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A Review On Sorbents Used For Heavy Metal Removal

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Full Text

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Abstract

The reduction of water resources due to the growing population in the ecosystem leads to an increase in the need for freshwater. Wastewater released from various industries contains many pollutants, like heavy metals which are hazardous not only for humans but also affects other species which makes the water unsuitable for use. Due to lack of water, we are in need for emerging methods to remove contaminants from wastewater to make it less hazardous. One such advanced method is a sorption method used to remove heavy metals in an effective manner. This article will briefly overview the different sorbents used for removing heavy metals and their capacities, advantages and disadvantages of their usage.

Keywords

Wastewater, Heavy metals, Hazardous, Sorption method

References

1. Leung, W.C., *et al.* 2000. Removal and recovery of heavy metals by bacteria isolated from activated sludge treating industrial effluents and municipal wastewater. *Water Sci. Tech.,* 41(12):233-240.
2. Rao, K., *et al.* 2010. Review on cadmium removal from aqueous solutions. *Int. J. Eng. Sci. Tech.,* 2 (7):81-103.
3. Hegazi, H. A. 2013. Removal of heavy metals from wastewater using agricultural and industrial wastes as adsorbents. *HBRCJ.* 9(3).

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4. Gunatilake, S. 2015. Methods of removing heavy metals from industrial wastewater. *J. Multidisc-iplinary. Eng. Sci. Studies.* 1:12-18.
5. Davis, T.A., B. Volesky and A. Mucci. 2003. A revew of the biochemistry of heavy metal biosorption by brown algae. *Water Res.,* 37:4211-4330.
6. Volesky, B. 1990. Biosorption of heavy metals. CRC Press, Boca Raton, Florida.
7. Chojnacka, K. 2010. Biosorption and bioaccu-mulation–The prospects for practical applications. *Env. Int.,* 36:299-307.
8. Al-Rashdi, B., D. Johnson and N. Hilal. 2013. Removal of heavy metal ions by nanofiltration. *Desalination.* 315:2-17.
9. Choi, S.Y., *et al.* 2015. Removal of heavy metal and nitrate nitrogen in polluted groundwater by electrodialysis process. *J. Water Resour. Hydrualic Eng.,* 4:412.
10. Wang, L.K., Y.T. Hung and N.K. Shammas. 2006. Advanced physico-chemical treatment processes. Humana Press.
11. Muruganandam, L., *et al.* 2017. Treatment of wastewater by coagulation and flocculation using biomaterials. *IOP Conf. Ser.* : *Mater. Sci. Eng.,* 263(3).
12. Kumar, M.M., *et al.* 2016. Coagulation process for tannery industry effluent treatment using *Moringa oleifera* seeds protein : Kinetic study, pH effect on floc characteristics and design of thickener unit. *Seperation Sci. Tech.,* 51(12):2028-2037.
13. Santos, A.F.S., *et al.* 2012. Coagulation process of *Moringa oleifera* protein preparations : Application of humic acid removal. *Env. Tech.,* 33(1):69-75.
14. Balaka'r, T., M. Bu'gel and L. Gajdošova'. 2009. Heavy metal removal using reverse osmosis. *Acta Montanistica Slovaca.* 14:250-253.
15. Li, L. and Y. Liu. 2009. Ammonia removal in electrochemical oxidation : Mechanism and pseudo-kinetics. *J. Hazard. Mater.,* 161:1010-1016.
16. Mishra, P.C. and R.K. Patel. 2009. Removal of lead and zinc ions from water by low cost adsorbents. *J. Hazard. Mater.,* 168:319-325.
17. Malik, D.S., C.K. Jain and A.K. Yadav. 2016. Removal of heavy metals from emerging cellulosic low-cost adsorbents : A review. *Appl. Water Sci.,* 7:2113-2136.
18. Velkova, Z., *et al.* 2018. Immobilized microbial biosorbents for heavy metals removal. *Eng. Life Sci.,* 18:871-881.
19. Srinivasan, K., N. Balasubramaniam and T.V. Ramakrishna. 1998. Studies on chromium removal by rice husk carbon. *Indian J. Env. Health.* 30(4):376-387.
20. Tripathi, A. and M. R. Ranjan. 2015. Heavy metal removal from wastewater using low cost adsor-bents. *J. Bioremed. Biodegr.*,6(6).
21. Xie, J. Z., H.L. Chang and J. J. Kilbane. 1996. Removal and recovery of metal ions from wastewater using biosorbents and chemically modified biosorbents. *Bioresour. Tech.,* 57:127-136.

