

## CHAPTER V

### CONCLUSION AND RECOMMENDATION

#### 5.1 Conclusion

Bioadsorption process was used to study the reduction of Copper and Zinc using the two fruit peels (Banana peels and Pineapple Peels). The banana peels and pineapple peels appeared and were proven to be useful and effective as an alternative treatment for the removal of Copper and zinc in water. The peels also didn't undergo any carbonization or activation process that's why this course of action produces a less harmful and low cost adsorbent. The result of the Scanning Electron Microscopy (SEM) also proves that the Adsorption process of the peels to remove the heavy metals in the contaminated water is proven useful and effective. Furthermore, because of the presents of pectin in the banana and pineapple, the metal ions tends to bond to it. The banana peels appeared to reduce copper and zinc more than the pineapple peel. Therefore, the most effective adsorbent material in this study is the banana peel.

Using the Flame Atomic Absorption Spectrometry (FAAS), the highest percent removal of the identified heavy metals using the peels was found to be 100% for Copper and 99% for Zinc using banana peels with a mass of both 1 gram; and 100% for Copper and 99% Zinc using pineapple peels with a mass of 1 gram. The optimum contact time of the adsorption process is 40 minutes. Therefore, using the banana peel as bioadsorbent, the most optimum concentration in reducing copper and zinc in water is using a mass of 1 gram with a contact time of 40 minutes. The said peels can only be

used twice (2), because the efficiency of the powder reduces after the adsorption process.

The designed treatment is proven to be effective using banana peels as bioadsorbent. The prototype experimentation proves that the designed treatment facility can remove copper and zinc in the contaminated water.

## 5.2 Recommendation

The researchers strongly recommend for further research this technology to other kinds of heavy metals. It is also recommend having further research about the usage of banana peels and pineapple peels other than adsorption of heavy metals that can help promote public health and at the same time a low cost product that can be produced locally. It is also recommended to have a further research about the reduction of copper and zinc using a pressurize water and an upward flow of water instead of using gravitational force and downward flow. Lastly, the researchers recommend having a simulated analysis to analyze the effect of pH, temperature and other parameters in the adsorption capacity of the peels.