ҚР БІЛІМ ЖӘНЕ ҒЫЛЫМ МИНИСТРЛІГІ

ӘЛ-ФАРАБИ АТ.ҚАЗАҚ ҰЛТТЫҚ УНИВЕРСИТЕТІ

ЭКСПЕРИМЕНТТІК ЖӘНЕ ТЕОРИЯЛЫҚ ФИЗИКА ҒЫЛЫМИ-ЗЕРТТЕУ ИНСТИТУТЫ

АШЫҚ ТҮРДЕГІ ҰЛТТЫҚ НАНОТЕХНОЛОГИЯЛЫҚ ЗЕРТХАНА

MINISTRY OF EDUCATION AND SCIENCE RK

AL-FARABI KAZAKH NATIONAL UNIVERSITY

SCIENTIFIC RESEARCH INSTITUTE OF EXPERIMENTAL AND THEORETICAL PHYSICS

NATIONAL NANOTECHNOLOGY OPEN LABORATORY

«ФИЗИКАНЫҢ ЗАМАНАУИ ЖЕТІСТІКТЕРІ ЖӘНЕ ІРГЕЛІ ФИЗИКАЛЫҚ БІЛІМ БЕРУ» атты

9-шы Халықаралық ғылыми конференцияның

ТЕЗИСТЕР ЖИНАҒЫ

12-14 қазан, 2016, Алматы, Қазақстан

СБОРНИК ТЕЗИСОВ

9-ой Международной научной конференции

«СОВРЕМЕННЫЕ ДОСТИЖЕНИЯ ФИЗИКИ И ФУНДАМЕНТАЛЬНОЕ ФИЗИЧЕСКОЕ ОБРАЗОВАНИЕ»

12-14 октября, 2016, Алматы, Казахстан

BOOK OF ABSTRACTS

of the 9th International Scientific Conference

«MODERN ACHIEVEMENTS OF PHYSICS AND FUNDAMENTAL PHYSICAL EDUCATION»

October, 12-14, 2016, Kazakhstan, Almaty

Алматы
«Қазақ университеті»
2016

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Regulation of the quality of the environment must ensure environmental safety of the population and the preservation of the gene pool, to ensure rational use and reproduction of natural resources in the context of sustainable development of economic activities.

Environmental regulation is one of the most effective means of environmental protection and rational use of natural resources [1]. The permissible load on the ecosystem is regulated and the boundaries of the impact of economic activity on the environment are established with it.

As a general and informative indicator of air pollution is acomprehensive pollution index(CPI)-complex index of annual average atmospheric pollution. Its quantitative ranking by the class of state of the atmosphere is shown in table 1.

Table 1

Indicators	Classes of ecological status of the atmosphere			
	Rates(N)	risk (R)	crisis (K)	Disasters (D)
Levels of air pollution	<5	5-8	8-15	>15

Air pollution in the city of Almaty is an acute environmental problem, which is complicated by the geographic and climatic conditions. For the study of air pollution in the city estimates of the content of harmful substances in the atmosphere of the city were analyzed. Accounts for air pollution in the city Almaty are lead with 5 types of pollutants.

By the program “Era-Air” the maximum one-time emissions and surface concentration for enterprise TPP-2 of Almaty that burn high-ash Ekibastuz coal were calculated. The installed power capacity of TPP-2 -510 megavolt, thermal capacity - 1176 Gcal/h.

Basic characteristics of Ekibastuz coal, which is burnt at TPP-2, are shown in Table 2.

Software package of “Era-Air” is devoted to a wide range of problems in the field of air associated with the calculations of air pollution.

Using the program in the work single emission ash, oxides of sulfur, carbon, nitrogen, which formed from the combustion of Ekibastuz coal, characteristics, which are listed above, with the height of the chimney 120 meters were calculated.The calculation results are shown in Table 3.

According to our calculations, during the burning of high-ash coal, the maximum amount of one-off emissions from a point source exceed at 10 times the maximum single concentration, therefore, the average daily concentration will also be significantly higher than the maximum permissible concentration.

As can be seen from the calculation, the maximum surface concentration of greenhouse gases exceeds the average daily concentration.

It was found that the burning of Ekibastuz coal emits large amounts of pollutants, the concentration of which exceeds the maximum single and daily average concentration of impurities, on average, 2 times the permissible limit values of maximum permissible concentration. This leads to an increase in complex index of air pollution of the city of Almaty, which is higher than officially known air pollution index is 12. CPI normally should not exceed 5. The calculated figure shows the complex exceeded air pollution of the city of Almaty in 2 times

In this regard, our work provides a new way to reduce greenhouse gas emissions on the atmosphere. Different ways of disposing of greenhouse gases contained in industrial emissions widely used in practice. However, it may be appropriate to reduce emissions by improving the quality of fuel burned, increase the efficiency of its combustion. To modify the Ekibastuz coal quality in our work, we conducted research on the effect of electron beam processing on the physical and chemical properties of coal, increasing the efficiency of its combustion in order to reduce emissions

We studied the impact of the accelerated electron beam on the structure of coal. Experiments on radiation processing of coal were carried out on an electron accelerator ILU-8. Accelerator generate electrons with an energy of 1.3 MeV, power of dose vary from 0.19 to 0.33 Mrad/s, the total dose of absorption - from 10 to 200 Mrad/s, the total dose of uptake - from 10 to 200Mrad. The temperature of the coal layer thickness of 7 mm was monitored using a thermocouple and maintained in the range 60-70 and 250-260°C.

