

## **Removal of dissolved copper ions in water by using tea waste and tea waste-derived Biochar**

Darsigan S., Maithreepala R.A. \*, Asanthi H.B.

*Department of Limnology and Water Technology, University of Ruhuna, Matara, Sri Lanka*

Various methods are used to remove heavy metal ions from water, but many of these methods are not applicable in terms of cost, materials, equipment, and energy. Therefore, the use of low-cost, non-toxic natural and biological materials in the removal of metal ions dissolved in water is encouraged. Biochar is a substance created by burning biological material to create active carbon structures with high absorption ability. This research investigated the removal of Cu (II) ions from tea waste and tea-biochar, comparing their efficiency with commercial Granular activated Carbon based on the mass of adsorbent. Three adsorbents tea waste, tea-biochar and commercially available activated carbon were optimized for best removal efficiency of Cu (II) by adjusting key parameters such as adsorbent dosages, solution pH, contact time, and initial concentration. Under optimal conditions (adsorbent doses of 0.8 g/L, solution pH of 6, contact period of 60 minutes, initial concentration of 5 ppm), Biochar adsorbent achieved 97% maximum removal of Cu (II) while commercial activated carbon and tea waste showed 69% and 44% removal respectively. The study demonstrates an effective method for removing high concentrations of copper from industrial waste, lowering metal waste release, conserving the environment. In comparison to previous studies, this study accomplished approximately 97% copper removal without using any chemicals or an expensive approach.

**Keywords:** Tea waste, tea-biochar, copper removal, adsorption

\*Corresponding author: maitree@fish.ruh.ac.lk