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SCIENTIFIC RESEARCH OF CLEANING OF SALT LAYERS OF COAL PROCESSING EQUIPMENT USED FOR OBTAINING FUEL FROM COAL AND PLANT WASTE

ANNOTATION

In this article, samples were taken from brine layers of heat exchangers and coal reprocessing equipment and their chemical composition was determined using various methods. In addition, the results of the atomic absorption spectrophotometer (AAC-spectrum) related to NaX zeolite are presented.

The results of chemical analysis of entities formed in the device created for the process of obtaining liquid fuel obtained from coal and factory waste have been scientifically studied. In order to obtain high-quality coal products, it is necessary to develop the technology of coal enrichment in a complex way. For this purpose, a new flotation reagent will be developed, its physicochemical properties, efficiency in flotation enrichment, and coal gas extraction technology require development. In these processes, there are layers of salt, and it is necessary to develop chemical reagents that dissolve these layers in a complex manner. Preliminary scientific results were obtained for this and presented in this article.

Keywords: smelter, coal processing plant, brine, slag, fuel, flotation reagent, gravity, chemical reagent, coal source.

KO‘MIR VA ZAVOD CHIQINDILARIDAN YONILG‘I OLISH UCHUN ISHLAB CHIQILGAN KO‘MIRNI QAYTA ISHLOV BERISH USKUNALARINI TUZLI QATLAMLARDAN TOZALASHNING ILMIY TADQIQI

ANNOTATSIYA

Ushbu maqolada issiqlik almashinuvchi hamda ko‘mirni qayta uskunalarini tuzli qatlamlardan namunalar olingan hamda turli usullar yordamida kimyoviy tarkibi aniqlangan. Bundan tashqari Atomic Absorption Spectrophotometer (AAC-spektr) dan olingan natija tasviri natijalarining NaX seoliti bilan bog‘likligi haqidagi ilmiy natijalari keltirilgan.

Ko‘mir va zavod chiqindilaridan olingan suyuq yoqilg‘i olish jarayoni uchun yaratilgan qurilmada hosil bo‘ladigan qurumlarning kimyoviy tahlil natijalari ilmiy o‘rganilgan. Sifatli ko‘mir maxsulotlarini olish uchun ko‘mirni kompleks usulda boyitish texnologiyasi ishlab chiqish talab etiladi. Buning uchun esa yangi flotoreagent ishlab chiqiladi, uning fizik-kimyoviy xossalari, flotatsion boyitishdagi samaradorligi hamda ko‘mirdan gaz olish texnologiyasi ishlab chiqilishni talab etadi. Bu jarayonlarda esa tuz qatlamlari hosi bo‘ladi hamda ushbu qatlamlarni kompleks holda erituvchi kimyoviy reagentlar ishlab chiqish zarur. Buning uchun dastlabgi ilmiy natijalar olindi va ushbu maqolada keltirilgan.

Kalit so‘zlar: erituvchi, ko‘mirni qayta ishlovchi qurilma, tuzli qatlam, shlak, yoqilg‘i, flotatsiyon reagent, gravitatsiya, kimyoviy reagent, ko‘mir manbai

НАУЧНЫЕ ИССЛЕДОВАНИЯ ПО ОЧИСТКЕ СОЛЯНЫХ СЛОЕВ УГЛЕОБРАБАТЫВАЮЩЕГО ОБОРУДОВАНИЯ, ИСПОЛЬЗУЕМОГО ДЛЯ ПОЛУЧЕНИЯ ТОПЛИВА ИЗ УГЛЯ И ОТХОДОВ ЗАВОДОВ

АННОТАЦИЯ

В данной статье были взяты пробы из слоев рассола теплообменников и углеперерабатывающего оборудования и определен их химический состав различными методами. Кроме того, представлены результаты атомно-абсорбционного спектрофотометра (ААС-спектр) на цеолите NaX.

