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## NamMTI ILMIY-TEXNIKA JURNALI TAHRIR HAY'ATI A'ZOLARI

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# EFFECTIVENESS ANALYSIS OF THERMALLY AND STEAM ACTIVATED PLUM SEED ADSORBENTS

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**Abstract:** The article describes the results of the activation of plum pit waste using temperature and water vapor, as well as the analysis of the composition of wastewater based on a selected sample. These adsorbents are intended for the treatment of wastewater from industrial enterprises. The research methods were carried out based on samples presented in the literature and GOST standard indicators. According to the results, the carbon sample pyrolyzed at 500°C and steam activated at 800°C demonstrated high adsorption properties and efficiency.

**Keywords:** adsorption, desorption, adsorbate, isotherm, plum seed waste, pyrolysis, steam activation, tar, ash content, moisture, iodine.

**Introduction.** Today, we all understand that people need to use available resources wisely to meet the demand for clean drinking water. Treatment and reuse of wastewater from industrial enterprises is one of the main problems of large manufacturing enterprises around the world today. We all know the process of producing active adsorbents for wastewater treatment from coal, which is the main raw material of power plants. However, the need to find other domestic options for treating wastewater from industrial enterprises, which is a natural resource, is met by the need to supply coal for electricity and heat energy. One of such domestic options is the use of local plant raw material waste.

**Methods.** In this research work, methods for obtaining activated carbons from plum seeds, which are grown in large quantities in our republic, and their activation were studied, as well as an analysis of the adsorption efficiency for iodine and industrial wastewater was conducted. Among the carbons activated by acid, alkali and water vapor, carbons activated by water vapor were selected as the most suitable due to their high adsorption efficiency indicators, and several analyses were conducted. In the analysis of iodine efficiency, a sample pyrolyzed at 500 °C and a sample activated by steaming the same sample at 800 °C were selected, and UAU (Russia) coal was used for comparison.

The next research work is to check the adsorption activity of the above samples for iodine. These research methods were carried out according to GOST 6217-74.



**Figure 1.** a). Crushed plum seeds;

b). Pyrolyzed sample;

**Experimental part.** First, the coal samples were dried in a desiccator at 110-115 °C until a constant mass was obtained. 1 g of dried coal samples were weighed and (the weighing result was recorded to the fourth decimal place), placed in a conical flask with a volume of 250 cm<sup>3</sup> and 100 cm<sup>3</sup> of potassium iodide iodine solution was added to it. Then it was closed with a lid and shaken for 15 minutes at a vibration intensity of 100-125 per minute. Then it was left to settle and after 20 minutes, 10 cm<sup>3</sup> of the solution was carefully removed from the flask using a pipette and placed in a conical flask with a capacity of 50 cm<sup>3</sup>. In this process, it is important to ensure that no coal particles fall into the flask at all. Because this measurement serves to ensure the accuracy of the result obtained. Then it was placed on a magnetic stirrer and titrated with sodium thiosulfate solution. At the end of the titration, 1 cm<sup>3</sup> of starch solution was added and titrated until the blue color disappeared and the solution became clear. At the same time, the initial iodine content in the solution was determined, for which 10 cm<sup>3</sup> of iodine solution in potassium iodide was taken and placed in a 50 cm<sup>3</sup> conical flask. At the end of the titration, the starch solution was added and titrated with sodium thiosulfate solution. Accordingly, the volume of sodium thiosulfate solution with a concentration of 0.1 mol/dm<sup>3</sup> (0.1 N) spent on titration of 10 cm<sup>3</sup> of iodine solution in potassium iodide was 9.8 cm<sup>3</sup>.

The adsorption activity of charcoal for iodine (A) was calculated in percent by the following formula:

$$A = \frac{(V_1 - V_2) * 0,0127 * 100 * 100}{10 * m}$$

where:

V<sub>1</sub> is the volume, sm<sup>3</sup>, of a 0.1 mol/dm<sup>3</sup> (0.1 N) sodium thiosulfate solution used to titrate 10 sm<sup>3</sup> of iodine solution in potassium iodide;

V<sub>2</sub> - concentration of sodium thiosulfate solution, 0.1 mol/dm<sup>3</sup> (0.1 n.), sm<sup>3</sup>, which resulted in titration of 10 sm<sup>3</sup> of iodine solution containing potassium iodide after treatment with charcoal;

0.0127 is the mass of iodine corresponding to 1 cm<sup>3</sup> of sodium thiosulfate solution, exactly 0.1 mol/dm<sup>3</sup> (0.1 n), g;

100 - volume of iodine solution in potassium iodide taken for coal cleaning, cm<sup>3</sup>;

m is the mass of the coal sample, g.

The analysis results were the arithmetic mean of two parallel divisions, the absolute difference between which should not exceed the permissible difference of 3% [1,2].

According to the results obtained, the coal sample pyrolyzed at 500 0C showed 13% adsorption activity, the coal sample pyrolyzed at 500 0C and steamed at 800 0C showed 48% adsorption activity, and the UAC coal sample showed 38% adsorption activity [3,4].

