Carbon adsorbents for cleaning of cotton oil

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Углеродные адсорбенты для очистки хлопковых масел

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Abstract: *the results of research to assess the impact of pyrolysis temperature of Angren coal brand 2BPK porosity obtained carbon adsorbents. It is found that the highest porosity of carbon adsorbents is achieved by thermal pyrolysis equal 5000S. At the same time the use of the obtained activated carbon adsorbent in an amount of 2.0 % by weight oil allows clean (bleach), refined cotton oil to the requirements of the standard.*

Аннотация: *в работе приведены результаты исследования по оценке влияния температуры пиролиза ангренского угля марки 2БПК на пористость получаемых углеродных адсорбентов. Установлено, что наибольшая пористость углеродных адсорбентов достигается при термическом пиролизе, равном 5000С. При этом применение полученного активированного углеродного адсорбента в количестве 2.0 % от массы масла позволяет дочистить (отбелить) рафинированное хлопковое масло до требований стандарта.*

Keywords: *adsorbent, coal, carbonic adsorbent, pyrolysis, modification, cottonseed oil, coloration, acid number.*

Ключевые слова*: адсорбент, уголь, углеродный адсорбент, пиролиз, модификация, хлопковое масло, цветность, кислотное число.*

Last decade in Uzbekistan the tendency to production of refined vegetable oil, in particularly cottonseed oil with low coloration and long-term preservation them have been increased. In world practice the adsorption refining (bleach) of vegetable oil have already had wide spread occurrence, i.e. obtained at this product does not only meet consumer demand, but also it allows to remove oxidation product out of the oils, including free radical and other carcinogenic impurities. Producers compel to collect not only optimal regime of oil bleach as well as to use more effective adsorbents in the processes.

Comparative analysis have shown that some adsorbents possess high activity, the best hydrodynamic behaviors during the filtration, low oil absorption, low moisture content (up to 10 %) which provide long-term period work of filter and high sorption ability [1]. Activated carbons, i.e carbonic adsorbents adsorb various organic substances out of oil based on their specificity properties. They are used widely in fat-and-oil industry as adsorbents.

Carbonic adsorbents are highly porous carbonic materials obtained by high-temperature processing without air admission (pyrolysis) of different wood species, turf, and coal got from vegetable and animal objects (sawdust, wood chippings and etc.), rich in carburets [2].

However, thermal pyrolysis of coal is not always available to obtain highly porous and selective carbonic adsorbents that in the first place combined with component composition of raw material and regimes of high-temperature processing.

It is necessary to note that for adsorption refining of cottonseed, used adsorbents must have highly porosity, selectivity and hydrophobic property (wetting angle of adsorbent by water “a” should been more 90º). The Angren coal is hydrophile and water-wet due to the presence of carboxyl and hydroxyl groups in it. Therefore, the coal is not required to use for cottonseed oil bleach. It is necessary to attach coal hydrophobic properties, for example, by thermic pyrolysis. During the pyrolysis process, carboxyl and hydroxyl groups have decomposed that lead to hydrophobization its organic mass. In this study we presented researches on influence of pyrolysis temperature on the physico-chemical properties of the Angren coal. Sifted and ground Angren coal with size 2-5 mm was subjected to thermic pyrolysis without air admission at temperature 300, 500 and 700°C on the laboratory facility.

From given data shown that porosity on acetone of the Angren coal grade of 2 BSC makes 44,4 % at 300ºC, 48,4 % at 500 °C, and 52,6 % 700ºC. It can be seen that pyrolysis of the Angren coal is enough at 500 °C without air permission. Moreover, the coal adsorbent obtained based on thermic pyrolysis (500 °C) of the Angren coal has porosity at level active coal grade of BAC. However, necessary to note that when the thermic pyrolysis of the Angren coal at 700°C, gas removed into atmosphere, i. e. they too pollute environmental.

In order to define the most effective carbonic adsorbent, comparative bleach of cottonseed oil was carried out with use them in quantity 2 % with the mass of oil.

Presentes that adsorbents obtained by thermic pyrolysis of the Angren coal for bleaching power do not make well-

known coal grade of BAC (check). Then the most optimal results reached on thermal activated (500°C) Angren coal grade of 2 BSC.

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