Научно изучены результаты химического анализа образований, образующихся в устройстве, созданном для процесса получения жидкого топлива, полученного из угля и отходов предприятий. Для получения высококачественной угольной продукции необходимо комплексно развивать технологию обогащения угля. Для этого будет разработан новый флотореагент, требуют разработки его физико-химические свойства, эффективность при флотационном обогащении, технология извлечения угольного газа. В этих процессах присутствуют слои соли, и необходимо разработать химические реагенты, которые комплексно растворяют эти слои. Для этого были получены и представлены в данной статье предварительные научные результаты.

Ключевые слова: плавильный завод, углеперерабатывающий завод, рассол, шлак, топливо, флотореагент, сила тяжести, химический реагент, источник угля

Introduction

All over the world, the problem of cleaning sediment bodies in technological and heat exchange equipment, as well as pipes, is very urgent. The need to carry out work to ensure the smooth operation of heating devices is a very important problem [1].

One of the main problems faced by organizations is the formation of solid deposits on the inner surface of pipes of boiler houses and coal processing devices, heat exchangers and heat stations [2].

The formation of these deposits leads to serious energy losses. These losses can reach 60%. the growth of sediments significantly reduces heat transfer [3].

Large deposits can completely block system performance, cause clogging, accelerate corrosion, and ultimately destroy expensive equipment [4].

All these problems occur in water heating boilers for feeding heating networks, as a rule, because there are no water treatment facilities or those installed are already morally and physically outdated. Technical water is often supplied to the heating system without necessary cleaning and preparation. At the same time, the reliability and efficiency of the coal processing unit, boiler, heat-energy and other similar equipment depends to a large extent on the efficiency of the water treatment performed [5].

As a result of the rapid growth of the population in the republic and the development of entrepreneurship and businesses, the supply of energy to the population is becoming more and more urgent [6].

Oil and gas reserves are decreasing, demand for alternative energy sources is increasing, processing of solid fuel [7], tar and other industrial waste is an urgent problem [8].

One of the most effective ways to solve this problem is to develop new methods of obtaining alternative fuel by processing coal resources [9].

For large-scale use of coal fuel, beneficiation and processing of low-quality coal and introduction of advanced technologies are important. The formation of salt layers in the equipment used during coal processing also has a negative effect on economic and quality indicators [10].

Therefore, the study of the composition and structure of sediments and corrosion products is a necessary step in the development of chemical cleaning technology of thermal electrical equipment [11].

The reason for this is that different chemical reagents and different technological modes (temperature, cleaning time) should be used to destroy and remove different deposits [12].

It should be remembered that the properties of sediments with the same or similar chemical composition may differ depending on the structure [13].

For example, the rate of dissolution of iron oxide deposits depends on the symmetry of the crystal lattice [14].

Cleaning pipelines from solid salt deposits accumulated during the operation of oil wells is also a serious problem. Current cleaning methods only remove a limited amount of salt deposits [15].

Previous studies have shown that one of the ways to expand the possibilities of cleaning pipes from salt deposits is the use of electrohydropulse technology, the essence of which is to load the treated object with impulse forces caused by high-voltage electric discharge [16].

When separation occurs in the interior of a liquid-filled pipe, the salt deposits and the pipe wall are subjected to impulse pressure, causing elastic deformation of the pipe wall, and the resulting hydrodynamic flows facilitate the destruction and removal process [17].

Experimental

AAC-spectrum (SHIMADZU AA-700 Atomic Absorption Spectrophotometer) was investigated in AAC spectrometry. This device detects elements in liquid or solid samples by using characteristic wavelengths of electromagnetic radiation from an atomic absorption spectrometry (AAS) light source. Individual elements absorb wavelengths differently, and these absorbances are measured against standards.

A scanning electron microscope (SEM) is a type of electron microscope that produces images of a sample by scanning a surface with a beam of focused electrons. Electrons interact with atoms in the sample, producing a variety of signals that contain information about the surface topography and composition of the sample.

