

*SUMMARY AND
CONCLUSION*

5.0 SUMMARY AND CONCLUSION

Industrial pollution includes air, water and chemical pollution caused by industries. Industrial pollution began when our country went through the industrial revolution. Mostly all parts of the world are affected in some way by industrial pollution. The smog, smell and contamination of food or water are some direct effects. Remote areas of the world are affected indirectly by industrial pollution.

The presence of heavy metals in the environment is a major concern due to their toxicity. Many industrial processes produce aqueous effluents containing heavy metal contaminants. The environment with the atmospheric depositions of trace metals plays an important role in the biogeochemical cycle of the elements and consequently the contamination of the various ecosystems.

Various techniques have been employed for the treatment of heavy metals, such as chemical precipitation, ion exchange, electrolysis and reverse osmosis. But the disadvantage of these methods includes high operating costs and the production of sludge. As a result, an aquatic problem is changed into solid disposal problem. To overcome these problems, adsorption process is widely used. Activated carbon is used for the removal of heavy metals by adsorption process from the industrial wastes. However, the high cost and the difficulty of procuring commercial activated carbon proved the way to use indigenous agricultural wastes.

An attempt was made in the present study to assess the efficiency of selected agrowastes namely orange peel, rice husk and sugarcane bagasse in the removal of copper from synthetic copper solution.

Adsorption experiments were carried out under five different experimental conditions namely different pH (pH 2,3,4 and 5), different temperatures (20°C, 25°C, 30°C, 35°C and 40°C), different adsorbent dose (0.5g, 1g, 1.5g, 2g and 2.5g), different contact time (15 min, 30 min, 45 min, 60 min and 75 min) and different initial copper concentrations (20mg/100ml, 40mg/100ml, 60mg/100ml, 80mg/100ml and 100mg/100ml).

The salient findings of the study are as follows:

Powdered form of the selected agrowastes (orange peel, rice husk and sugarcane bagasse) had greater adsorption capacity at pH 5 from synthetic metal solution of copper ; maximum adsorption occurred at the temperature 30°C for orange peel and sugarcane bagasse and 35°C for rice husk; adsorbent dosage of 2.5g showed maximum adsorption with all agrowastes and the efficiency of adsorption increased with the contact time. The maximum adsorption occurred at 35 minutes for all adsorbents. Maximum adsorption was observed with the initial concentrations of 40mg/100ml, 60mg/100ml, 20mg/100ml for orange peel, rice husk and sugarcane bagasse respectively

Freundlich and Langmuir isotherm adsorption models were performed using the selected agrowastes. The value of $1/n$, indicate the relationship between the sorbent and the adsorbate. The value of $1/n$ for the selected sorbents were less than 1 for copper sorption indicating the

suitability of the three adsorbents for copper removal. The equilibrium data described both the Langmuir and the Freundlich isotherm models satisfactorily.

The present study has shown that the powdered agrowastes can be successfully used for the removal of copper ions from contaminated water and adsorption has been found to be spontaneous and rapid.