American Journal of Interdisciplinary Research and Development
ISSN Online: 2771-8948
Website: www.ajird.journalspark.org
Volume 04, May, 2022

DERIVATOGRAPHIC ANALYSIS OF NAVBAHOR BENTONITE IN NANOCATALIZATOR TECHNOLOGY

J.M. Kurbonov
Doctor of Technical Sciences, Professor
Samarkand Economic Service Institute, Samarkand, Uzbekistan

Abstract
In this study, the study of drying process using convektiv-UYuCh EMC energy in obtaining nanocatalyser from" Navahor " bentonite was covered. Also, the relevance of the topic, the experimental device of the laboratory used in the study, the research techniques and the analysis of the results obtained are presented. On the basis of the purpose of the work, the study of the drying process in the technology of obtaining a nanocatalizer and the acceleration of the process and technology by carrying it out in UYuCh EMC, the quality of texturized descriptions of loyi samples of "Navakhor" bentonite (catalyst)has been achieved.

Keywords: Zol –gel " technology, bentonite, UYuCh EMC, chemical composition, texture, adsorption method , porosity, modification

1.INTRODUCTION.

In recent years, "Zol-gel" technology has been carried out large scientific-practical research on the synthesis weight of inorganic and organo - inorganic materials in low-carb. It differs from other technologies by the advantages of catarrhal properties, such as the simplicity of equipment used in technology, energy efficiency, environmental safety, cost effectiveness, flexibility of the coinage, [1-8]. It is also distinguished by the fact that the initial precursors are carried out in soft conditions of a gully polycondensation reaction and the possibility of introducing into the reaction system the oxides of monomers, polymers, variable valence metals with a functional group, the use of a single solvent for all reagents and the possibility of controlling both the structure and size of the In the process of Zol-gel, organic / inorganic components can be mixed in the desired proportions and in nanostructures.

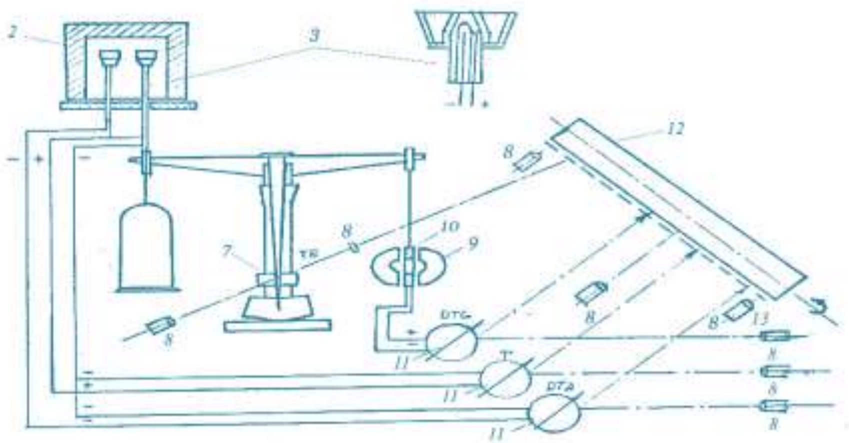
One of the main processes in the" Zol-gel " technology is the thermal treatment of this material: drying and burning, and as a result, obtaining catalyst sorbents with quality porosity. Therefore, the conducting substance is considered to be thermogravimetric tracing of bentonite and the determination of its basic description is topical.

II.THE MAIN PART

Research Metods

As is known, thermographic measurement of mass changes during studies is of great importance for quality analysis. To do this, a simultaneous application of the differential thermal and thermographic method is required. Such a method is derivatography, with the help of which the sample simultaneously measures the studied product (T), temperature, weight change (tg), weight change rate and entalpia change (DTG).

Derivatogram-non-isothermic kinetic data were obtained in Od - 103 derivatography. 1-the picture shows the device of the derivatograph, which consists of the weight of the measuring, photographing device, working camera and control, security devices, and the scheme of movements.



1. Heating oven. 2.Cone-shaped alund inert material. 3. Tigel for Material.4. The scales. 5.Output of thermopar.6.Cover 8.Light source.9. Magnetic. 10. Collector 11. Galvanometers.12. Photoregistrasia drum.

