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CREATION OF THE TECHNICAL ADSORBENT FROM LOCAL RAW MATERIALS

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The solution of the environmental problems which linked with use poor-quality fuels and imperfect industrial equipment, leads to pollution of industrial waste water and requires creation in our country own production oftechnical adsorbents.

Currently, the market price of one tone technical adsorbent reaches $4.000, which leads to the economic feasibility of production of industrial adsorbents based on local raw materials.

Semi coke obtained by thermal decomposition of coal under anaerobic conditions has perfect adsorption properties. Such activity of the semi cokeis due to the fact that most of the high molecular weight organic substances included into natural coal undergo decomposition at high temperature and removing products of destruction fromcoal surface or desorbing.

For example, the sample of coal "Ziddi" deposit in amount of 50 g contains: 4.0 g (8%) water; 1.3 g (2.6%) resinous substances; 12g (13litre) (24%) of the burning gas; 21% ash 32.7g (65.4%)semi coke[1-3].

The adsorption capacity of semi cokefound experimentally is close to the level shown at the regulations of the GOST.

The analyses for activity semi coke were done by determination of the residual amount of iodine ions in a solution of potassium iodideaccording to described method [2].

Quantitative determination of the adsorption activity of the Lead ions bySemi Coke

To the 50 ml flask contained10 ml 0.05% of Lead Acetate solution,0.2 g of dried at 120^{O}C Semi Coke was added. The resulting suspension was stirred on a magnetic stirrer for 60 min. The suspension was transferred to the filter and water soluble compounds were separated from the solid Semi-coke. The resulting filtrate was treated byPotassium Iodide. The resulting precipitate of Lead Iodide was separated by filtration, dried and weighed. A similar procedure is subjected to control sample which is didn't treated bySemi Cokepowder.

Our results show that the activity of the Semi- Coke produced from coal "Ziddi" deposits has a high activity in respect to Lead ions and consist in a range of 0.019 g (9.5%) per 1 g of adsorbent. In contrast, the semi-coke received from the coal "Fon-Yagnob" depositshas less activity relative to the lead ion which does not exceed 0.005 g per 1 g of adsorbent. The explanation of this evidence maybe done by suggestion that such differences could be subject of ionogenic properties of absorbers and containing of minerals in Semi-Coke bodies.Obtained, adsorbents are capable of ion exchange, becausecontain in enough amount the mineral components in the Semi Coke [3].

Heavy metals are very dangerous for vital environment. For the purpose of cleaning the environment from heavy metals currently number of adsorbents obtained fromplant wastessuch as a walnut shells and basket sunflower were suggested[4-5]. One of the weaknesses of these absorbers is high price. Therefore one of the targets of our investigation is preparation adsorbent from the local miningcoals, which looks to be cheaper and can successfully applied in practice.

Also for comparison of adsorbedproperties Semi Coke number of different adsorbents from waste plant origin walnut shell and baskets sunflower were prepared bythermolysis at the temperature650^{0}C.

The quantitative abudance of main thermolysisproducts per 1 kg of plant waste is shown in Table 1.

For comparison same parameters of coal composition are shown.

Table 1

ABUDANCE OFMAIN PRODUCTS OF THERMOLYSIS

Name of Plant waste	II	III	IV	V
Walnut shells	300	60.5	414	230
SunflowerBasket	80	26	265	650
Coal of "Ziddi"deposit	866	117.3	106.6	-426.6

I-Type of organic waste
II- Moisture (ml/kg),
III-Resinous substance (g/kg),
IV- Burning gas (l/kg),
V-Semi Coke (g/kg).

