

# Effectiveness Of Biochar In Adsorbing Heavy Metals In Wastewater

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## Introduction

### OSPW

- Oil sands process affected water (OSPW) is produced when oil sands are cleaned with water. The water is considered a waste and stored in tailings ponds.

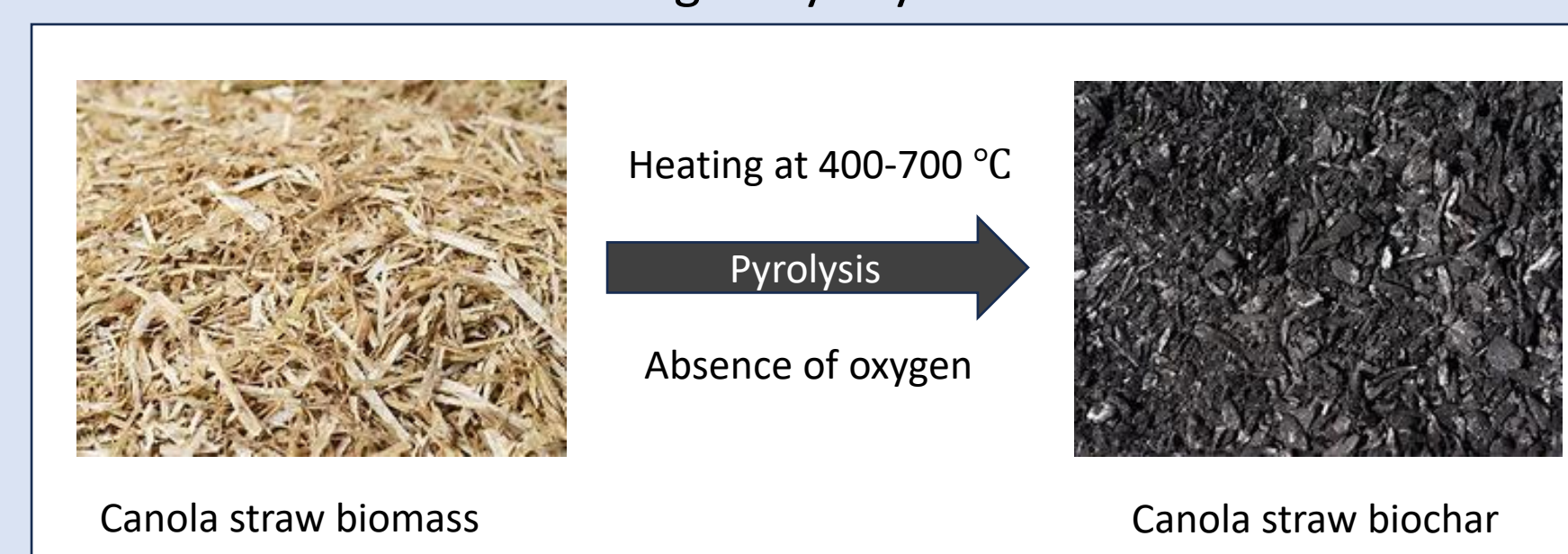


- In the Athabasca Region, surface mines have created over 1.3 billion m<sup>3</sup> of tailings ponds [1].
- OSPW has heavy metals which can be harmful to the environment [2].

### Biochar

- Biochar is solid carbon that is produced from agricultural wastes through a process called pyrolysis.[4]

Fig 2: Pyrolysis



- Biochar is useful in remediating heavy metals because it has a large surface area with thousands of small functional groups that bind to pollutants.[4]

## Objectives

- To evaluate how effective biochar is at removing heavy metals in a continuous system.
- To scale up a batch experiment so that biochar can be used to remediate OSPW in industrial scale projects.

