Green synthesis of ZnO coated hybrid biochar for the synchronous removal of ciprofloxacin and tetracycline in wastewater

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INTRODUCTION

Despite being indispensable in the treatment of infectious diseases of humans and animals, ciprofloxacin and tetracycline have been classified as high priority emerging organic pollutants by the World Health Organisation (WHO)[1, 2] due to their prevalent use, toxicity[3] and increase in rise in cases of antibiotics resistance in organisms[4, 5].

Conventional treatment methods have been found to be inadequate in the complete removal of these pollutants[3] and several advanced techniques utilized have the disadvantages of high cost, incomplete mineralization and the production of even more toxic metabolites[3]. Hence, the need for a greener, low-cost, effective alternative technique.

JUSTIFICATION

Researchers are concerned about the effects of pollutants in the environment hence the vigorous research activities geared to ridding the environment of toxic pollutants.

Adsorption technique, which involves the use of adsorbents, is a green method for wastewater treatment.

Activated carbon with its high surface area is limited by high cost and its inefficiency towards selected pollutants.

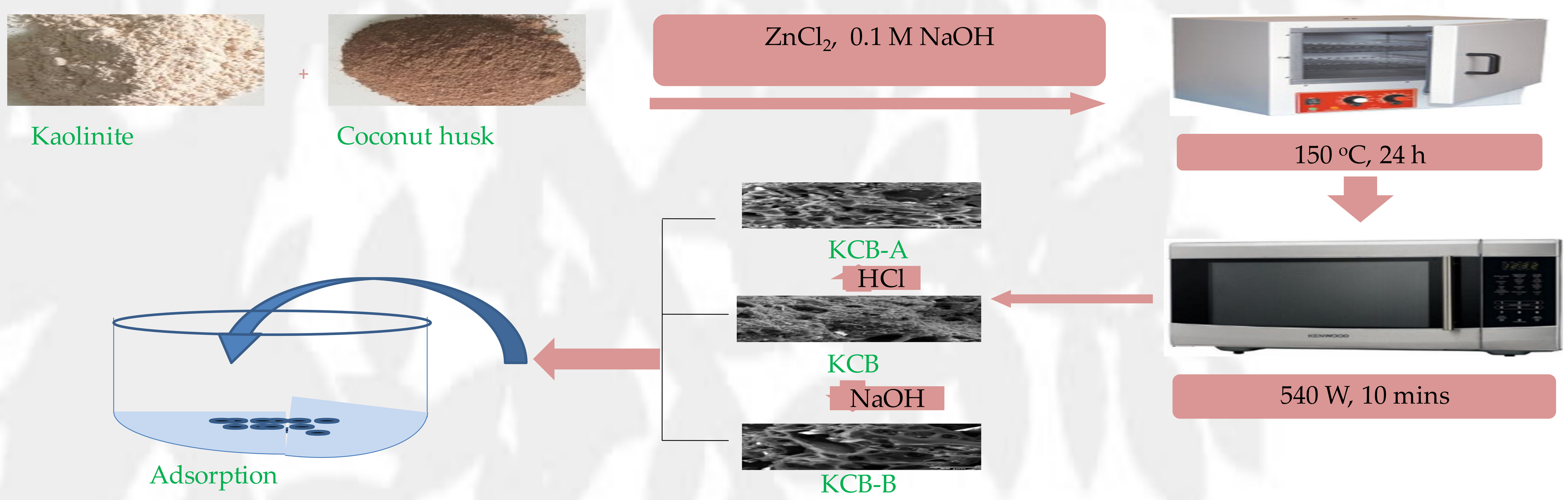
Hence the need for a greener, low-cost and effective alternative treatment method.

OBJECTIVE

The main goal of this research is to produce functionalized adsorbents from environmentally friendly materials, Kaolinite and coconut husk via microwave techniques for the removal of ciprofloxacin and, tetracycline from polluted water. To achieve this are two main objectives:

1. To determine the efficiencies of the prepared adsorbents by subjecting them to various experimental conditions.
2. To apply obtained data to determine adsorption characteristics using isotherm and kinetic models

