Study the Optimum Parameter in Chloride Removal from Rare Earth Wastewater Industrial using Bioremediation Hybrid with Electrocoagulation System

A.A.M. Azoddein[1, a)], M.C. Mamat[2], F.A.M. Azli[3], N.A.A. Azman[4]

[1,2,3,4] *Faculty of Chemical & Natural Resources Engineering, University Malaysia Pahang, 26300 Gambang, Pahang, Malaysia*

[a)]Corresponding author: aaziz@ump.edu.my

Abstract. Chloride (Cl^-) is a major anion found in all natural waters. It occurs naturally and is also a relatively minor contaminant. Currently, a larger amount chloride (Cl) in wastewater was generated from rare earth industrial. Chloride is non-toxic to humans, however, it can bring harmful to some plants and aquatic. There is needed for treatment to remove chloride from wastewater before discharged to river or water bodies. Furthermore, chloride is also a very corrosive agent, and elevated levels pose a threat to infrastructure, such as road beds, bridges, and industrial pipes. The effect caused by these hazardous pollutants and growing concerns to environmental issues led to remove chloride concentration from rare earth wastewater by using bioremediation hybrid with electrocoagulation system. The application of yeast in the wastewater treatment has potential in the treatment and reuse of wastes containing solids and high concentrations of salt, fat and antibiotics. However, Electrocoagulation is a novel method in wastewater treatment especially in chloride removal and this emerging technology combines the functions and advantage of conventional methods such as coagulation, flotation, and electrochemistry in water and wastewater treatment. The treated rare earth wastewater was tested for its chloride (Cl^-) concentration to determine the percentage of reduction by measured using spectrophotometer. Results shows *S. cerivisiae* cells grew and adapted well under condition 10 g/L NaCl in suitable nutrient medium. Yeast was able to growth in standard (10 hr), synthetic chloride (6 hr) and actual wastewater (6 hr) with OD increased from 0.8 to 2.4, 0.8 to 1.2 and 0.4 to 0.6 respectively. Besides that, the optimum yeast able to growth in standard pH 6 at first 9 hours with OD increased from 1.1 to 2.1. Thus, the samples directly treat by using electrocoagulation system. The result shows ferum plate able to remove chloride concentration which is 75.0 % removal at 5 minute and 2 Ampere. The information obtained from this study is useful for scale up purpose in the rare earth industry that choose bioremediation hybrid with electrocoagulation system method to remove chloride concentration from rare earth wastewater.

Keywords: Chloride; rare earth wastewater; *S. cerivisiae* cell; bioremediation; electrocoagulation.