**Table 1.** Iodine capacity of samples

Adsorbents	Adsorption rate,%
Plum seed 500 °C	13
Plum seed 800 °C	48
BAU	38

The adsorption efficiency of these activated carbons was analyzed by adsorption of various adsorbates. The next analysis was carried out for the treatment of wastewater from an industrial enterprise. The wastewater of the “Pesticides” workshop of “IFODA AGROKIMYO KHIMOYA” LLC, selected for treatment, was tested using a TB 210 IR LOVIBOND water clarity tester before and after treatment. For water treatment, 200 ml of wastewater was placed in a 250 ml conical flask and stirred with a magnetic stirrer at a speed of 1000 rpm for 35-40 minutes. When the magnetic stirrer started to rotate, 6% adsorbent was added. 0.5 mm adsorbent was used for treatment. The treated wastewater was filtered for 35-40 minutes and the results were compared [5].

**Results and discussion.** The following tables present the pre- and post-treatment parameters of the wastewater selected for analysis.

**Textural indicators of water selected for treatment**

Cations	Content per liter			Other definition
	mg/l	mg - eq/l	% - eq/l	
Na <sup>+</sup>	558	24,24	60	Hardness mg - eq/l: General 16,50 Removable Constant
K <sup>+</sup>		shifts chroma		
NH <sub>4</sub> <sup>+</sup>				Carbonate 6,00
Ca <sup>2+</sup>	100	5,00	12	Non-carbonate 10,50
Mg <sup>2+</sup>	140	11,50	28	pH 7,30
Fe <sup>3+</sup>				CO <sub>2</sub> free mg/l CO <sub>2</sub> agr mg/l
Fe <sup>2+</sup>				
Total	798	40,74	100	Oxidability mg O <sub>2</sub> /l
Anions	Content per liter			SiO <sub>2</sub> mg/l H <sub>2</sub> S mg/l
	mg/l	mg - eq/l	% - eq/l	
Cl <sup>-</sup>	523	14,75	36	F mg/l
SO <sub>4</sub> <sup>2-</sup>	774	16,12	40	Dry residue: mg/l Experimental 2600 Calculated 2518
NO <sub>2</sub> <sup>-</sup>		shifts chroma		
NO <sub>3</sub> <sup>-</sup>	240	3,87	9	
CO <sub>3</sub> <sup>-</sup>		No		Physical properties: opaque specific unpleasant grayish-dark green weakly salty sediment forms when standing
HCO <sub>3</sub> <sup>-</sup>	366	6,00	15	
Total	1903	40,74	100	Transparency Smell Bloom Taste Sediment Change when standing Na+ on flame photometer mg/l
Formula for salt composition of water				
$2,6 \frac{SO_4^{40} Cl^{36} HCO_3^{15}}{Na^{60} Mg^{28} Ca^{12}}$				

\*\*summed  $\frac{1}{2}$  HCO<sub>3</sub> mg/l.

This sample of water contains 60% eq/l of Na<sup>+</sup> cation, 12% of Ca<sup>2+</sup>, and 28% of Mg<sup>2+</sup> per liter. In addition, it was found that the NH<sub>4</sub><sup>+</sup> cation is also partially present, and this is only due to the change in the color of the water.

In addition, the Cl<sup>-</sup> anion is 36% eq/l, SO<sub>4</sub><sup>-</sup> 40%, NO<sub>3</sub><sup>-</sup> 9%, and HCO<sub>3</sub><sup>-</sup> 15%, and the NO<sub>2</sub><sup>-</sup> anion is partially present in the composition, which causes the change in the color of the water.

It was also found that the water has a hardness of 16.5 mg-eq/l, a pH of 7.3, is turbid, has a specific unpleasant odor, is grayish-dark green in color, is relatively salty, and precipitates when standing still.

**Table 2.** Textural indicators of treated water

Cations	Content per liter			Other definition
	mg/l	mg - eq/l	% - eq/l	
Na <sup>+</sup>	791	34,39	72	Hardness mg - eq/l: General 12,80 Removable
K <sup>+</sup>	9	0,50	1	
NH <sub>4</sub> <sup>+</sup>				Constant 12,80
Ca <sup>2+</sup>	24	1,20	3	Carbonate No
Mg <sup>2+</sup>	141	11,60	24	Non-carbonate
Fe <sup>3+</sup>				pH 8,40
Fe <sup>2+</sup>				CO <sub>2</sub> free mg/l
Total	965	47,69	100	CO <sub>2</sub> agr mg/l
<b>Anions</b>	Content per liter			SiO <sub>2</sub> mg/l
	mg/l	mg - eq/l	% - eq/l	H <sub>2</sub> S mg/l
Cl <sup>-</sup>	539	15,20	32	F mg/l
SO <sub>4</sub> <sup>2-</sup>	667	13,90	29	Dry residue: mg/l Experimental 2850 Calculated 2750
NO <sub>2</sub> <sup>-</sup>	0,02			
NO <sub>3</sub> <sup>-</sup>	24	0,39	1	Physical properties: transparent specific unpleasant colorless weakly salty sediment forms when standing
CO <sub>3</sub> <sup>-</sup>	18	0,60	1	
HCO <sub>3</sub> <sup>-</sup>	1074	17,60	37	Transparency Smell Bloom Taste Sediment
Total	2322	47,69	100	
Formula for salt composition of water				Change when standing Na <sup>+</sup> on flame photometer mg/l
$2,85 \frac{SO_4^{29} Cl^{32} HCO_3^{37}}{Na^{72} Mg^{24}}$				

\*\*summed  $\frac{1}{2}$  HCO<sub>3</sub> mg/l.