Results and discussion

Taking into account the large number of heat exchangers with aluminum content in the Republic of Uzbekistan, the process of cleaning them has not yet been developed. It follows that the cleaning of heat exchanger equipment with aluminum content imported from abroad is considered one of the urgent issues today.

To determine the amount of NaX zeolite used in the AAC-spectrum device, the NaX zeolite used in the factory was taken and left in a drying oven at 200^{o}C for 2-3 hours (Fig. 1).

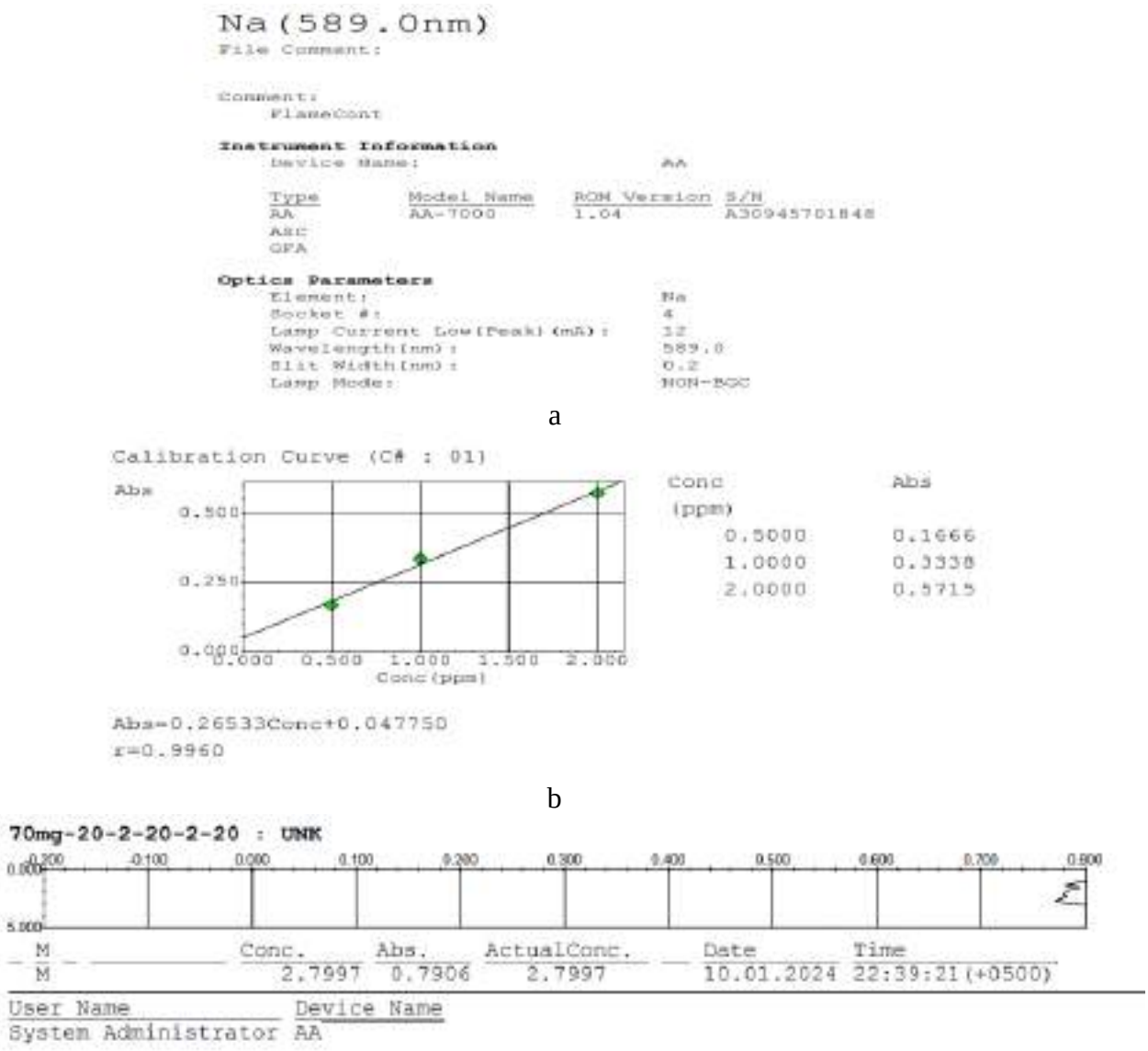


Fig. 1. Result image from AAC-spectrum

The AAC lists the parameters given for the analysis of Na, which are suitable for the Na ion when Na is at 589.0 nm. Other than this point, the result of the analysis is wrong (Fig. 1a). 0.5- 1- 2 ppm is compared to the standard Na ion concentration. This proves that the result is accurate when checked through a reference solution. Abs Na has an optical density of 0.1666 at 0.5 ppm or 0.3338 at 1, and a rise appears on the graph corresponding to this reading. The table shows that the linear line y=ax+b results are on the same line, and based on the difference with the standard, we can accurately check the amount of Na metal. Here, Abs=0.2633 cons+0.04775 is Y=ax+b, that is, the results are calculated. R=0.996 is the coefficient of lying on the correlation line, Fig. 1b. It is possible to determine the amount of Na ion from the graphic image when the device quantitatively analyzes the results (Fig. 1-c).

After volatilization of the organic matter, the zeolite with NaX was ground. AAC-Analysis The NaX-containing zeolite used was analyzed by AAC (Table 1).

