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"Gheorghe Asachi" Technical University of Iasi, Romania

REMOVAL OF CADMIUM IONS FROM AQUEOUS SOLUTIONS USING CARBONATE-CONTAINING REAGENT

Ekaterina Bayan[1]*, Marina Gorbunova[1,2], Yulia Bayan[1], Irina Rybalchenko[1], Timofey Lupeiko[1]

[1]Southern Federal University, Faculty of Chemistry, Zorge str., 7, Rostov-on-Don, 344090, Russia
[2]Rostov State Medical University, Nakhchivansky lane, 29, Rostov-on-Don, 344000, Russia

Abstract

This paper presents a new method for removal of Cd(II) ions, one of the most dangerous toxic metals that have a harmful effect on humans and the environment. The method is based on the use of a reagent, which is carbonate-containing industrial waste. It consists of an agglomerate of nanosized particles, which was confirmed by TEM. The aim of the study was to determine the optimal conditions for the aqueous solutions treatment to remove Cd (II) ions to the maximum permissible concentration level. Various parameters such as are initial Cd(II) ion concentration, amount of reagent used, treatment time and temperature, which affect the efficiency of Cd(II) ions removing, were studied. The characterization data of the reagent was determined using X-ray diffraction and TEM. The maximum complete removal of Cd(II) ions was achieved in 15 minutes under the selected conditions. The temperature increasing by 10 °C leads to the reducing of reagent consumption by 30 %, which makes it possible to adapt the proposed method for various climatic conditions. The optimal consumption of the reagent for aqueous solutions with different concentrations of Cd (II) (1-1000 mg/L) was established and a mathematical dependence was derived, which allows predicting the consumption of the reagent in real conditions. The economic and environmental advantages of suggested treatment procedure compared to the traditional sorbents using are considered in the article. Therefore, carbonate-containing industrial waste could be proposed as an efficient and low-cost reagent for the removal of Cd(II) from aqueous solution.

Key words: cadmium, waste, wastewater treatment

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* Author to whom all correspondence should be addressed: e-mail: ekbayan@sfedu.ru; Phone: +78632975151; Fax: +78632975151