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The Factors on Removal of Zinc Cation from Aqueous Solution by Bentonite

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ABSTRACT

The removing zinc cation from aqueous solution by Ca-bentonite and Na-exchanged bentonite was studied. The factors such as the initial concentration of Zn²⁺, the liquid-to-solid ratio, pH, adsorption time, stirring speed, coexisting ions, temperature and bentonite particle size were investigated. The results show that the adsorption process of bentonite accorded with the Freundlich isotherm model, the removal of Zn²⁺ by Ca-bentonite and Na-exchanged bentonite reached equilibrium in 2 h, and adsorption of Na-bentonite was superior to Ca-bentonite. The adsorption rate of zinc increased with increasing pH, temperature, stirring speed, time span and with decreasing bentonite particle, the initial concentration of Zn²⁺ and the liquid-to-solid ratio. In mixed solution which contains Pb²⁺ and Cr⁶⁺, Pb²⁺ has no influence on the removal of Zn²⁺ by both the bentonites while Cr⁶⁺ can decrease it.

KEYWORDS

 Bentonite, Zn²⁺, Adsorption

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References

- [1] C. G. Fraga, "Essentiality and Toxicity of Trace Elements in Human Health," *Molecular Aspects of Medicine*, 2005, Vol. 26, pp. 235-244. doi:10.1016/j.mam.2005.07.013
- [2] Y. H. Liu, X. B. Wan, A. H. Li and Y. Y. Dong, "Bentonite Modified and Its Purification of Zn²⁺ in Water," *Chemistry and Bioengineering*, 2007, Vol. 24, No. 3, pp. 34-35.
- [3] Z. A. Wang, Y. M. Zhu, D. Z. Wei and S. J. Dai, "Research on Adsorption of Zn²⁺ from Wastewater by Ca-Bentonite," *Non-ferrous Mining and Metallurgy*, Vol. 22, No. 2, 2006, pp. 45-47.
- [4] J. F. Pan and J. Lu, "Experimental Study on Adsorbing the Pb²⁺, Ni²⁺, Cd²⁺ from Wastewater with Natural Ca-Bentonite and Modified Ca-Bentonite," *China Mining Magazine*, Vol. 9, 2008, pp. 35-138.
- [5] J. F. Hodgson, "Cobalt Reactions with Montmorillonite," *Soil Science Society of America Proceedings*, Vol. 24, 1960, pp. 165-168.
- [6] P. Peigneur, A. Maes and A. Cremers, "Heterogeneity of Charge Density Distribution in Montmorillonite as Inferred from Cobalt Adsorption," *Clays and Clay minerals*, Vol. 23, 1975, pp. 71-75. doi:10.1346/CCMN.1975.0230110
- [7] M. F. Brigatti, F. Corradini, et al., "Interaction between Montmorillonite and Pollutants from Industrial Waste-Water: Exchange of Zn²⁺ and Pb²⁺ from Aqueous Solutions," *Applied Clay Science*, Vol. 9, 1995, pp. 383-385. doi:10.1016/0169-1317(94)00027-N
- [8] M. J. Garcia and A. L. Page, "Influence of Ionic Strength and in Organic Complex Formation on the Sorption of Trace Amounts of Cd by Montmorillonite," *Soil Science Society of America Proceedings*, Vol. 40, 1976, pp. 658-663.

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- [9] H. Omar, H. Arida and A. Daifullan, " Adsorption of ^{60}Co Ra-dionuclides from Aqueous Solution by Raw and Modified Bentonite," *Applied Clay Science*, Vol. 44, 2009, pp 21-26. doi: 10.1016/j.clay.2008.12.013
- [10] S. T. Akar, T. Akar and Z. Kaynak, " Removal of Copper (ii) Ions from Synthetic Solution and Real Wastewater by the Combined Action of Dried *Trametes Versicolor* Cells and Montmorillonite," *Hydrometallurgy*, Vol. 97, 2009, pp. 98-104. doi: 10.1016/j.hydromet.2009.01.009
- [11] E. Alvarez-Ayuso and A. Ganchez-Sanchez, " Removal of Heavy Metals from Waste Waters by Natural and Na-exchanged bentonite." *Clays and Clay Minerals*, Vol. 51, No. 5, 2003, pp. 475-480. doi: 10.1346/CCMN.2003.0510501
- [12] W. Matthes, F. T. Madsen and G. Kahr, " Sorption of Heavy-Metal Cations by Al and Zr-hydroxy Intercalated and Pillared Bentonite," *Clays and Clay Minerals*, Vol. 47, No. 5, 1999, pp. 617-629. doi: 10.1346/CCMN.1999.0470508
- [13] G. Bayramoglu and M. Y. Arica, " Construction a Hybrid Biosorbent Using *Scenedesmus Quadricauda* and Ca-Alginate for Biosorption of Cu (II), Zn (II) and Ni (II): Kinetics and Equilibrium Studies," *Biore-source Technology*, Vol. 100, 2009, pp. 186-193. doi:10.1016/j.biortech.2008.05.050
- [14] E. Eren, " Removal of Copper Ions by Modified Unye clay, Turkey," *Journal of Hazardous Materials*, Vol. 159, 2008, pp. 235-244. doi:10.1016/j.jhazmat.2008.02.035
- [15] Ministry of Environmental Protection of the People' s Republic of China, Committee on Water and Wastewater Monitoring Methods, " Monitoring Analysis Method of Water and Wastewater," Environmental Science Press of China, Beijing, 2002.
- [16] N. ünlü and M. Ersoz, " Removal of Heavy Metal Ions by Using Di-thiocarbamated-Sporopollenin," *Separation and Purification Technology*, Vol. 52, 2007, pp. 461-469. doi: 10.1016/j.seppur.2006.05.026
- [17] D. Hunkeler and L. R. Ehwald, " Cell Physiology and Interactions of Biomaterials and Matrices," *Proceedings of the X International BRG Workshop on Bioencapsulation*, 2002, pp. 183-186.
- [18] M. Alkan, B. Kalay, M. Doğan and ?. Demirba?, " Removal of Copper Ions from Aqueous Solutions by Kaolinite and Batch Design," *Journal of Hazardous Materials*, Vol. 153, 2008, pp. 867-876. doi: 10.1016/j.jhazmat.2007.09.047
- [19] S. L. Ding and C. G. Sun, " Study on Factors Affecting Adsorption of Cr^{6+} in Wastewater by Bentonite," *Non-metallic Mines*, Vol. 29, No. 3, 2006, pp. 45-48.