA) (curve 2) shows that the DTGA curve occurs mainly in the 1 intensive decomposition temperature range. This range corresponds to a temperature of 68-444 0S.



1-Temperature curve; 2 - dynamic thermogravimetric analysis curve line (DTGA); 3 - dynamic thermogravimetric analysis curve the product of the line (DTGP); 4-DSK curve.

Figure 7. 13.8 gr. 3-sample derivatogram

DISCUSSION

The analyzes show that an intensive decomposition process takes place in the 1st decomposition interval. In this range, the amount of decomposition, i.e., 5.239% of decomposition, takes place.

A detailed analysis of the dynamic thermogravimetric analysis curve and the DSK curve is given in the table below.

TABLE 3 ANALYSIS OF THE RESULTS OF THE DTGA AND DSK CURVE OF THE 3RD PROBE

№	Temperature, °C	Lost mass, %	Decomposition rate of the substance, mg / min	Amount of energy consumed (µV * s / mg))
1	50	0,125	0,157	1,40
2	100	0,585	0,765	2,11
3	200	0,725	1,453	2,14
4	300	1,035	0,257	1,99
5	400	1,285	0,847	2,02
6	500	1,569	0,955	1,03

As a result of these derivatograph studies, it is seen that the basic mass loss occurs in the range of 63-454 oC, in which 5.328% of the basic mass, ie 1.325 mg of the mass is lost. No change is observed after 460 oC. The mass remains unchanged.

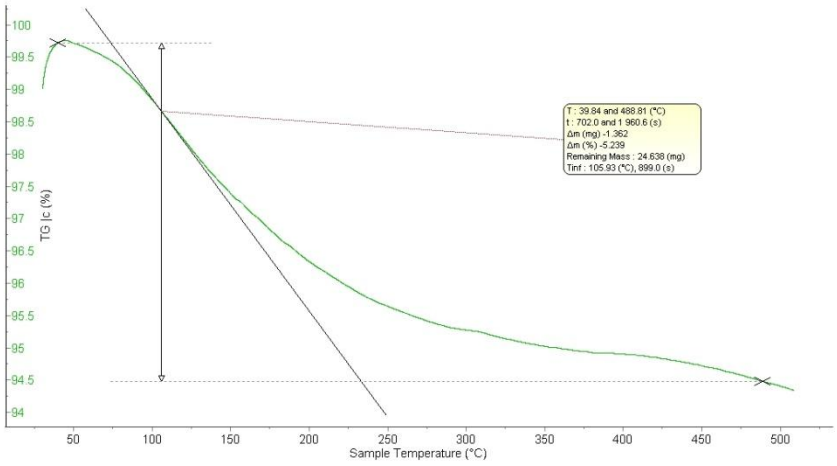


Figure 8. 3-probe thermogravimetric line

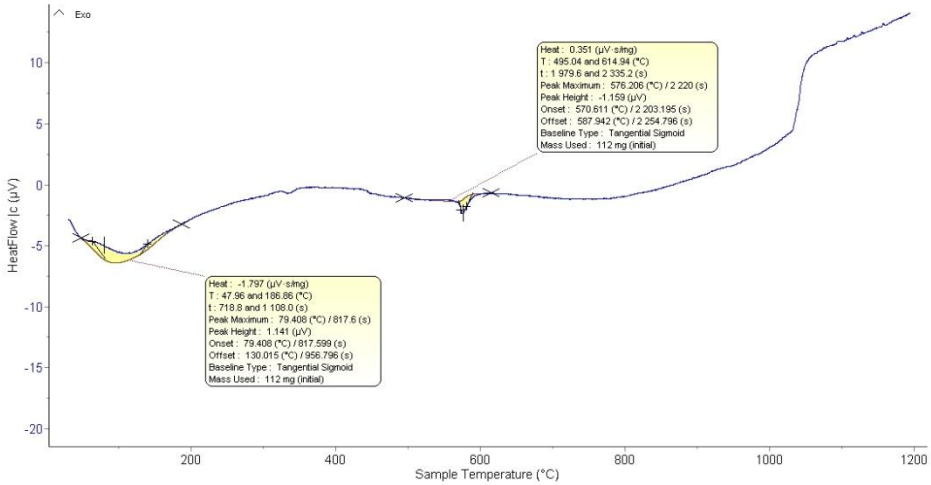


Figure 9. 3-sample DSK analysis

CONCLUSIONS

When the composition of the obtained enrichment is studied, it is possible to obtain graphite concentrate of industrial importance by enrichment of crushed graphite. The results of the chemical analysis are given for spectral analysis.

There are no special requirements for graphite ores for industry. Feasibility studies for their extraction and enrichment are evaluated on the basis of books in accordance with the conditions established for each industry. The results of this research show that the graphite ore of the Tashkazgan deposit can be used as a raw material for the production of graphite concentrate on an industrial scale.

At present, graphite ore mining is not carried out, and products and materials based on graphite concentrate required for the Republic are purchased from abroad on the basis of currencies.

Therefore, the most important task is to enrich the graphite ore of the Tashkazgan deposit in Bukhara region, which will save currency in the country and solve the problems of all industries in Uzbekistan.

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