Picture-1. Device and scheme of action Od-103 derivatography

The Od-103 derivatographic kurilma works automatically, and the curved lines that characterize the observed changes are written on the photointensive paper attached to the photo registration drum. The test sample is fried in a special container in the oven, the temperature of which will be the same over time. The light signal of the illuminated optical slit, which is mounted on the balance arm, records the deviation of the slit in the magnified lens system according to the scale in the form of a thermogravimetric curve on the photo intensive paper.

The measurement of the speed of weight change is carried out with the help of a coil with a high number of rotations suspended on the balance sheet and moving in a homogeneous area of a permanent magnet. The force field of the magnet induces the tension in the moving coil, the magnitude of which is proportional to the deviation of the shoulder. The light signal of the galvanometer, connected to the terminals of the coil, is described in photointensive paper so that the main curve is the derivatives of tg, that is, the derivative of the thermogravimetry curve (DTG).

Differential thermal analysis (DTA) curve line is also obtained by using a differential circuit to connect thermocouples. All curved lines are simultaneously transferred to paper over time. In order to find out at what temperature value the observed changes occur, a temperature curve is drawn at the same time.

For the kinetic analysis of the thermoanalytic curve obtained by thermogravimetry under non-isothermic conditions, a differential method was used.

Bentonite in Navoi region Navahor district is a light gray powder, odorless, almost insoluble in water and organic solvents, pH value of the suspension is 7,1-8,7. The weak alkalinity of the suspension is explained by the presence in the clay of hydroxide soil and hydroxide metals. According to adsorption properties, this is a combined meso-macro-microbial adsorbent, its specific surface is 54,5 m2 / g, the porous volume is 0,065 cm3 / g, the average porous magnifier is 4,8 nm, adsorption activity for methylene is blue - 62,0 bentonite / g., this is confirmed by a number of literature data [10,11]. According to its technological properties, it is a fine dispersion medium-weight powder with an average fluidity index. For use in the chemical industry, the standardization of bentonite clay is carried out.

Standardization of bentonite was carried out according to the following indicators: description, pH of aqueous suspension, adsorption activity at drying time, cation exchange capacity, heavy metals (mishyak), comparative surface area, volume and average size of the swabs.

Technological and adsorption standardized descriptions of bentonite clay "Navbahor" are presented in Table 1

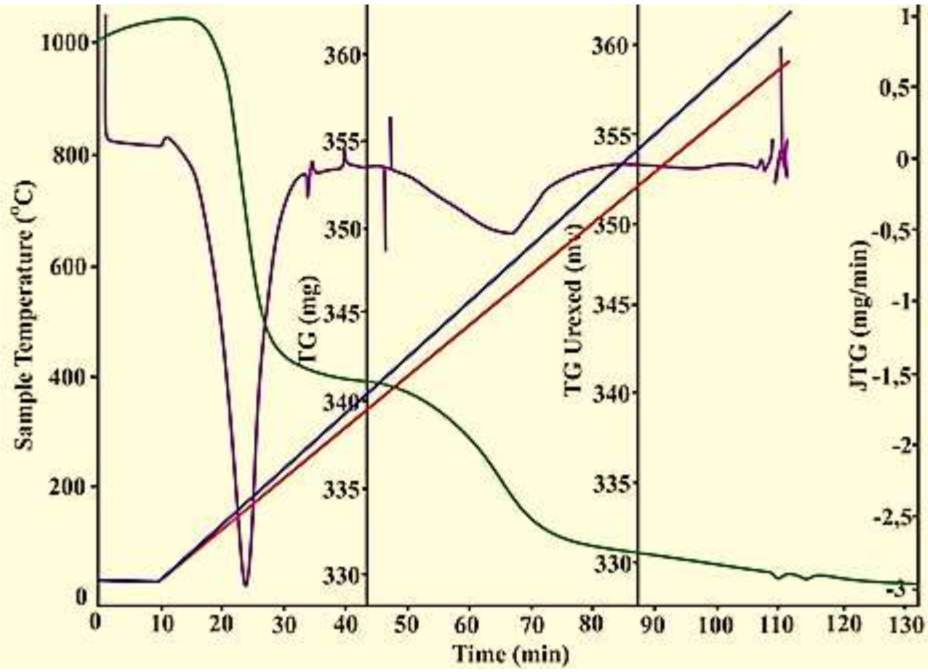
Table 1 Technological and adsorption characteristics of bentonite clay" Navbahor"