Preliminary electron beam processing of coal results in lower emissions reduces the amount of ash and reduces the maximum one-time emissions (table 2-3) at least from 0.6% to 9% for the different greenhouse gases.

Table 2

Fuel	humidity W_p %	volatility, V_{daf} %	lfur,S_d %	ash content., A_d%	carbohydrates., C_{daf} %	hydrogen H_{daf} %	nitrogen, N_{daf} %	oxygen., O_{daf} %	combustion heat, Q_P MJ / kg
no exposure	8.43	28	0.7	43	43.3	2.64	0.79	6.07	16.83
Radiation	6.41	26	0.5	39	45	3.1	0.7	7.2	16.5

Results of calculation of the maximum single-emission (by the program “Era”) are shown in Table 3.

Table 3

Fuel	Maximum one-time emissions, g/s			
	Ash	sulfur dioxide SO_2	nitrogen oxides NO	carbon monoxide M_{CO}
no exposure	57.91	12.6	3	16
radiation	52.6	9	3.08	15

In view of the above, results, which obtained in this study may help to solve the problems associated with the implementation of Kazakhstan's commitment to reduce air pollution, the development of green economy.

Conducting pilot tests of the electron beam by a point is necessary for the widespread introduction of the proposed method directed to modification of fuel, improving the quality of the environment. Industrial electron accelerator ILU-8 capacity of 95 kilowatts works in the industrial park of Almaty, which has high performance and can be used technologically complex by electron beam processing of different materials.

This work was financially supported by Scientific Committee of MES (grant №3481 / GF4).

References

1. V.Zykov, Chernyshev V. Introduction to environmental metrology and environmental valuation: Method Manual. –People's Friendship University, from 2003-24p.

2. Mazhrenova N. Environmental aspects of the use of powerful beams of accelerated electrons in the complex processing of natural raw materials. KSU Series Environmental №1, 1996.,71-79pp.

3. Mazhrenova N. Investigations on radiation progressing in Kazakhstan J.Radiat.Phys. Chem. 1995, Vol. 46, №4-6, 1401-1404 pp.

4. Serikov E. Thermal energy systems and energy use in the industrial process heat production. Study benefit.- Almaty AIPET 2006p.

5. Ryzhkin V. Thermal power plants, -M:Energy, 1987 – 328 p.

6. Askarova A., Mazhrenova N. Environmental problems of the energy sector of Kazakhstan and unconventional ways of solving them Almaty: Kazakh University, 1997 - 202 p.

ТЕРМОДИНАМИЧЕСКАЯ МОДЕЛЬ ВЯЗКОСТИ СМАЗОЧНОГО МАТЕРИАЛА

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Выделим элементарный напряженно-деформированный объем смазочного материала. Будем считать, что он погружен в термостат - невозмущенная часть смазочного материала. Квантовые переходы, связанные с полем деформаций, приводят к диссипации энергии внешнего поля. Если считать, что выделенный объем обменивается с термостатом только энергией, то соответствующий ансамбль частиц выделенного элементарного объема будет каноническим. Функция отклика такого ансамбля на внешнее воздействие получена в работе [1]. Если в качестве функции отклика взять кинематическую вязкость ν, то получим следующее выражение:

$$\nu = C \cdot \frac{A}{G^0}, \qquad (1)$$

где G^0 - энергия Гиббса термостата, A - работа внешних сил, C - постоянная.

Энергия внешних сил расходуется на разрыв молекулярных связей смазочного материала и равна $A = \sigma \cdot S$ (σ - поверхностное натяжение, S - площадь поверхности элементарного объема). Тогда уравнение (1) примет вид:

$$\nu = C \cdot \frac{\sigma}{G^0}, \qquad (2)$$

Уравнение (2) выражает связь между кинематической вязкостью и поверхностным натяжением жидкой среды (смазочного материала).

По мнению ряда исследователей вязкость и поверхностное натяжение – абсолютно независимые величины:вязкость – это динамическое явление (поперечные силы), а поверхно-

Ғылыми басылым

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9-шы Халықаралық ғылыми конференцияның
ТЕЗИСТЕР ЖИНАҒЫ
12-14 қазан, 2016, Алматы, Қазақстан

Шығарушы редакторлары *А. Шуриева*
Компьютерде бетеген *А. Иманбаева*
Мұқаба дизайны *А. Қалиева*

ИБ №
Басуға 03.10.2016 жылы қол қойылды. Формат 60x84 $^{1}/_{8}$.
Көлемі 24,5 б. т. Тапсырыс № . Таралымы 70 дана.
Әл-Фараби атындағы Қазақ ұлттық университетінің
«Қазақ университеті» баспа үйі.
Алматы қаласы, әл-Фараби даңғылы, 71.
«Қазақ университеті» баспа үйі баспаханасында басылды.