

# Adsorption of Cd (II) ions on biocarbon prepared from *Tridax procumbens*

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**Abstract:** Adsorption using low cost biocarbon prepared from *Tridax procumbens* has many advantages over other methods for heavy metals removal. Effect of pH, metal ion concentration, adsorbent portion and temperature on adsorption limit and percentage removal of cadmium from aqueous solutions using minimal effort adsorbents has been displayed in this paper.

**Keywords:** Cadmium, biocarbon, *Tridax procumbens*, Contact time.

## I. INTRODUCTION

Water pollution is becoming greatest threat to ecosystem. Enormous deposition of effluent containing heavy metals into water is very dangerous. Industries should not release partially treated or untreated effluent into the adjacent water bodies which containing heavy metals. A large portion of heavy metals are toxic and due to their non-biodegradability and bioaccumulation, they cause adverse effects to human beings as well as plants and animals (M. Siganan, 2017). Heavy metals must not be released directly to the environment due to its harmful effects to living organisms. These metals can cause accumulative poisoning, nervous excessive ingestion system damage, cancer and ultimately death (Salman H. Abbas et al, 2014).

Cadmium is getting introduced into water resources by effluent from alloy, mining, fertilizers and cadmium-nickel batteries industries (2019). Cadmium damages the lungs when it inhale by human beings and may even lead to death. It also causes liver disease, high blood- pressures and brain or nerve damage. 0.005 mg/L (5 $\mu$ g/L) is maximum acceptable concentration for cadmium in drinking water. (Liu et al. 2009).

Adsorption is one of the simple, secure and inexpensive method (Shah et al., 2009), (Mohamed E. Goher et al, 2015), (D. S. Malik et al, 2016) among different types of methods used to remove heavy metals from wastewater. These methods include reverse osmosis solvent extraction, chemical precipitation, ion-exchange, coagulation, electro-dialysis etc.

*Tridax procumbens* is annual or perennial weed belongs to family Asteraceae. It exhibit different pharmacological activities such as wound healing, anti-inflammatory, hepatoprotective, insecticidal, immuno-modulatory, hypotensive and hair growth promoting etc. (Surendra Agrawal et al, 2010).

## II. MATERIALS AND METHODS

### Preparation of synthetic wastewater:

1000-ppm Cd (II) stock solution was prepared by dissolving AR grade CdCl<sub>2</sub> in deionized water. 100 ppm Cd (II) Standard solution prepared from stock solution by dilution method. Absorbance of solution before and after adsorption of heavy metals by biocarbon was measured by Uv-Visible spectrometer.

Metal ion removal is calculated by:

% removal of metal ion =  $\frac{C_0 - C_t}{C_0} \times 100$  Where, C<sub>0</sub> is initial concentration of metal ion, C<sub>t</sub> is concentration of metal ion after

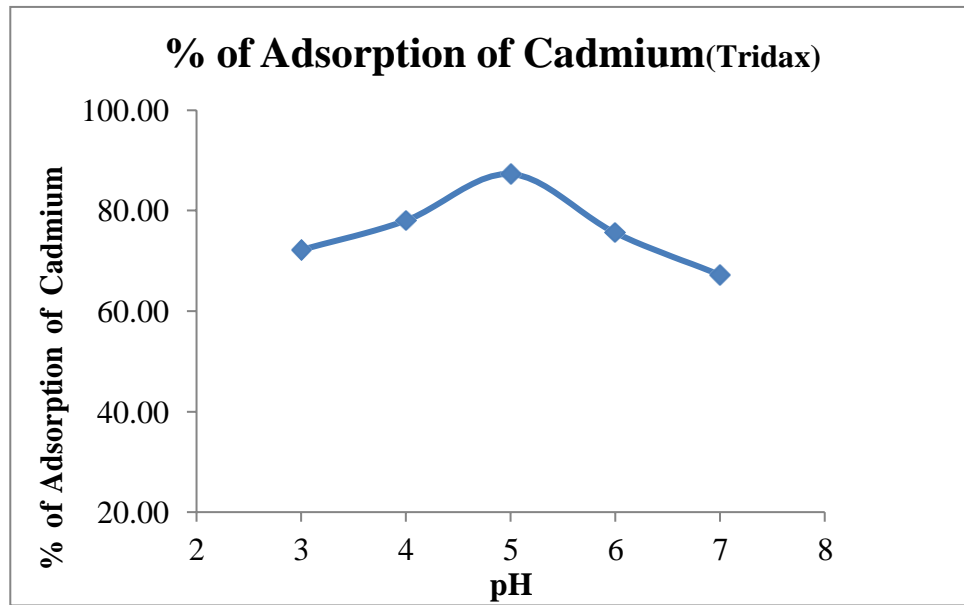
### Preparation of biocarbon:

Whole plants of *T. procumbens* were collected and washed with distilled water to remove particulate matter and dirt. Then sundried plant material are crushed in fine particles and activated in 1:1 HCl solution. The activated biocarbon was washed with excess of distilled water to remove excess acid and again dried then stored in sealed container to

