

Abstract

Effluent from Ujams Waste Water Treatment Pond (WWTP) has been reported by the city of Windhoek to contain some high levels of heavy metals which are then discharged in the Klein Windhoek River.

The efficiency of acid-activated *Moringa products* (husks and pods) as natural adsorbents in contaminated wastewater was investigated by adsorption process using the jar test apparatus. The wastewater was initially analysed for metal concentration, subjected to purification and reanalysed after purification. The activated charcoal was prepared by dispersing the powder made from the husks and pods in concentrated sulphuric acid (98%) and heated in an oven at a temperature of 150°C for 24 hrs. The charcoal was thoroughly washed with distilled water and dried in the oven at 105°C for 24 hrs. Variable dosages of the activated charcoal prepared from the husks and pods were dispersed in 100 mL of the wastewater and jar test carried out. 20 mL of the supernatant was drawn from the agitated solution after settling and analysed for heavy metal concentration with Inductively-Coupled Plasma Mass Spectrometer (ICP-MS).

The pH and turbidity of the wastewater was found to be 8.03 and 84 NTU respectively. Both husks and pods showed removal of the heavy metals with the former having better removal efficiency. The removal efficiencies of the various metal ions followed the trend $Fe > Zn > Cu > Cd > Ni > Co$. It was observed that increased dosage increased the removal of heavy metals. The effect of particle size was also evaluated. Smaller grain size powder achieved better removal efficiency than relatively bigger sizes.

It was concluded that natural products from *Moringa oleifera* plant have potential to be good adsorbents in removal of metal ions in contaminated wastewater. However the husks adsorbent seemed to have an edge over the pod adsorbent in the removal process which can be attributed to difference in metal ion affinity. In addition, activated charcoal with finer grain size was found to be more effective in removing heavy metals due to increased surface area.