

Nanocomposites and nanomaterials

Removal of Cu (II), Mn (II) and Cr (III) ions from the aqueous solutions by nanoporous activated carbon studied by EPR : effect of nitrogen doping and thermal treatment.

A.K. Melnyk¹, V.A. Trychlib¹, B.I. Rachiy², I.M. Budzulyak², V.V. Trachevskiy³

¹ *Institute for Sorption and Problems of endoecology, NAS of Ukraine. Naumov str.,13, Kyiv- 03164, Ukraine*

E-mail: mak106@ukr.net

² *Vasyl Stefanyk Precarpathian National University. Shevchenko str.,57, Ivano-Frankivsk – 76025, Ukraine*

³ *Technical centre, NAS of Ukraine. Pokrovska str.,13, Kyiv- 04070, Ukraine*

Nowadays, heavy metal ions are the principal environmental pollutants and toxic compounds to living organisms. Activated carbon is considered to be one of the most competitive and effective sorbents even for their trace concentrations.

The aim of our present research is to investigate the influence of nitrogen doping and the thermal treatment on the adsorption capacity of activated carbon material. Commercial carbon with primary pore size of 0.7 – 6 nm and effective surface of 1500 m²/g mechanochemically treated with different amount of melamine was used for the synthesis of N doped AC. To prepare thermally treated samples, coconut shell based carbon was heated at T = 673 K for the times from 90 to 210 minutes. Adsorption of Cu (II), Mn (II) and Cr (III) ions were studied using EPR spectroscopy, efficiency of the removal of ions was determined by the signal intensity in the initial solution and in the suspensions containing AC. N doping shows almost linear growth of adsorption of copper ions while maximum value for the Cr (III) was observed at 4-5%, with no effect for Mn (II). Thermal treatment revealed similar behaviour for Cu (II) and Cr (III), and a weak linear dependence for Mn (II).

1. H. Liu, S.Feng, N.Zhang, X.Du, Y.Liu. Removal of Cu (II) ions from aqueous solution by activated carbon impregnated with humic acid. // *Front. Environ. Sci. Eng.* - 2014. – **8(3)** – P. 329 - 336.
2. R. M. Schneider, C.F. Cavalin, M.A.S.D. Barros, C.R.G. Tavares. Adsorption of chromium ions in activated carbon. // *Chemical Engineering Journal* - 2007. - **132** - P. 355-362.
3. Y.K.Meshram, N.T.Khati, R.U.Khope. Adsorption characteristics of manganese (II) on granular activated carbon. // *Der Chemica Cinica* – 2014. – **5(4)** – P. 25-29.