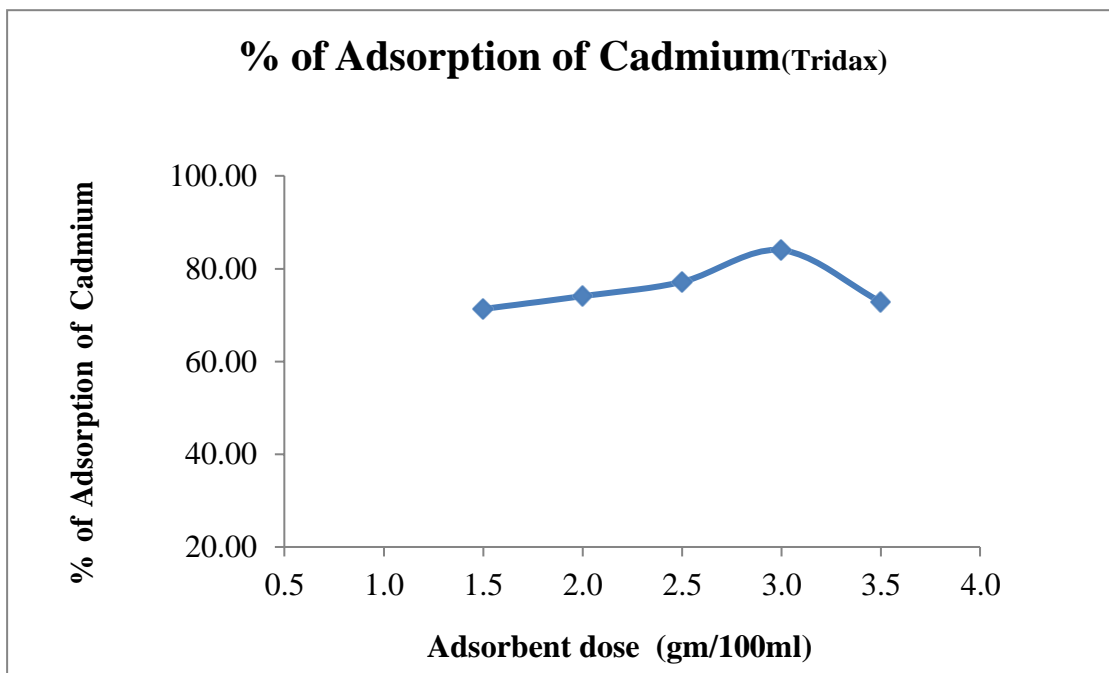
further studies.(prachi,Sulekha)

### III. OBSERVATIONS AND RESULT

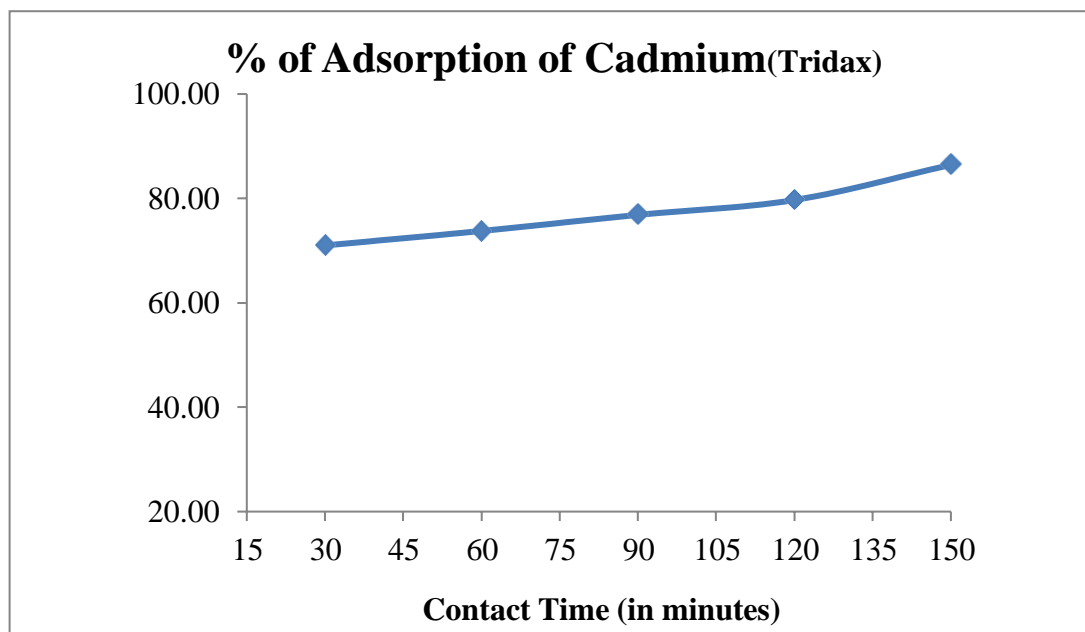
**Effect of pH:** This parameter has great importance to inspect the dependence on adsorption power of adsorbent because it affects the degree of the ionization of the adsorbent and solubility of the metal ions (Hashem, A., et al, 2007), (Karri et al, 2008). Percentage of removal of cadmium was appreciable at pH 5.



**Effect of adsorbent dose:** The accessibility and availability of adsorption site is managed by adsorbent quantity (Rafeah W. et al, 2009) Adsorbent dose is crucial parameter which steadily affects the adsorption process by influencing adsorption power of the adsorbent. Percentage of removal of cadmium was maximal at 3.0 g/100ml adsorbent dose.



**Effect of contact time:** It is the time essential for adsorption process to attain equilibrium when no changes in adsorptive concentration were detected after a definite interval of time (Jagruti N. Jadav et al, 2015). Percentage of removal of cadmium was highest at 150 minutes.



### CONCLUSION

The study indicates that the agricultural biomass *T. procumbens* can be efficiently employed for the preparation of activated carbon and become a good adsorbent for the removal of Cd(II) ions from aqueous solutions. The present analysis shows that the removal of Cd (II) from aqueous solution onto activated carbon derived from *T. procumbens*. The removal capacity of Cd (II) was appreciable at pH5, adsorbent dose 3 g and 150 minutes contact time.

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