№	Quality indicators of bentonite clay	Features of bentonite clay
1	Eulogy	light gray powder, odorless, almost insoluble in water and organic solvents
2	pH suspension (5 v 100) in water	7,1-8,7
3	Loss of mass in drying,%	8% not more than
4	Adsorbtion activity, bentonite/g	62,0±0,2
5	Cation exchange capacity, bentonit ekv	19,4
6	Meringue	no
7	Si^{4+} and Al^{3+} elements ratio	3:1
8	Specific surface area by five-point vet method, m2/g	54,5±2,0
9	P/P_o = 0,98, sm^3/r / g pressure gas volume	0,065±0,005
10	The average size of the pores, in nm	4,8
11	Moisture content of bentonite clay,%	26 -28
12	moisture content of dry bentonite clay, %	2-3

American Journal of Interdisciplinary Research and Development
ISSN Online: 2771-8948
Website: www.ajird.journalspark.org
Volume 04, May, 2022

For the analysis and calculation of the bentonite derivatogram, its non-isothermic thermographic derivatogram was obtained, in which four curved lines were described: T, tg, DTG and DTA.

Picture 2 shows the derivatogram of bentonite" Navbahor".



2-picture. Derivatogram of bentonite" Navbahor"

Derivatogram curve lines are characterized by the analysis and calculation of the quality of bentonite material, the finding of kinetic constants from TGA curve lines.

In the qualitative analysis of the derivatogram, the types of connection of water in the Benton with the material and the nature of its drying give an opportunity to outline the Basques.

From the properties of bentonite clay colloidal capillary porous material, considered, it follows that it is practically difficult to draw the boundary between the connections of a separate type of water with a rigid skeleton of the material. Bentonite is a complex system with its structure, both in its nature and has different moisture compounds, at different stages of dehydration of flour, it or this type of moisture boundary plays a big role.

Derivatogram DTA line bentonite contains mainly three types of bound water (moisture): chemical (molecular), physico-chemical (due to absorption, osmotic storage), physico-mechanical (humidity of macro - and micro-capillaries). From the DTA and tg line, in the case of its cloaking, the initial starter in the first presser (at 10-12 min), the physico-mechanical (macro - and micro - capillaries moisture) chiksa, in the second presser (at 13-24 min), the physico-chemical (due to absorption, osmotic storage) moisture chikadi, and in the next presser, the destoruction begins, and in 35-

50 min, The sung (at 50-70 CHIKISHI is within reach, and in the bayonet Tulik occurs the process of destruction, and the chemical water molecules are broken down. We can configure the property ribbon when TG and DTA lines are clamped. You can also specify whether these processes are uttered in the range of kaysi tempratura as compared with T temparatura line.

From the derivatogram, the primary decomposition of bentonite began at a temperature of 70% and ended at 300%. over the past 35 minutes, 80 bentonite was lost or 363.0 bentonite was 11% of the total mass. The damage occurred due to absorbed systemic water and other volatile compounds.

One of the main properties of bentonite when used in industry is its ability to absorb water and swell.

Recently, methods of finding kinetic constants from these curved lines have become widespread. The methods of calculating the curve lines obtained by linear heating speed are tested in the most convenient way. The advantage of non-isothermic Kinetics is that it works less, and on the basis of small experiments it is possible to determine the qualitative and quantitative characteristics of the process. Now, in fact, there are several independent ways to determine the kinetic constant of the reaction.

Studies on existing computational equations have shown that a single kinetic equation is selected, which best approximates experimental data to determine the reaction mexanizm according to thermogravimetry data. The proposed kinetic equations in the general analytical form are reduced to the form in the tone

$$:\frac{d\alpha}{d\tau} = \text{z}\exp\left[-\frac{E}{RT}\right]\alpha^m(1-\alpha)^n\left(-\ln(1-\alpha)\right)^P \qquad 1.$$

here: $\alpha -$ Adorlik level of interaction,

$\text{z}, E, m, n, p -$ kinetic model parameters.

The initial approximations of kinetic parameters are evaluated by the method of low squares of weight

$$\sum_{i=1}^{M} \omega_i\left(\alpha_i^{\ni} - \alpha_i^{p}\right)^2 \to \min \qquad 2.$$

Here: $\alpha^{\ni}$and α^{p}- the degree of experimental and computational communication

For weight coefficients, as a rule, the following form is used:

$$\omega_i = \alpha_i^{\beta} \qquad 3.$$

For example: $\omega_i = 1/\alpha_i$ statistical measure.

