МОНГОЛЬСКОЕ ПЛАТО

2017

СЕКЦИЯ 2
ГЕОЭКОЛОГИЧЕСКИЕ И ГЕОХИМИЧЕСКИЕ ПРОБЛЕМЫ ПРИРОДОПОЛЬЗОВАНИЯ

SESSION 2. GEOECOLOGICAL AND GEOCHEMICAL PROBLEMS OF NATURE USE

Results and future developments of collaboration between BINM, SB RAS and ICCT, MAS

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Результаты и перспективы сотрудничества между БИП СО РАН и ИХХТ АНМ

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Mongolia is one of the top ten countries with large coal resources. Coal is the major energy source among fossil fuels in the country because of its wide distribution and easy availability. Total geological resources of coal are 173 billion tones.

Activated carbon which is a versatile adsorbent because of its good adsorption properties can be produced from a variety of raw materials. Among them, coal is the most commonly used precursor due to its low cost and large supply.

The Institute of Chemistry and Chemical Technology, MAS and Baikal Institute of Nature Management SB RAS have been collaborated fruitfully more than 10 years in the field of coal chemistry and technology. As a results of collaboration have been published several joint papers, book and patent and also organized joint conferences, workshops and seminars.

As a latest example of our collaboration is the objective of the present work was to study the possibility to obtain adsorbent materials from Mongolian coals by conventional physical method.The main technical properties of Mongolian coal of Nariinsukhait were determined and processed by pyrolysis and thermolysis. Have been characterized the obtained solid and liquid products.

Mongolian high rank coal of Nariinsukhait was used as raw material to prepare activated carbon by physical activation method. The proximate, ultimate, andthermogravimetric analysis (TGA), scanning electron microscopy, surface area, and pore size distribution analysis were used to characterize the surface properties of activated carbonsand initial raw coal of Nariinsukhait. The effect of coal grade on the adsorption properties of the carbons were studied. Thecarbonizationexperimentwasperformedusing TGA instrument in argon, at a temperaturerange of 25-1120 °C, withheatingrate of 40°C/min. ThemasslossforNariinsukhaitcoalwas in case of carbonization 30.6 % respectively.Activated carbon obtained from Naryn sukhait coal had highest yield (66.1%), lowest ash content (7.1%), high iodine adsorption (420 mg/g), surface area (402 m^2) and highest total pore volume (0.54 ml/g).

Aquatic environment coliform monitoring research of the Rivers Kharaa and Yeruu

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Abstract. The purpose of this paper is to research aquatic environment of river Kharaa and Yeruu by confirmed method and evaluate the degree of water pollution, estimate water environment ecology changes, determine and compare outspread dimension, dynamic of coli form bacteria occurrences from water temperature.

Keywords: thermotolerant, bacteria, coliform

Мониторинг колиформ в реках Хараа и Еруу

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INTRODUCTION

The climate changes expected will also affect the quality of water resources. Higher water temperatures increase the likelihood of blooms of toxic algae and bacteria occurring in surface water [1]. To evaluate water sanitary quality is have to analyze any pathogen in that water. If there are more than 500 microbe, considering that water is dirty and disallow to use for drinking water. The microorganism of water is depends on many factors. Such as water temperature, pH, osmotic pressure, water deepness, aeration and sun optical reflection [3].

Coliform bacteria are a commonly used indicator of sanitary quality of foods and water. They are defined as rod-shaped Gram-negative non-spore forming and motile or non-motile bacteria which can utilize and cleavage lactose to acid and gas. The temperature optimum for growth are between 35 and 37°C. Coliform bacteria can be found in the aquatic environment, in soil and on plants; they are universally present in large numbers in the feces of warm-blooded animals [2].

Determination of coli index is important to monitor drink water quality. The coli index is a rating of the purity of water based on a count of intestinal bacteria. It must be less than 3 in water supply water and less than 10 in water abyssinian well of Mongolia. The coli titer is a minimal water volume amount to detect the coliform. It must be more than 300 in water supply water and more than 100 in water abyssinian well [4].

Therefore it is necessary to determine amount of coliform bacteria and thermotolerant coliform bacteria, also temperature and turbidity of water samples in our research for water monitoring of Kharaa and Yeruu river environments.

RESEARCH METHOD AND RESULTS

We have worked by following objectives to implement the purpose.