## Materials

- Biochar
- OSPW
- Beads
- Filter cloths
- Glass columns

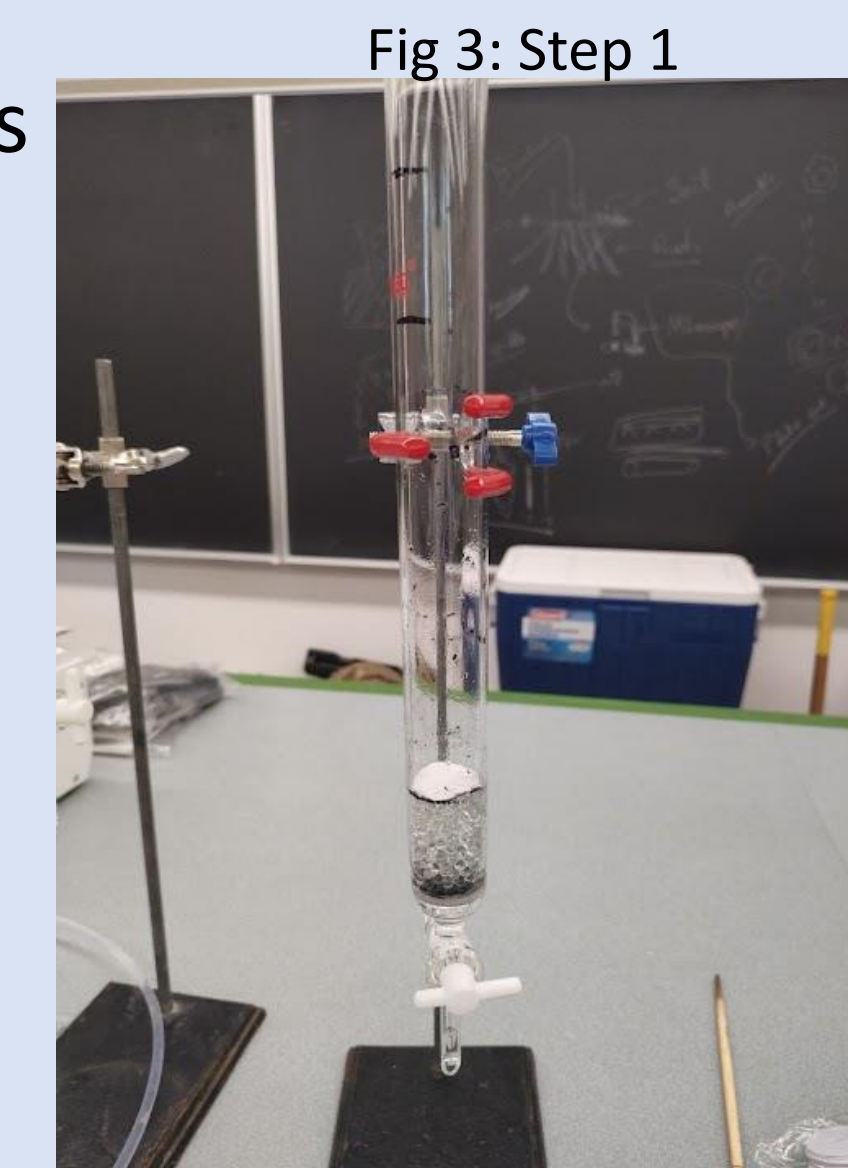
## Methods

A column experiment was used to test whether biochar is an effective remediation tool in a continuous system.

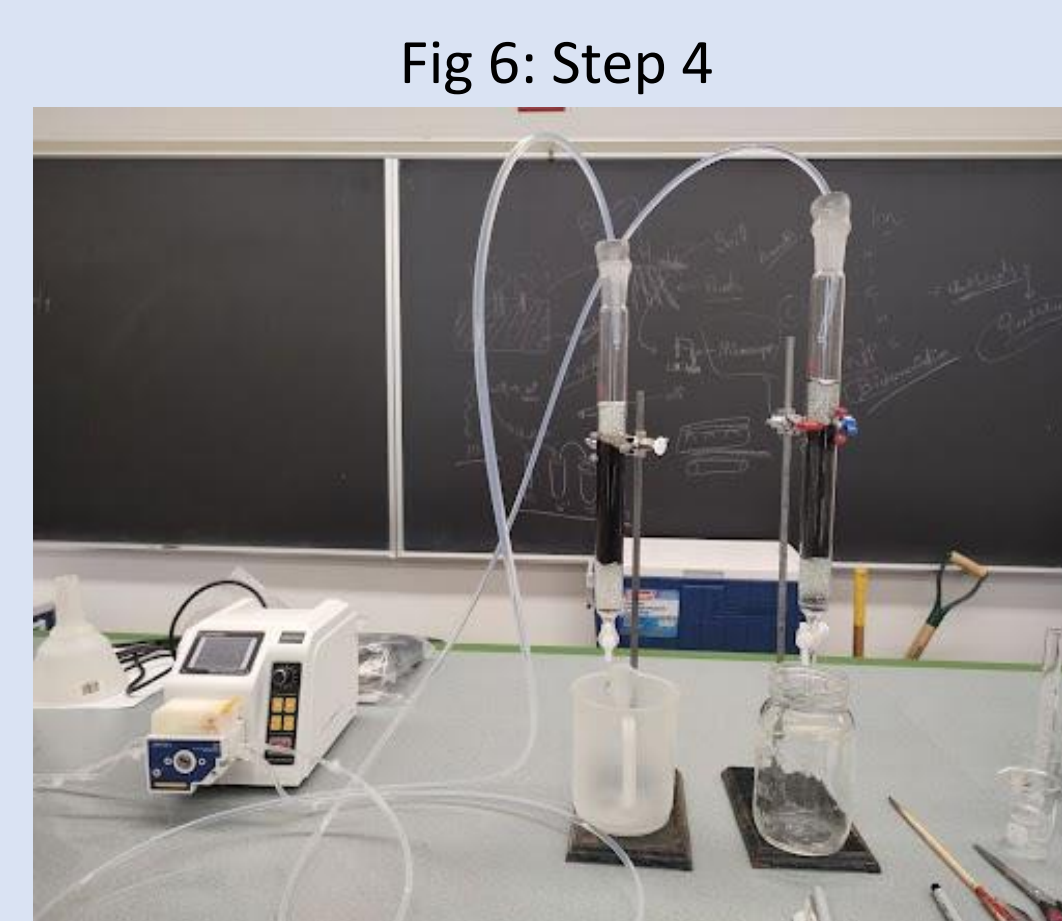
The first step was to add glass beads and filters to the bottom of the column.