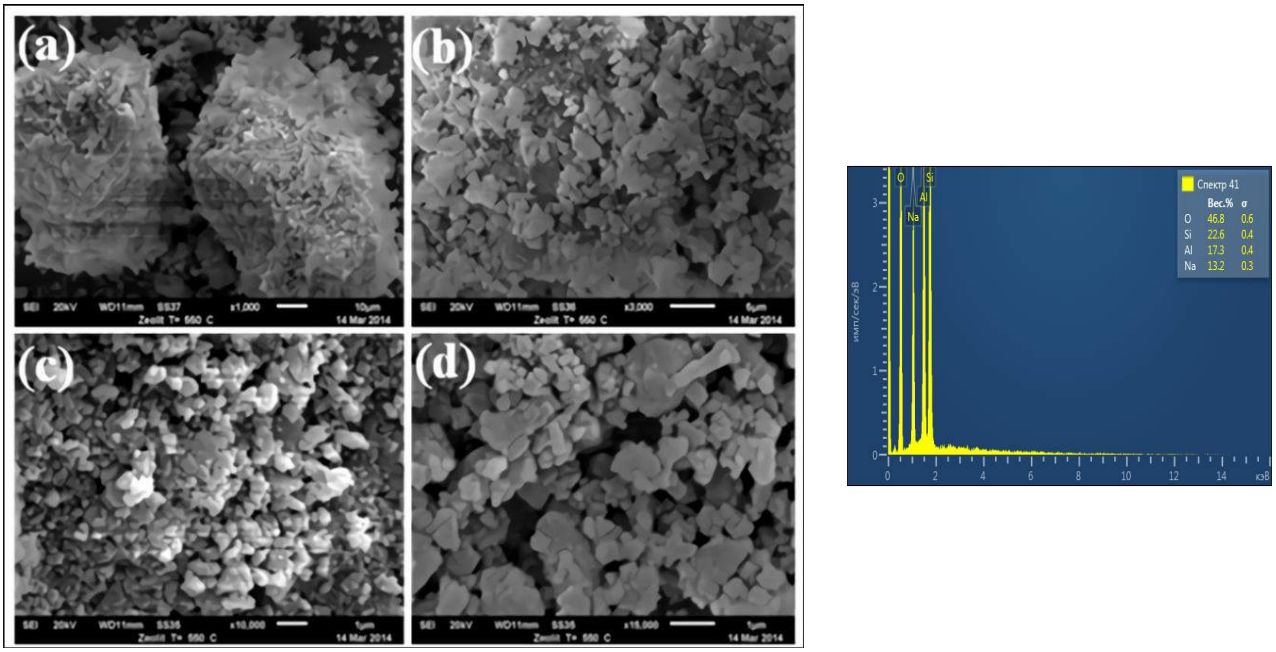
Table 1

Percentage of NaX zeolite determined by AAC-spectrometry.

Name	Quantitative analysis	Quantitative
NaX zeolite ser180/01 (used)	Na	6,87 %
NaX zeolite ser180/01 (not used)	Na	7,25%

The difference between Na content in used and unused samples of NaX zeolite was scientifically explained. The resulting spent NaX zeolite can be reused. It needs to be chemically treated for reuse.

The main focus of our solution when cleaning aluminum heat exchanger equipment is to prevent it from reacting with aluminum. Aluminum reacts quickly with acids. It was found that the composition of sedimentary bodies consists of NaX zeolite bodies when analyzing the solids solidifying in the aluminum heat exchanger equipment used in the Mubarak gas processing plant. It was found that the zeolites used in the aluminum heat exchanger equipment are drying up.



А) Б)

Fig. 2. Scanning electron microscope image of NaXL adsorbent (A) elemental composition (B).

The SEM images of the sample clearly show that the sample exists as a porous material, which is one of the important characteristics of a heterogeneous catalyst. The image taken at 1000x magnification showed the presence of clusters, and agglomeration of particles was observed on the surface of the sample. Closer inspection of the cluster at 3000x magnification revealed grains of various sizes and shapes scattered across the surface. A further increase in magnification to 10,000x shows that when the image is formed, three different shapes of particles can be distinguished in general, i.e. cubic, rectangular and irregular. These crystalline forms are more clearly visible in the image taken at the highest magnification (15000 x). It can be seen that the different crystal shape of zeolite-X crystal (octahedral) is the different crystal shape of zeolite-X.The efficiency of the process depends on the properties of the flotation agents used. Flotation agents create favorable conditions for flotation of enriched coal particles. As a flotation agent in the enrichment process, collectors and foaming agents are used together as a complex reagent.

