VII-ий ВСЕУКРАЇНСЬКИЙ З'ЇЗД ЕКОЛОГІВ З МІЖНАРОДНОЮ УЧАСТЮ

(За підтримки Вінницької міської ради)

ЗБІРНИК НАУКОВИХ ПРАЦЬ

ВІННИЦЬКИЙ НАЦІОНАЛЬНИЙ ТЕХНІЧНИЙ УНІВЕРСИТЕТ • ВНТУ • VINNYTSIA NATIONAL TECHNICAL UNIVERSITY

Інститут екологічної безпеки та моніторингу довкілля

VII-th ALL-UKRAINIAN CONGRESS OF ECOLOGISTS WITH INTERNATIONAL PARTICIPATION

Congress Proceedings

InterEco

eco.com.ua [промислова екологія]

УКРАЇНА, ВІННИЦЯ, ВНТУ
UKRAINE, VINNYTSIA, VNTU
25–27 вересня, 2019

УДК 504+502
З–41

Друкується за рішенням Вченої ради Вінницького національного технічного університету Міністерства освіти і науки України

Відповідальний за випуск **В. Г. Петрук**

Рецензенти: **Клименко М. О.,** доктор сільськогосподарських наук, професор, Заслужений діяч науки і техніки України
Адаменко О.М., доктор геолого-мінералогічний наук, професор, Заслужений діяч науки і техніки СРСР

З–41 VII-й ВСЕУКРАЇНСЬКИЙ З'ЇЗД ЕКОЛОГІВ З МІЖНАРОДНОЮ УЧАСТЮ (Екологія/Ecology–2019), 25–27 вересня, 2019. Збірник наукових праць. – Вінниця: ВНТУ, 2019. – 200 с.

ISBN 978-966-641-772-8

Збірник містить наукові праці VII-го Всеукраїнського з'їзду екологів з міжнародною участю за такими основними напрямками: техногенно-екологічна безпека України і прогнозування ризиків у природокористуванні; моніторинг довкілля та сучасні геоінформаційні системи і технології; альтернативні (відновлювальні) джерела енергії; прилади та методи контролю речовин, матеріалів, виробів і навколишнього середовища; хімія довкілля та екотоксикологія; проблеми радіоекології та агроекології і шляхи їх вирішення; екологія людини та екотрофологія; екологічні, економічні та соціальні проблеми сталого розвитку; проблеми екологічної освіти і науки, виховання та культури.

УДК 504+502

ISBN 978-966-641-772-8

UDC 628.31

Ziarati P. (Iran, Tehran), Mostafidi M. (Iran, Tehran), Arabian S. (Iran, Tehran), Vambol S. (Ukraine, Berdyansk), Vambol V. (Ukraine, Berdyansk), Kozub S. (Ukraine, Kharkiv), Kozub P. (Ukraine, Kharkiv)

EXPERIMENTAL AND THEORETICAL BACKGROUND FOR THE WASTEWATER TREATMENT TECHNOLOGY DEVELOPMENT BY TEA WASTE

As one of its Sustainable Development Goals, the UN aims to achieve universal and equitable access to safe and affordable drinking water for all by 2030. The main disadvantages of most existing methods are the high maintenance costs, the formation of toxic sludge and the water treatment complicated technology. Compared with other processes, the adsorption process is the best alternative for water and wastewater treatment, because it is convenient, easy to operate and simple in design. To reduce the cost of wastewater treatment use of waste from various industries is the most efficient. So the results of experimental study revealed that using 0.5 % red tea residue in accompany by 3 % black tea residue can remove and decrease Cadmium and Nickel significantly and for Cobalt decreasing the rate of adsorption is not as much as 2 other metals but remove Cobalt after 40 minutes in remarkable contents.

Next, mathematical modeling was carried out based on experimental data. Work on the mathematical model creation was divided into several stages. At the first stage, the general kinetic regularities of the adsorption process were assessed. At the second stage, model coefficients specific values were assessed. At the third stage, the technological parameters impact on technological solutions was assessed. Next, mathematical modeling was carried out based on experimental data. Work on the mathematical model creation was divided into several stages. At the first stage, the general kinetic regularities of the adsorption process were assessed. At the second stage, model coefficients specific values were assessed. At the third stage, the technological parameters impact on technological solutions was assessed. Visual assessment of the kinetic dependencies form showed the presence of 2 parts on the chart (Fig. 1). The first part of the graph is characterized by a fast absorption process, which is observed up to 5 minutes (the fast process), and the second part is characterized by a slow absorption process that takes place after 5 minutes from the cleaning start (the slow process).

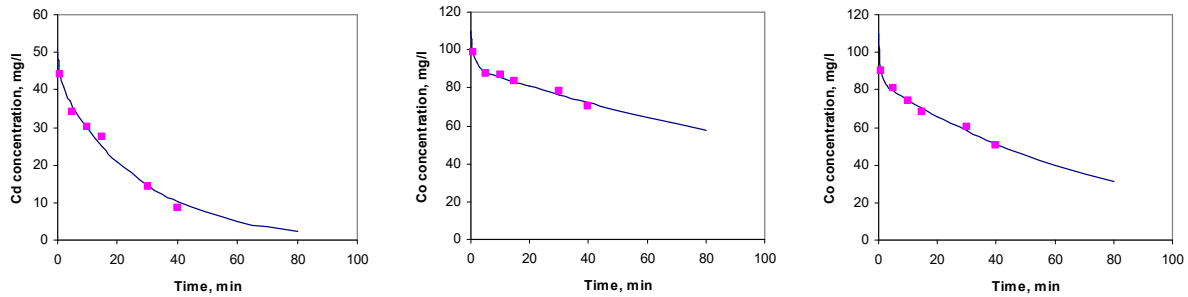

Fig. 1. Some kinetic dependencies obtained experimentally using maximum amounts of the adsorbent

From a technological point of view, water treatment is not important until the complete removal of metals. Therefore, it is required to determine the contact time of the solution (polluted water) with the adsorbent, at which this purification degree is considered acceptable. As initial data for the study of the model, initial conditions were accepted: Cd – 50 mg/l, Co – 100 mg/l, Ni – 100 mg/l. As the final values of the metals at the end of the adsorption process, we take their MPC: Cd – 0.001 mg/l, Co – 0.1 mg/l, Ni – 0.1 mg/l. As a result, we see that an increase in the red tea concentration always results in a decrease in the minimum adsorption time. And at a concentration of more than 2.5%, the adsorption time for all metals less than 60 minutes. At the same time, an increase in the concentration does not lead to a monotonic decrease in the minimum adsorption time for nickel, but to dependence with a minimum. Moreover, the value of the minimum depends on the red tea concentration. At the red tea absence in the adsorbent (that is, only black tea is used), the adsorption time for all three metals, when they are present simultaneously, is not lower than 4400 min (about 72 hours). If you add 25 % of red tea from the total amount of adsorbent, the adsorption time of all three metals to the MPC can be reduced to 45 min. If red tea is used (without black tea), the concentration of which is 3 %, then complete extraction of cadmium, cobalt and nickel will be provided in 30 minutes.