

Synthesis and Applications of Biosorbent from Barley Husk for Adsorption of Heavy Metals and Bacteria from Water

Authors : Sudarshan Kalsulkar, Sunil S. Bhagwat

Abstract : Biosorption is a physiochemical process that occurs naturally in certain biomass which allows it to passively concentrate and bind contaminants onto its cellular structure. Activated carbons (AC) are one such efficient biosorbents made by utilizing lignocellulosic materials from agricultural waste. Steam activated carbon (AC) was synthesized from Barley husk. Its synthesis parameters of time and temperature were optimized. Its physico-chemical properties like density, surface area, pore volume, Methylene blue and Iodine values were characterized. BET surface area was found to be 42 m²/g. Batch Adsorption tests were carried out to determine the maximum adsorption capacity (q_{max}) for various metal ions. Cd⁺² 48.74 mg/g, Pb⁺² 19.28 mg/g, Hg⁺² 39.1mg/g were the respective q_{max} values. pH and time were optimized for adsorption of each ion. Column Adsorptions were carried for each to obtain breakthrough data. Microbial adsorption was carried using E. coli K12 strain. 78% reduction in cell count was observed at operating conditions. Thus the synthesized Barley husk AC can be an economically feasible replacement for commercially available AC prepared from the costlier coconut shells. Breweries and malting industries where barley husk is a primary waste generated on a large scale can be a good source for bulk raw material.

Keywords : activated carbon, Barley husk, biosorption, decontamination, heavy metal removal, water treatment

Conference Title : ICBENS 2015 : International Conference on Biological Engineering and Natural Sciences

Conference Location : Paris, France

Conference Dates : January 23-24, 2015