- use and improve currently applying methods
- carrying of field research and taking samples from necessary points
- determination of bacteria numbers of coli groups
- collected data evaluation and discussion of achieved results

We have used DelAguaportable water testing Kit tool for our research measurement. The field research had to estimate the number of total coli-form bacteria and thermo-tolerant coli-form bacteria of Kharaa and Yeruu river water environments between 5th and 14th September 2016.

Therefore we have taken samples from 12 monitoring points to explore coli-form bacteria and thermotolerant coli-form bacteria. For our researches we have prepared cultivation media and sterilized by our common elaborated methods, samples were placed and cultivated in these media (Figure 1). Yellow culture colonies are coli-form bacteria.

Figure 1. Field research and cultivated coliform bacteria

The following table 1 shows results of estimated coli-form bacteria and thermo-tolerant coli-form bacteria's numbers in 12 collected samples from monitoring points.

Table1. Locations of monitoring points and average numbers of coli-form bacteria and thermo-tolerant coli-form bacteria

point	Location	Coli-forms			Thermo-tolerant	Coli-form average
1	Sugnugur	75	7	99	63	60.3
2	Gatsuurt	77	68	78	45	74.3
3	Balj	77	68	78	45	74.3
4	Kharaa	43	83	72	49	66.0
5	Yalbag river	44	14	73	40	29.0
6	Yeroo	2	4	80	38	3.0
7	Boroo	14	13	40	53	13.5
8	Kharaa	0	0	35	33	0.0
9	Kharaa /Salkhit/	26	20	32	37	23.0
10	Kharaa /Headbuilding, burentolgoi/	207	14	20	44	110.5
11	Orkhon river	11	3	4	50	7.0
12	Shariingol	44	39	15	49	41.5
13	Yeruu River /Dulaankhan/	0	0	8	49	0.0
14	Darkhan WW	39	200	22	42	119.5

From this results we can see there are not detected coli-form bacteria in 100 ml water around Baruunkharaa of river Kharaa and around Dulaankhan of river Yeruu, the number of coli-form bacteria was less (3-13) in samples of river Yeruu, Boroo and Orkhon. But the occurrence of bacteria increasing and there are 30-74 coli-form bacteria in 100 ml water around Sugnugur, Gatsuurt, Balj and Kharaa rivers. Also there are much more numbers (about 110-119) coli-form bacteria in 100 ml water of Burentolgoi and Darkhan samples.

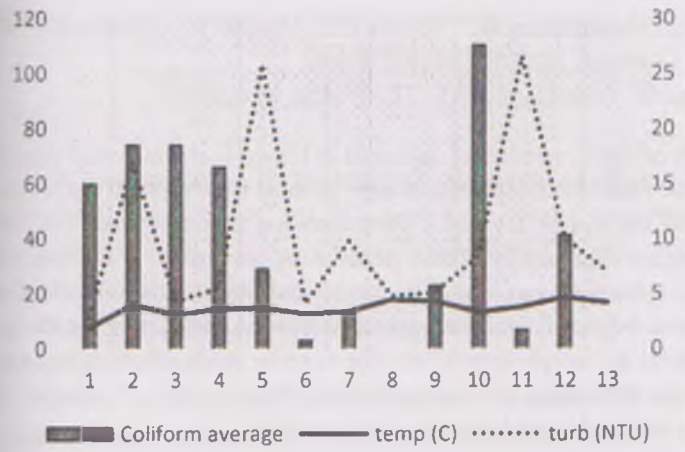

Figure 2. Graphics of coliform bacteria's average amounts, temperature, turbidity

Next figure 2 shows the average number of coli-form bacteria, temperature and turbidity values of water while taking samples.

From above achieved results we can see the number of thermo-tolerant coli-form bacteria of Sugnugur, Boroo, Orkhon Rivers are much higher (more than 50) in comparing to another samples from monitoring points. However there are about 33-38 thermo-tolerant coli-form bacteria in river Yeruu and Yalbag.