Foam formers are organic surfactants that form an adsorption film on the outer layer of the foam and increase the stability of the foam. Collectors are organic substances whose molecules are composed of non-polar (hydrocarbon) and polar (carboxyl, hydroxyl, etc.) parts. These substances are adsorbed on the surface of coal with their polar part and dramatically increase the hydrophobicity of coal. As a result, hydrophobic coal particles accumulate on the surface of the bubbles and float to the surface of the liquid. The resulting concentrate is separated and dried.

Angren lignite grade 2BR-B2 had a mineral content of 52% before beneficiation (see Figure 5). The amount of minerals when enriched with water on the first stage sieve was 25.7%. The size of the fraction is between 3-100 mm and the moisture content is 27-35%. After the second stage gravity drum enrichment, the amount of minerals was 30.9%. Moisture was 26.5% after filtering the coal samples. the amount of minerals decreased to 25.7% and the moisture content was 24-30% when enriched in the third stage flotation reactor. The coal suspension is filtered and dewatered in a simple way.

Conclusion

The physico-mechanical properties and chemical composition of lignite were studied, the main parameters of beneficiation and optimal conditions for demineralization in an aqueous environment were determined. Factors affecting the heat of combustion were studied.

Modern AAC (atomic absorption spectrometry) equipment was used to determine NaX zeolite. According to the results of the equipment, it was determined that the composition of the alloy obtained from the aluminum heat exchanger equipment contained 8.07% of Na metal. The results were analyzed and scientifically interpreted by taking SEM images.

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