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REMOVAL OF HUMIC ACID FROM AQUEOUS SOLUTION USING MgO NANOPARTICLES

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The main purpose of this work was to investigate the removal of humic acid (HA) from aqueous solutions using MgO nanoparticles as a novel adsorbent. The effect of contact time, competing anions in the aqueous solutions, for the removal of HA in batch system was studied. The nanoparticle was characterized by scanning electron microscope method. Experimental results show that MgO nanoparticles can remove more than 90% of HA under optimum conditions. The results showed that the examined interfering anions influenced the HA removal. The adsorption kinetics and isotherm were also studied. The adsorption kinetics was well described by the pseudo-second-order equation, and the adsorption isotherms were better fitted by the Langmuir model.

Key words: aqueous solution, removal, humic Acid, MgO nanoparticles.

1. Introduction

One of the most important contaminants being present in water supplies is natural organic matter (NOM). NOM is a set of few complex organic materials produced from dead or living animals, plants and microorganisms [1].

Naturally humic substances are known as humic, humic acid (HA) and fulvic acids (FA). These organic substances based on their solubility and with regard to acidic or alkaline characteristics in aqueous solutions are classified [2]. Humic substance comprises the greatest proportion of NOM. Recent studies indicate some concentration of NOM in surface waters in Tehran [3]. Humic substances can react with chlorine during water treatment and produce disinfection byproducts. These disinfection byproducts include a group of chemicals known as Trihalomethanes (THMS) [4 - 6].

Removal of Humic acid substance from water is very important, because they have a harmful effect on the water quality human health. Some of these hazardous materials are known as mutagenic compounds and are consumed

- [5] Zazouli M.A. et al. //J. Appl. Sci. - 2007. - 7. - P. 2651 - 2655.
- [6] Wan-Ngah, W.S. et al. // J. Fuel Proc. Technol. - 2008. - 90. - P. 375 - 380.
- [7] Li C. et al.// Appl. Clay Sci. - 2011. - 52. - P. 353 - 357.
- [8] Al-Rasheed R. D. et al. A//Appl. Catal. - 2003. - 246. - P. 39 - 48.
- [9] Wang S. et al. // J. Sep. Purif. Technol. - 2008. - 58. - P. 353 - 358.
- [10] Anirudhan T.S. et al. // J. Colloids and Surfaces, A. - 2008. - 326. - P. 147 - 156.
- [11] Chang M.Y. et al.//Ibid. - 2004. - 278. - P. 18 - 25.
- [12] Mahvi A.H. et al. // J. Chem. Eng. - 2007. - 24. - P. 79 - 82.
- [13] Matilainen A. et al. //Chemosphere. - 2010. - 80. - P. 351 - 365.
- [14] Yang J.K. et al. // Ibid. - 2006. - 63. - P. 1677 - 1684.
- [15] Yigit Z. et al. //Water Air Soil Pollut: Focus. - 2009. - 9. - P. 237 - 243.
- [16] Lowe J. et al. // Desalination. - 2008. - 218. - P. 343 - 354.
- [17] Zazouli M.A. et al. //Iran. J. Environ. Health Sci. and Eng. - 2008. - 5. - P. 11 - 18.
- [18] Mahvi A.H. et al. //Ibid. - 2009. - 6. - P. 233 - 240.
- [19] Mahvi A.H. et al. //Desalination. - 2009. - 238. - P. 309 - 316.
- [20] Lin G. et al. // J. Colloid and Interface Sci., A. - 2011. - 353. - P. 392 - 397.
- [21] Fang Z. et al.// Desalination. - 2011. - 268. - P. 60 - 67.
- [22] Mishakov I.V. et al.//J. Catalysis. - 2002. - 206. - P. 40 - 48.
- [23] Zhou Q. et al.// Materials Lett. - 2008. - 62. - P. 1887 - 1889.
- [24] Daifullah A.A.M. et al. // J. Hazard. Materials. - 2007. - 147. - P. 633 - 643.
- [25] Moussavi G. et al. //Ibid. - 2009. - 168. - P. 806 - 812.
- [26] Park J.Y. et al. //J. Ind. Eng. Chem. - 2006. - 12. - P. 882 - 887.
- [27] Sheha R.R. et al.// Chem. Eng. J. - 2010. - 160. - P. 63 - 71.
- [28] Panuccio M.R. et al.// J. Environ. Management. - 2009. - 90. - P. 364 - 374.
- [29] Sundaram C.S. et al. // J. Hazard. Materials. - 2008. - 155. - P. 206 - 215.
- [30] Chiou M.S. et al. //Dyes and Pigments. - 2004. - 60. - P. 69 - 84.
- [31] Chatterjee S. et al. // J. Hazard. Materials. - 2009. - 164. - P. 1012 - 1018

Received 12.03.2012.