22. Kaur, A. and S. Sharma. 2017. Removal of heavy metals from wastewater by using various adsorbents–A review. *Indian J. Sci. Tech.,* 10(34): 1-14.
23. Yao, Y., *et al.* 2011. Removal of phosphate from aqueous solution by biochar derived from anaerobically digested sugarbeet tailings. *J. Hazard. Mater.,* 190:501-507.
24. Jain, C.k., D. S. Malik and A. K. Yadav. 2016. Applicability of plant based biosorbents in the removal of heavy metals : A review. *Env. Process.,* 3(2):495-523.
25. Anastopoulos, I., *et al.* 2018. Leaf biosorbents for the removal of heavy metals. **In** Green adsorbents for pollutant remval. **Ed** Gregorio Crini and Eric Lichfouse. pp 87-126.
26. Rajfur, M. 2013. Influence of preparation method of *Spiroya sp.* algae of their sorption capacity. *Ecol. Chem. Eng.,* 20:475-488.
27. Thiruvenkatachari, V. and A. Srinivasan. 2011. Fungal biosorption and biosor-bents. **In** Microbial biosorption of metals. **Ed** Pavel Kotrba, Martina Mackova and Tomas Macek. pp 143-158.
28. Moat, A.G., J.W. Foster and M.P. Spector. 2003. Microbial physiology (4th edn). John wiley and Sons, New York. pp 734.
29. Kyas, G.Z. and N.K. Lazaridis. 2009. Reactive and basic dyes removal by sorption onto chitosan derivatives. *J. Colloid Interface Sci.,* 331:32-39.
30. Malik, D.S., *et al.* 2017. Role of plant-based biochar in pollutant removal : An overview. **In** Advanced material for wastewater treatment. **Ed** Shahid-ul-Islam. pp 313-330.
31. Shukla, A., *et al.* 2002. The role of sowdust in the removal of unwanted materials from water. *J. Hazard. Mater.,* 95(1):137-152.
32. Kaushal, A. and S.K. Singh. 2017. Removal of heavy metals by nanoadsorbents. *J. Env. Biotech., Res.,* 6:96-104.
33. Gupta, V.K., S. Agarwal and T. Saleh. 2011. Chromium removal by combining the magnetic properties of iron oxide with adsorption properties of carbon nanotubes. *water Res.,* 45(6):2207-2212.
34. Mujawar, M., *et al.* 2014. Removal of heavy metals from wastewater using carbon nanotubes. *Seperation Purif. Reviews.* 43:311-338.
35. Amin, M.T., A.A. Alazba and U. Manzoor. 2014. A review of removal of pollutants from water/waste- water using different types of nano-materials. *Adv. Mater. Sci. Eng.* DOI: 10.1155/2014/825910.
36. Nayak, P.S. and B. K. Singh. 2007. Removal of phenol from aqueous solutions by sorption on low cost clay. *Desalination.* 207:71-79.
37. Kusmierek, K., K. Zarebska and A. Swiatkowski. 2016. Hard coal as a potential low-cost adsorbent for removal of 4-chlorophenol from water. *Water Sci. Tech.,* 73(8):2025-2030.
38. Carolina, C. F., *et al.* 2017. Efficient techniques for the removal of toxic heavy. Metals from aquatic environment : A review. *J. Env. Chem. Eng.,* 5:2782-2799.

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