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ACCEPTED MANUSCRIPT

<AT>A novel adsorbent from carrot, tomato and polyethylene terephthalate waste as a potential adsorbent for Co (II) from aqueous solution: Kinetic and Equilibrium studies

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<ABS-HEAD>Highlights► A composite adsorbent prepared using carrot, tomato and PET waste exhibited excellent adsorption of Co (II) in aqueous state. ► Adsorption equilibrium studies suggested Freundlich model to be best suited. ► A high adsorption capacity of 312.50 mg/g was obtained.

<ABS-HEAD>Abstract

<ABS-P>Heavy metal ions in waste water are known to affect human health, aquatic life and the overall ecosystem in adverse ways. Such pollutants need to be removed however, the technologies utilized for such removal is often expensive and is not easily accessible for all the people around the world. It has been found that chemically activated organic wastes from tomato and carrot can be utilized to remove toxic metal ions and organic pollutants from aqueous solution. To increase the efficiency of the adsorbent these were combined with activated polyethylene terephthalate **(**PET) to produce a composite adsorbent. This study describes the preparation of novel adsorbents from carrot, tomato and PET. The developed adsorbents were used for the removal of Co (II) from aqueous solutions. The synthesized adsorbent particles were characterized using Fourier transform infrared spectroscopy (FTIR), X-ray diffractometer (XRD), Field emission scanning electron microscope (FESEM), Electron dispersive x-ray (EDX) and thermogravimetric analysis (TGA). The effect of all the three adsorbents on the physicochemical properties of Co (II) adsorption was studied by varying different parameters such as contact time, adsorbent dose and pH. Kinetic behavior of the three adsorbents for the uptake of Co (II) were studied. The adsorption isotherms such as Langmuir and Freundlich isotherms were used to investigate the equilibrium behavior of the system. Langmuir model was best suited for the composite adsorbent with an adsorption capacity 312.50 mg/g.

<KWD>Keywords: Adsorbent; Characterization; Co (II); Equilibrium; Kinetics

<H1>1. Introduction

The necessity of heavy metal pollution control has been of significant concern in last few decades. Environmentalists are primarily concerned due their high toxicity and impact on human

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