Table 2

ADSORPTION ACTIVITY WALNUT SHELLACTIVITED COAL IN CONDITIONS OF DIFFERENT (PbAc) SOLUTIONCONCENTRATION

I	II	III	IV	V	VI
0.25		0,85		42.5	85/425
0.5	0.025	0,74	0,06825	37.5	75/375
0.75		0,63		30	60/300
1		0,51		25	50/250
0.25		0,7		35	70/350
0.5	0.56	0,58	0,05	30	60/300
0.75		0,42		20	40/200
1		0,3		15	30/150
0.25		0,4		20	40/200
0.5	1	0,36	0,03475	15	30/150
0.75		0,33		15	30/150
1		0,3		15	30/150

I-Concentration of solution (%),
II-Semi-Coke size (mm),
III- Yield grams per1g,
IV-Average Semi-Coke adsorption,
V-Percentage settlement at 1g,
VI-Settlement to 1kg %/g.

The weight of the taken sample 0.2 g, and the processing time is 2 hours). Table 2 shows the data describing depends of the adsorption activated coal produced from walnut shell on particle size and solution concentration. For all experiments processing time was lasted 1h. According to received datadecreasing ofparticle size leads to increasing their adsorption activity. Activated carbons produced from walnut shell shows enough adsorption activity and could be used for solution of environmental problems.

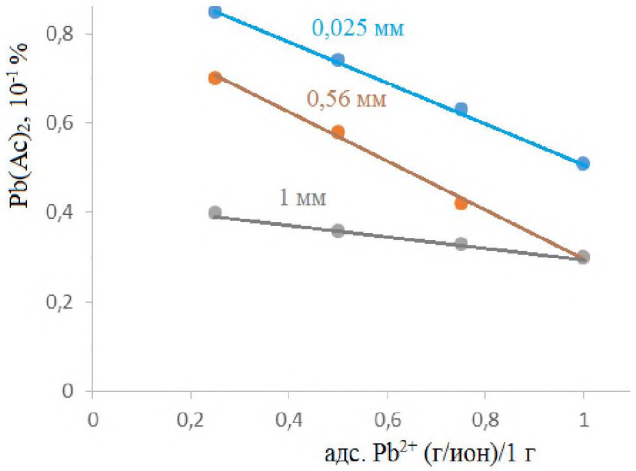

Figure1. Graphically dependence of thewalnut shell activated coal adsorption activity on concentration and size of powder

As shown in the Fig.1 graph walnut shell activated coal adsorption activity in depends on concentration and size of powder adsorbents particles with size of 0.025 mm have better adsorption ability in respect to particles having 0.56 mm and 1 mm.

Conclusion

The results showed the possibility of obtaining effective adsorbents of walnut shell and the sunflower for environmental purposes, in particular for the purification of polluted waters from heavy metals.

It has been shown, that 1 g of walnut shell adsorbent can adsorb on its surface ions of lead in amountof 47% by weight. The dependence of the adsorption activity of the semi-coke received from walnut shell from particle size and concentration of the solution.

References:

1. M.D.Isobaev, E.H.Pulatov, T.H.Abdullayev, M.Z.Turdialiev, M.D.Davlatnazarova, Sh.Mingboev. Proceedings of the Academy of Sciences Republic of Tajikistan, Branch of Physical-Math., Chem., Geol. and Techn. Sciences, Vol. 152 No.3 (2013), pp.52-58.
2. M.D.Isobaev, M.D.Davlatnazarova, M.Z.Turdialiev, T.H.Abdullayev, E.H.Pulatov Int. conf. "Uranium legacy of Soviet Union in Central Asia: problems and way forward" Dushanbe, Nov. 20-22, (2012) pp.151-152.
3. M.D.Isobaev., M.D.Davlatnazarova., E.H Pulatov., T.H.Abdullayev., M.Z .Turdialiev.,I.U.Fayzilov. Proceedings of the Academy of Sciences Republic of Tajikistan, Branch of Physical-Math., Chem., Geol. and techn.Sciences, Vol. 157 No.4 (2014), pp.76-81.
4. V.N.Maystrenko, R.Z.Khamitov. Ecological and analytical monitoring of super. M.: Chemistry. (1996), p 105.
5. E.U. BelyaevGetting and using active wood coal carbon. Plant raw materials chemistry.№2(2000) pp 5-15.