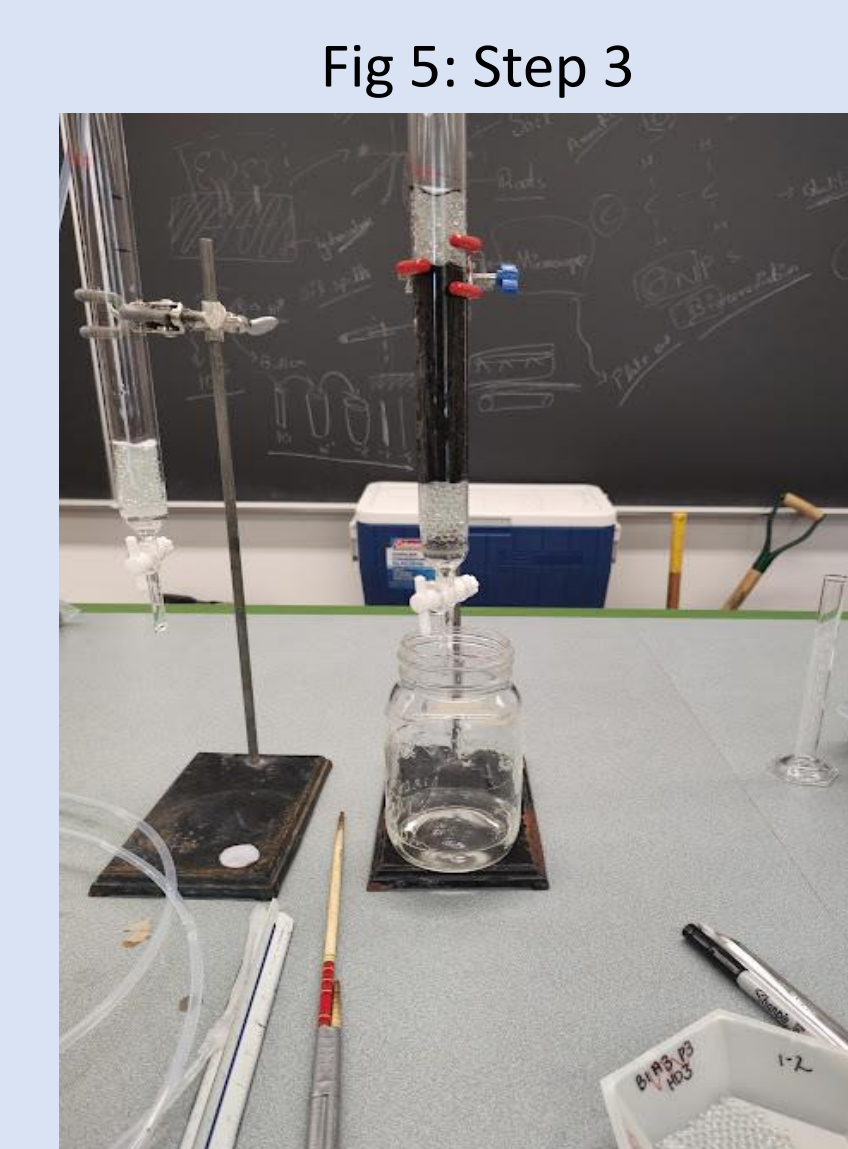
The second step was to add biochar on top of the glass beads and filters.



The third step was to add more glass beads and filters on the biochar.



The last step was to turn on the pump so the OSPW can flow and to take samples for quantifying heavy metal concentrations.