The change in the indicator in the weight formula is equal to the change in the degree of participation of different experimental points in the calculation of parameters. The change greatly affects the parameter evaluation results. Seeing the aprobation of the method of weight of the least squares with different values, it was shown that it was the most optimal for its installation .

$$\beta = -1 \qquad 4.$$

The resulting parameters are checked as follows: the selected synthetic equation is combined with the variable cadmium of the method Euler, which is used as the selection of the functional optimal parameters of the tone.:

$$f(z, E, m, n, p) = \int_{\tau_н}^{\tau_к} (\alpha^э - \alpha^p) \rightarrow min \qquad 5.$$

Optimization is carried out by the modified Nelder-Meade method, which ensures the approximation of the initial approximation with the successful positioning.

To calculate the kinetic parameters of the process, we used the models of the thermochemical equation - Vahuski - Voborila and Erofeev, which represent the modifications of the equation.

When using the first model, kinetic constants are calculated using a differential method from TG curve lines. In optimizing, it is possible to use the modified Nelder-Mid method.

It also takes into account the thermal effects of the reactions associated with the deviation of the sample temperature from the set values corresponding to the linear law. In this case, the differential equation of the thermal decomposition of a rigid body is taken as a basis.:

$$\frac{d\alpha}{d\tau} = z \exp\left(-\frac{E}{RT}\right)(1-\alpha)^n$$

Logarithmic form of this equation:

$$\ell n \frac{d\alpha}{d\tau} = \ell n z - \frac{E}{RT} + n\ell n(1-\alpha)$$

here: α - rate of exchange, z - factor of frequency of exchange, 1/c; E- activation energy, kcal, N- reaction order

The solution of this linear equation can be obtained by the method of least squares with further improvement of the Nelder-Mead method.

In describing the kinetics of thermal decomposition, the second method is used from the equation of topochemical Erofeev, which has the form, as shown above:

$$\frac{d\alpha}{d\tau} = z \exp\left(-\frac{E}{RT}\right)(1-\alpha)[-\ell n(1-\alpha)]^{\frac{n-1}{n}}$$

Thus, using the above equations, it is possible to simulate the kinetics of decomposition processes during high-temperature processing of bentonite clay.

The calculations were carried out on the IBM PS/XT personal computer using the EUREKA data processing package (from Borland International), which includes the processing of static data by the method of Least Squares and the method of iteration. The resulting account results are presented in Table 2.

Table 2.

Results of the calculation of kinetic parameters

№	Name Materal	Kinetic parameters		
		Variations of the Erofeev equation		
		z	E kcal/mol	n
1	Alkaline bentonite soil	13,90	18,2	1,210
2	Alkaline earth soil	12,80	17,4	1,36

Since the kinetic indicators of alkaline bentonite and alkaline earth soil bentonite from the results of the calculation of kinetic parameters based on the model of the topochemical Erofeev equation do not differ much from each other.

IV.CONCLUSION

Technological and adsorbtion standardized descriptions of bentonite clay" Navbahor " were drawn up.

From the results of the calculation of kinetic parameters based on the model of the topochemical Erofeev equation, kinetic indicators of the alkaline bentonite and alkaline earth bentonite were analyzed. The resulting constants can be obtained from equations for practical graying when burned to the Erofeev equation.

REFERENCES

1. Dedov A.G., Loktev A.S., Telpukhovskaya N.O., Parkhomenko K.V.Moiseev N.I.Novie catalyst okislitelnoy condensation methane mesoporistie amorphnie silicate redkozemelnix elementov / / dokladi akademii nauk. – 2008.- T.422. - .498-500.
2. Gusev A. I. Nanomaterials, nanostrukturi, nanotechnologii. - M.: Fizmetlit, 2007. - 416 s.Bobomurodova, S.Y., Fayzullaev, N.I., Usmanova, K.A. Catalytic aromatization of oil satellite gases//International Journal of Advanced Science and Technology, 2020, 29(5), стр. 3031–3039.
3. Fayzullaev, N.I., Bobomurodova, S.Y., Avalboev, G.A. Catalytic change of C1-C4-alkanes//International Journal of Control and Automation, 2020, 13(2), стр. 827–835.
4. Mamadoliev, I.I., Fayzullaev, N.I., Khalikov, K.M. Synthesis of high silicon of zeolites and their sorption properties//International Journal of Control and Automation, 2020, 13(2), стр. 703–709.
5. Mamadoliev, I.I., Fayzullaev, N.I.Optimization of the activation conditions of high silicon zeolite//International Journal of Advanced Science and Technology, 2020, 29(3), стр. 6807–6813.
6. Aslanov, S.C., Buxorov, A.Q., Fayzullayev, N.I. Catalytic synthesis of C2-C4-alkenes from dimethyl ether// International Journal of Engineering Trends and Technology, 2021, 69(4), стр. 67–75

