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TITLE:

Development of Biochar from Coconut Shell: Pyrolysis Process

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ABSTRACT

Biochar, an eco, and renewable organic matter are often studied for its potential in the removal of pollutants, especially wastewater treatment. Experiments were conducted. To improve the efficiency of pure biochar, research was undertaken on biochar composites that were combined with various active components. The effectiveness of different biochar composites on Chromium (VI) removal from an aqueous solution was examined in this research using a review of many journals. Biochar composites were created prior to post-pyrolysis of pure biochar treated with relevant article active components. The conclusions of characterization techniques such as electron microscopy, Fourier Transform Infrared Spectroscopy (FTIR), and weighing scale were discussed and analyzed. Temperature and time of treatment affected adsorption and surface diameter pore size, according to the results of the parameter research.

TABLE OF CONTENTS

CHAPTER ONE
BACKGROUND

1.1 Introduction

Biochar is flammable solid rich in carbon that is produced from biomass by a thermochemical process with either limited or no oxygen. It may be produced by pyrolysis. Although gasification and hydrothermal carbonization can make biochar, slow pyrolysis with low harmful gas emissions provides the finest biochar (Elkhalifa, et al., 2019). Biochar is frequently made from renewable biomass and has a variety of environmental uses, notably in agriculture (Hagemann, et al., 2018). In terms of organic waste as feedstocks and production techniques, it is characterized as 'green' and low-cost. Biomass is a renewable resource composed of organic materials such as wood or agricultural waste. As a result, it may be an efficient solution to manage agricultural waste sustainably by using it as a feedstock for biochar in a variety of applications. The discovery of 'Terra Preta' in the Amazon River basin by James Orton in 1870 inspired the concept of biochar. (Wayne, 2012). The soils of 'Terra Preta' were black and exceedingly productive. It possesses a high concentration of nutrients and organic matter, as well as 70 times more black carbon than surrounding soils, as proved (Glaser, et al., 2014). The fertility of the soil was often due to burning biomass. Its ability to regenerate and keep good features throughout time has significant potential for long-term agricultural success. (Bis, et al., 2018). In the meantime, biochar was expected to be the dominant soil and obtained higher similar properties.

1.2 Literature Review

1.2.1 Feedstocks of biochar

Biochar feedstocks included a variety of biomass classed as agricultural or industrial wastes such as coconut shell, food waste, sawdust, and animal waste. The qualities of the biochar generated were affected by the different types of feedstocks used. This research focuses on using coconut shells to create biochar with a variety of chemical and physical qualities. As a result, a significant body of research focuses on the use of biochar to remove heavy metals such as Pb(II), Cu(II), Cr(III), Cd(II), Ni(II), and Zn