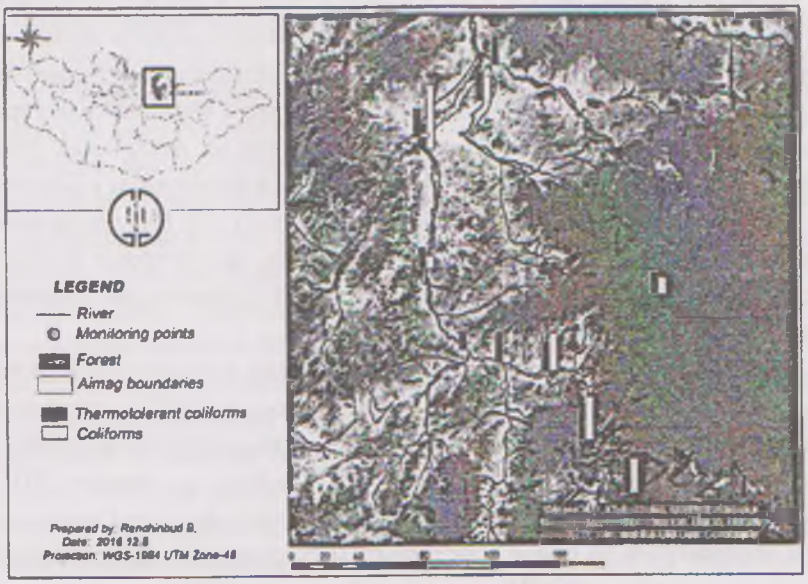

Figure 3. Transpired exposure of coliform bacteria and thermotolerant coliform bacteriain monitoring points

CONCLUSION

Analyzing the measured and estimated results from samples of field research, the amounts of thermo-tolerant coli-form bacteria were extra high (more than 50) in Sugnugur, Boroo, Orkhon rivers compared to other sample points and there are detected no coli-form bacteria in 100 ml water around Baruunkharaa of river Kharaa and around Dulaankhan ofriver Yeruu. There are 3-13 coli-form in 100 ml water samples of river Yeruu, Boroo and Orkhon, 30-74 coli-form bacteria in 100 ml water around Sugnugur, Gatsuurt, Balj and Kharaa rivers, 110-119 coli-form bacteria in 100 ml water samples of Burentolgoi and Darkhan.

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Структурная реорганизация гуминовых веществ углей монгольских месторождений в процессе щелочного гидролиза

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Structural organization of humic substances of coal during alkaline hydrolysis

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Abstract. The changes in the structural organization of humic substances contained in brown coal which take place in the process of their alkaline hydrolysis have been studied. These humic substances were isolated from some of the Mongolian deposits. The composition of ashy elements in initial and hydrolyzed humic substances has been analyzed. The functional composition of humic substances has been thoroughly examined by IR and electronic spectroscopy. It is shown that during alkaline hydrolysis, the oxidation level of all samples increases, and their water solubility exhibits multifold enhancement. Functional groups of humic substances are freed from mineral components and become ionized in the alkaline medium. It is noted that in the course of alkaline hydrolysis the morphology of the objects under study demonstrates a homotypic change towards a looser structure caused by reconfiguration of macromolecules. Varied effects of alkaline hydrolysis on the molecular structure of humic substances contained in coal increases their reactivity.

Key words: humic substances, coal, structure, morphology, alkaline hydrolysis.

Гуминовые вещества (ГВ), выделяемые из различных природных источников, широко используются, в том числе и в медицине в качестве противовоспалительных и антисептических средств наружного применения, а также антиоксидантов [5, 3]. Полимерная высокоразветвленная структура и широкий функционализированный состав гуминовых веществ [4] обуславливает их биоактивное воздействие на организм [5]. При разработке новых лекарственных препаратов с увеличенной терапевтической активностью нами использованы гуминовые вещества, извлеченные из различных природных источников Монголии [6, 8]. На основе матриц различных ГВ созданы нанокомпозиты с благородными металлами, для которых установлена высокая антиоксидантная активность [1, 4]. Для увеличения реакционной способности ГВ может быть проведен гидролиз в щелочной среде, при котором их матрицы активируются. Целью данного исследования является изучение структурной организации полимерной матрицы гуминовых веществ углей в процессе щелочного гидролиза.

В качестве объектов исследования использовали гуминовые вещества бурого угля (ГВ уг) из месторождения Бага Нуур ($41°39'4''N$ и $108°17'50''E$), разведанного в 1980 г., находящегося в центральном районе Монголии в долине Тавансувай в бассейне реки Хэрлэн на территории Бага нуурского дуурэ в 130 км от г. Улаанбаатара,. Ресурсы углей составляют 812 млрд т по данным 2015 г. [2]. Ежегодно из месторождения извлекается около 3 млн т угля. ГВ, представляющие собой черно-коричневые порошки, выделены щелочной экстракцией по ранее описанным методикам [8]. Дополнительный щелочной гидролиз ГВ проводили в растворе 0.1 н NaOH в течение 15 мин при 90 °C.