

NEW COAGULATION REAGENT FOR WASTEWATER TREATMENT

Nechyporuk D.O., Kyrii S.O., Kosogina I.V.

*National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute", Ukraine,
Kyiv, kysvit@gmail.com*

Coagulation process is the obligatory stage of water treatment. However, considering the high cost of commercial coagulants, creation of new low-cost coagulants from byproducts such as chemical waste, including red mud is promising. In Ukraine, red mud occupies an area of about 400 hectares and each year its amount increases. The red mud storages are environmentally hazardous objects since there is a potential possibility of destroying the main dam of the sludge due to excessive exploitation of the technological reservoir, climate change, indefinite shelf life of accumulated red mud; pollution by the filtration waters of the drainage of adjoining waters as a result of their incomplete catching; pollution of atmospheric air by alkaline evaporation of slurry pulp; pollution and deterioration of soil quality; pollution of atmospheric air and soils with red mud dust and others like that.

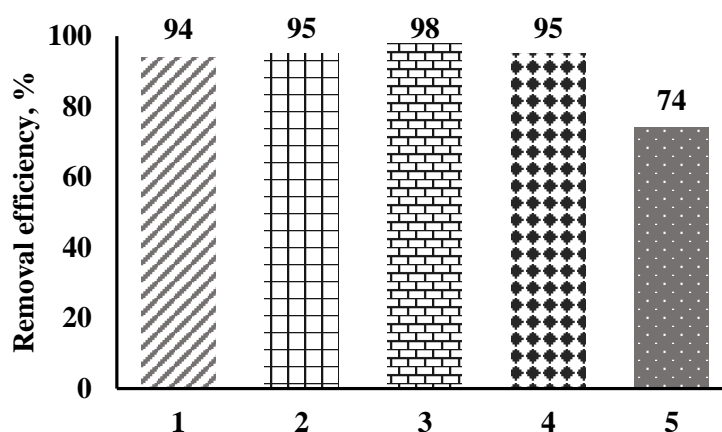
It has been established that red mud can be used in various industries, for example in ferrous metallurgy, for the production of pig iron, alumina and various separate components, the building industry for making bricks and cement, ceramic, glass, etc. Due to the high content of iron oxides (up to 55%) and aluminum (up to 30%), red mud can also be used as a coagulation reagent in water purification technology.

In water treatment technology, there is an acute problem of the organic dyes removal from wastewater (they are widely used in various industries, in particular, in textile, cosmetic, paper, plastic, pharmaceutical, food, etc.). At the same time, there are practically no effective methods of treating wastewater from organic dyes using reagents based on secondary raw materials.

The purpose of this work is to synthesize and test the using effectiveness of coagulation reagents based on red mud obtained in the technology of wastewater treatment from compounds of organic origin.

The coagulation reagent was obtained by acid activation of red mud (mass ratio of hydrochloric acid to red mud 1: 1, synthesis duration 60 min, temperature 100 °C).

The verification of the reagent efficiency was checked on model waters contaminated with organic matter of different origin using Jar-test (Fig. 1).



1 - Natural organic matter (sodium salt of humic acid), 8 mg/l; 2- Dye Active bright orange HF, 10 mg/l; 3 - Dye Active bright blue HF, 10 mg/l; 4 - Active bright red 5CX, 10 mg/l; 5 - Dye Direct Green, 10 mg/l.

Figure 1 Effectiveness of coagulation reagent synthesized from red mud

As can be seen in Fig. 1, new coagulation reagent synthesized from red mud is effective for organics pollutants removal.