

Getting of effective of sorbents of wide application for treating industrial process wastewater

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Получение эффективных адсорбентов широкого применения для очистки производственных сточных вод

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Abstract: in this article the following types of coal adsorbents on the base of brown coal of the Angren deposits were obtained for the first time for the effective purification of waste from the dissolved ions of inorganic impurities and petroleum products: composites allowing enhanced the sorption capacity of the adsorbents by 70-80 %; the coal heat-treated at 550°C with hydrophobic properties, which are suitable for purification of waste surface from oil-products.

Аннотация: в данной работе на основе бурого угля Ангренского месторождения Республики Узбекистан впервые получены следующие виды угольных адсорбентов для эффективной очистки сточных вод от растворенных ионов неорганических примесей и нефтепродуктов: композиционные, позволяющих повысить сорбционную ёмкость адсорбентов на 70-80 %; термообработанные при 550°C с гидрофобными свойствами, пригодных для очистки поверхности сточных вод от нефтепродуктов.

Keywords: composite sorbent, Angren coal, purification, waste water, oil products.

Ключевые слова: композиционный адсорбент, ангренинский уголь, очистка, сточная вода, нефтепродуктов.

It is known that many sorts of brown coals have natural cation-exchanging properties, owing to the presence in their structure some humic components with carboxyl groups [1]. The using of the adsorbents obtained on the base of Angren coals will not only to reduce the rigidity of waste owing to purification from inorganic impurities but also to utilize some of heavy metals heaving in their composition. We have established the possibility of using of obtained coal adsorbents for the purification of flowings of the mine «Koch-Bulak» of the «Almalyk MMC» and also the waste of the enterprise «Uzmetkombinat».

New methods of the coals activation and obtain on their base effective adsorbents and compositions used for waste purification were elaborated [2]. The initial local coals and obtained on their base adsorbents have been used at waste purification on the «Uzmetkombinat» and the mine «Koch-Bulak» JSC «Almalyk MMC» (Uzbekistan). In mine waters of «Koch-Bulak» the content of cations Ca^{2+} , Na^+ and anions SO_4^{2-} , Cl^- and also the water rigidity have varied in wide ranges and in some months their content has exceeded the norms of the MPC. it is shown that the initial Angren coal and composite adsorbent obtained on it's base have decreased in waste of mine «Koch-Bulak» the cations content: Ca^{2+} from 230.42 to 24.25 mg/l; Na^+ from 156.0 to 6.2 mg/l and anions: Cl^- from 153.17 to 20.10 mg/l; SO_4^{2-} from 2249.80 to 214.5 mg/l. The total rigidity of water has decreased from 16.4 to 8.1 mg.ekv/l. Thus the rigidity of the mine waters has decreased in two time and content of such ions as Ca^{2+} , Mg^{2+} , Na^+ , Cl^- and SO_4^{2-} – to level of the MPC.

For purification of waste of the «Uzmetkombinat» from some contaminations the heat-treated, activated coals and some obtained composite adsorbent on the base of Angren coal were tested. The heat treatment of coal was carried out at temperature 550°C during 30 min. without of air; composite adsorbents were synthesized by addition of alkaline earth metals salts to coal. The obtained adsorbents were tested for waste purification from dissolved inorganic impurities and oil – products on the «Uzmetkombinat». Purification was carried out in three stages under static and dynamic conditions. The first stage was carried out in static conditions at using of thermo-treatment Angren coal; the second and third stages – in dynamic conditions by activated coal and composite adsorbent.

Thus some new methods of obtain of coal adsorbents on the base of Angren coal were elaborated: composite, obtained by addition to coal carbonates of alkaline-earth metals, with high sorption capacity which can be used for sewage purification from some ions of inorganic impurities and decreasing of the water rigidity from 16.4 to 0.5 mg-eq/l; heat-treated at 550°C, with hydrophobic properties (wetting angle $\alpha = 99^\circ$), a porosity of 30 %,

capacity to kerosene – to 25 % and the specific surface 150 m²/g which are suitable for purification of waste surface from oil-products.

References

1. *Jukov A. I., Mongait I. L., Rodziller I. D.* Techniques for treating industrial wastewater. Moscow: Stroyizdat. 1989. 223 p.
2. *Jumaeva D. J., Eshmetov I. D., Agzamhodjaev A. A.* Adsorption treatment and mitigation of industrial wastewater // Journal of Chemical Industry. Russia. 2014. Vol. 91. № 3. P. 150-154.