

CHAPTER I

INTRODUCTION



1.1 General

Tremendous growth in industrial activities causes high discharge into the environment. The impact of heavy metal to the environment would require decades for the fate, transport, and deleterious effects of these metals to be comprehended. In order to be regulatory compliance, industries and organizations in both the private and public sectors have sought new technologies for effective heavy metal removal.

Landfill has its own problems and is being developed to overcome problems such as leachate, gas emission, odor, etc. Production of leachate has led to many documented cases of zinc contamination in leachate to groundwater and surface water.

The U.S. EPA secondary drinking water standard of maximum concentration limit (MCL) is 5 mg/L. Concentrations above 5 mg/L can cause a bitter astringent taste and opalescence in alkaline waters. Zinc can cause negatively affect health in large doses. It results in such physical symptoms as stomach cramps and nausea. Ingesting high levels of zinc for several months may lead to anemia, damage to the pancreas, and decreased levels of cholesterol.

Numerous treatment technologies exist for the removal of heavy metals from natural waters and wastewaters such as physical and chemical technologies. These include precipitation, coagulation–flocculation, ion exchange, solvent extraction, complexation, adsorption, filtration and membrane processes.

The existing physical and chemical treatment technologies are stationary, which required space and time to construct with high operating and maintenance cost.

Portable or mobile treatment equipments will be the solution, as it will provide the advantages of mobility, cost effectiveness and ease for operation. Portable treatment system is useful as it can be taken to treat heavy metal in a remote area for in-situ bioremediation and required shorter period of time as no construction is required.

1.2 Objectives of the study

The main objectives of this work are to:

1. To establish a start up system.
2. To investigate the optimum condition on the treatment of zinc (Zn) by the use of sulfate reducing bacteria (SRB).
3. To investigate the factors that inhibits the reaction process.

1.3 Hypotheses

1. Anaerobic conditions will affect the precipitation ability of zinc.
2. Quantity and quality of substrate affect the precipitation ability of heavy metal.

1.4 Scopes of the study

1. This study and investigation was conducted under the bench scale column condition.
2. The wastewater was synthesized and prepared. ZnSO_4 was added as heavy metal source.
3. The experimental was conducted under anaerobic condition.