This sample of water contained 72% Na<sup>+</sup> cation/l, 1% NH<sub>4</sub><sup>+</sup>, 3% Ca<sup>2+</sup>, and 24% Mg<sup>2+</sup> per liter. In addition, the Cl<sup>-</sup> anion was 32% eq/l, 29% SO<sub>4</sub><sup>-</sup>, 1% NO<sub>3</sub><sup>-</sup>, and 37% HCO<sub>3</sub>. In addition, it was determined that the water had a hardness of 12.8 mg-eq/l, a pH of 8.4, was transparent, had a specific unpleasant odor, was colorless, was relatively saline, and precipitated when standing still.

**Conclusion.** The adsorption activity of the steam-treated sample for iodine is almost 3.5 times higher than that of the pyrolyzed sample, indicating a higher adsorption activity than that of the control sample. Accordingly, the opening of micro- and macro-pore sizes and an increase in the number of carbons during steam and pressure treatment leads to a higher adsorption activity. In addition, the effect of activated carbon on cations and anions in the water composition, as well as on the hardness, color, odor, taste and pH of water, was determined when wastewater was treated with selected activated carbon. The results of water purification showed that it was almost 30 times higher, indicating the adsorption activity of the selected carbon.

## REFERENCES

1. ГОСТ 6217-74 Межгосударственный стандарт уголь активный древесный дробленый технические условия.
2. “Технический анализ нанопористых материалов” И.К.Гиндулин, Ю.Л.Юрьев. Екатеринбург. 2011.
3. D.S. Salixanova, Z.T. Usmonova, M. Mamajonova Technological basis of activated carbon production process through processing of plum seed waste. Scientific and Technical Journal Namangan Institute of Engineering and Technology. № -2. 128-133. (2023).
4. Usmonova Zulfiya Tokhirjonovna, Salikhanova Dilnoza Saidakbarovna, Mamadjonova Mahfora Abdulhokimovna. Analysis of the efficiency of plum seed adsorbents activated by various methods. Andijan Institute of Mechanical Engineering Scientific and Technical Journal of Mechanical Engineering Special Issue No. 3, 2023, pp. 26-31.
5. Salikhanova Dilnoza Saidakbarovna, Usmonova Zulfiya Tokhirjonovna. The Peculiarities of the Use of Activated Charcoals Obtained from Native Plum Pips in the Treatment of Wastewater of Industrial Enterprises. International Journal of Current Science Research and Review ISSN: 2581-8341 Volume 06 Issue 12 December 2023 DOI: 10.47191/ijcsrr/V6-i12-62, Impact Factor: 6.789 IJCSRR @ 2023 Page No. 8079-8082
6. Козлов В.Н. Пиролиз древесины. – М.: Изд-во АН СССР. 1952. - 282
7. ГОСТ 11022-95 Топливо твердое минеральное. Методы определения зольности
8. А.П.Карнаухов. “Адсорбция. Текстура дисперсных и пористых материалов” . Книга-лауреат конкурса научных изданий Сибирского отделения Российской академии наук. 1998 г

9. Карбонизация растительного сырья и исследование полученных материалов физикохимическими методами анализа [Электронный ресурс] Режим доступа: <http://helpiks.org/3-96312.html> (дата обращения: 01.11.2017).
10. Активированный уголь: производство из косточек фруктов, опилок, отходов с/х.[Электронный ресурс] Режим доступа: [http://www.asia-business.ru/torg/mini-factory/coal/activated/activated\\_1147.html](http://www.asia-business.ru/torg/mini-factory/coal/activated/activated_1147.html).(дата обращения: 27.11.2016).
11. Активированный уголь [Электронный ресурс] Режим доступа: [http://www.voda-kazan.ru/index.php?id=128&option=com\\_content&vi](http://www.voda-kazan.ru/index.php?id=128&option=com_content&vi). (дата обращения: 08.03.2017).
12. Угли активные. Каталог. Черкассы: НИИТЭХИМ, 1983. – 16 с.
13. <https://kun.uz/ru/news/2023/12/27/v-uzbekistane-za-11-mesyatsev-dobyto-57-mln-tonn-uglya>
14. <https://en.yellowpages.uz/rubric/activated-carbon-production>
15. <https://www.marketsandmarkets.com/ResearchInsight/activated-carbon-market>.
16. ГОСТ 7657-84
17. ASTM D 2866-11
18. ASTM D 2867
19. МРТУ №6-16-1003-67
20. Бронзов О. В. Древесный уголь [Текст] /О. В. Бронзов.- М.: Лесная промышленность, 1979. – 137 с.

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