METHODOLOGY



DISCUSSION OF RESULTS

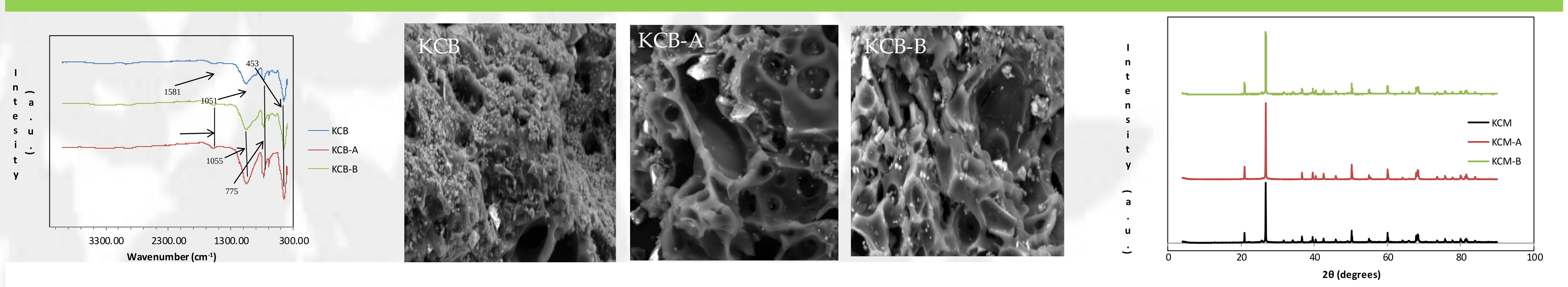


Figure 1: FTIR spectra, SEM images and XRD spectra of KCB, KCB-A and KCB-B

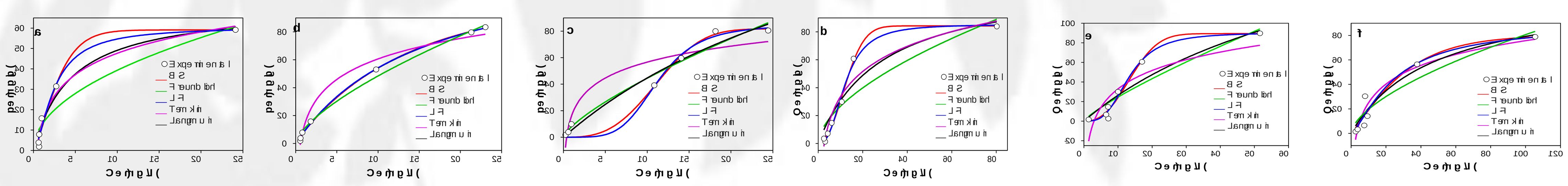


Figure 2: Isotherm plots for adsorption of CIP on (a) KCB (b) KCB-A (c) KCB-B; TET on (d) KCB (e) KCB-A (f) KCB-B

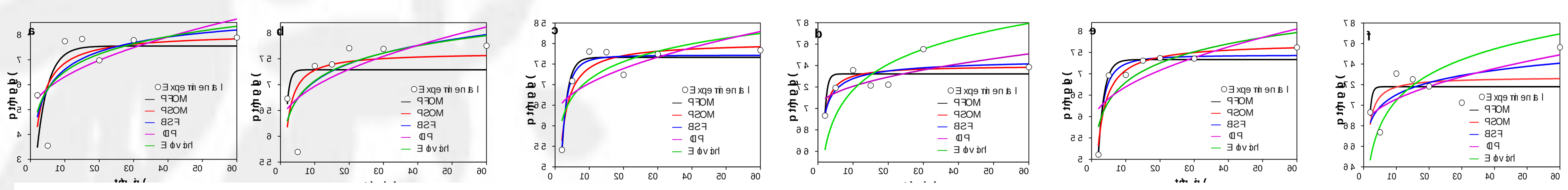
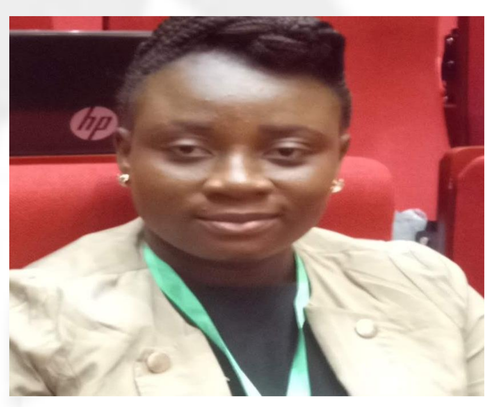


Figure 3: Kinetic plots for adsorption of CIP on (a) KCB (b) KCB-A (c) KCB-B; TET on (d) KCB (e) KCB-A (f) KCB-B

CONCLUSION

Environmentally sustainable adsorbents utilizing a waste-to-wealth approach through green method of synthesis was produced. The adsorbents are cheap, highly efficient and can replace activated carbon for removal of these pollutants.

CONTACT INFORMATION



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