7. F N Temirov, J Kh Khamroyev, N I Fayzullayev, G Sh Haydarov and M Kh Jalilov. Hydrothermal synthesis of zeolite HSZ-30 based on kaolin// IOP Conf. Series: Earth and Environmental Science 839 (2021) 042099 IOP Publishing doi:10.1088/1755-1315/839/4/042099
8. Шабанова Н. А., Корнеева Т. В., Фролов Ю. Е. Структурообразование в золях кремниевой кислоты // Получение и применение гидрозолей кремнезема МХТИ. – 1979. – № 107. – P. 65-71.
9. Fayzullaev, N.I, Bobomurodova, S.Y, Xolmuminova, D.A Physico-chemical and texture characteristics of Zn-Zr/VKTS catalyst//Journal of Critical Reviews, 2020, 7(7), стр. 917–920
10. B.Sh.Shukurov., Sh.B.Raxmatov., N.I.Fayzullayev. Kaolindan yuqori kremniyli seolitlar olish// SamDU, Ilmiy axborotnomasi. 2018-yil, 5-son (109), 106-111-betlar.
11. .Мухторович С. Ғ. АНТОНИМИК ТАРЖИМА НИМА? //Eurasian Journal of Academic Research. – 2021. – Т. 1. – №. 9. – С. 564-573.
12. Mahammadovna S. I. Needs snd Factors for Developing Professional and Creative Abilities of Students of Higher Educational Institutions //Annals of the Romanian Society for Cell Biology. – 2021. – Т. 25. – №. 6. – С. 2804-2810.
13. Iroda M. et al. Rational Methods Awakening and Stimulating University Students Professional and Creative Abilities //Eastern European Scientific Journal. – 2019. – №. 1.
14. Khamidovna P. O. Students develop communication culture pedagogical-psychological factors //Berlin Studies Transnational Journal of Science and Humanities. – 2021. – Т. 1. – №. 1.5 Pedagogical sciences.
15. Khamidovna P. O., Saidovna R. D., Bakhtiyarovna Y. B. THE ROLE OF COMMUNICATION AND INDEPENDENT THINKING IN THE DEVELOPMENT OF STUDENTS'CREATIVE ABILITY //Berlin Studies Transnational Journal of Science and Humanities. – 2021. – Т. 1. – №. 1.5 Pedagogical sciences.
16. Saidovna R. D. SYSTEMATIC APPROACH TO THE DEVELOPMENT OF STUDENTS'CREATIVE ABILITIES //Berlin Studies Transnational Journal of Science and Humanities. – 2021. – Т. 1. – №. 1.5 Pedagogical sciences.
17. Bakhtiyarovna Y. B. A modern method of independent teaching the role of the distance education system information //Berlin Studies Transnational Journal of Science and Humanities. – 2021. – Т. 1. – №. 1.5 Pedagogical sciences.
18. .Salijanovna S. Y. et al. Promotion And Campaigning for The Presidential Election in New Uzbekistan //Zien Journal of Social Sciences and Humanities. – 2021. – Т. 1. – №. 1. – С. 123-125.
19. Nazikhovna G. Y. PROGRAMMING AND ROBOTICS BASED IN STEAM LEARNING //American Journal of Interdisciplinary Research and Development. – 2022. – Т. 2. – С. 58-87.
20. Yunusova G. N. THE PROGRAM FRONT PAGE-PROGRAM OF MAKING WEB PAGE AND E-BOOK //Scientific Bulletin of Namangan State University. – 2020. – Т. 2. – №. 3. – С. 230-233.