## Results

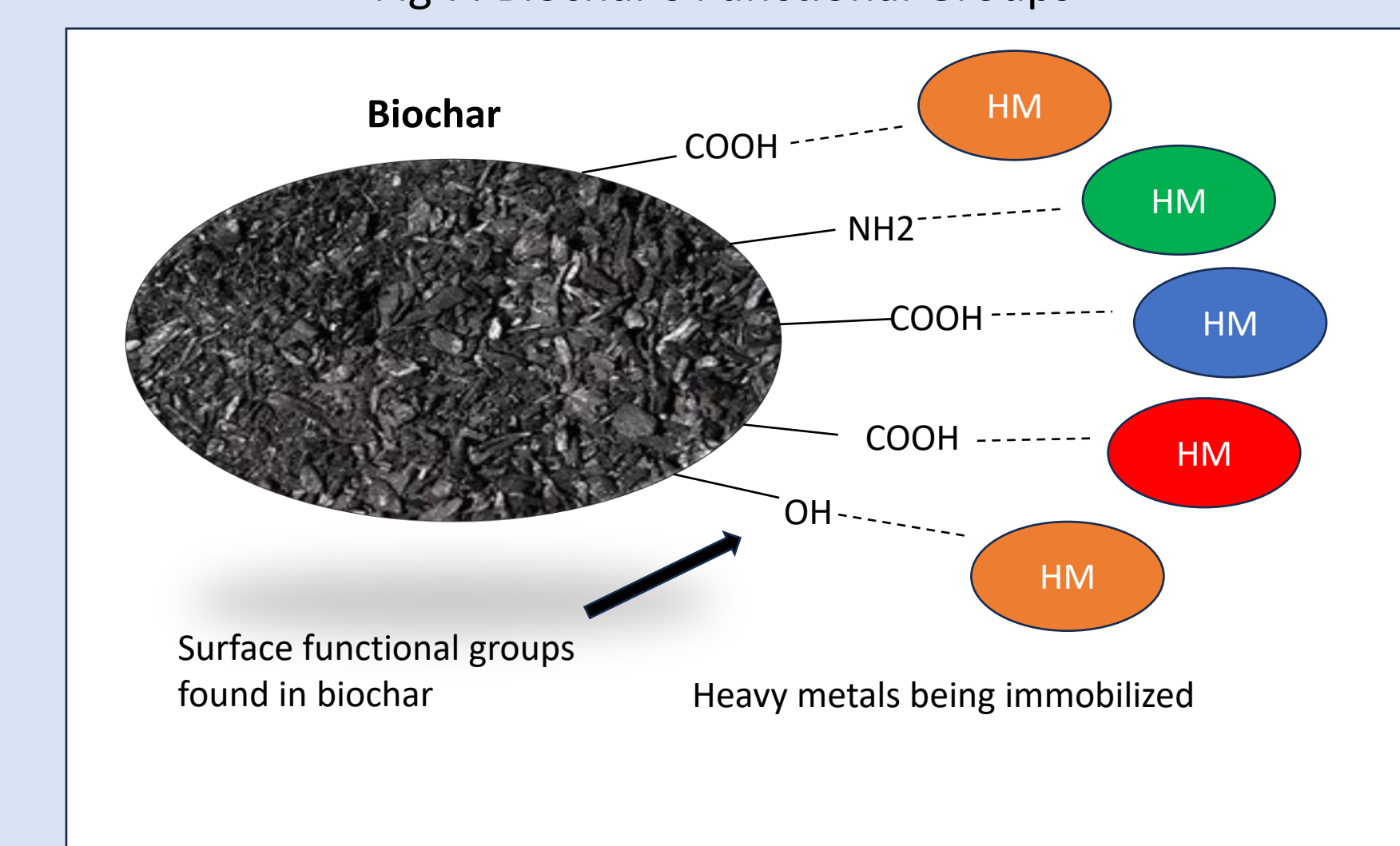
### Anticipated Results

- Using biochar to treat water contaminated with heavy metals is expected to lower the heavy metal concentrations by trapping them on the biochar's surface.
- The column study will provide insights regarding biochar's adsorption capacity for heavy metals.
- This process can improve water quality and reduce the potential of environmental harm due to biochar adsorption abilities.

## Discussion

Biochar has functional groups that interact with heavy metals and immobilize them on its surface.

Fig 7: Biochar's Functional Groups



## Conclusions

- Biochar based remediation is important in addressing the heavy metal contamination found in water.
- Biochar's absorbing abilities provides a sustainable method to improve water quality and benefit the environment.

## Acknowledgments

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## Citations

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