CHAPTER I
INTRODUCTION

Crude Glycerol is the by-product of biodiesel production via transesterification of triglyceride with methanol to give methyl esters of fatty acids and glycerol. The rapid growth of biodiesel production is resulting in a worldwide surplus of glycerol that decreased its price. But the valued applications of glycerol such as medical, pharmaceutical and personal care preparations required a highly purified product. The purification of the crude glycerol, while avoiding the application of expensive treating processes, will allow increased profitability of the biodiesel plants.

Main technologies used in desalination of glycerol: Distillation and ion exchange resin. The distillation heats glycerol in vacuum conditions, causing them to evaporate and subsequently condense as pure glycerol. Ion exchange resins swap their charges on the surface with the salt ions in the solution. In addition, another technology that is able to desalinate the salt is electrodialysis that uses the electric field to induce salt ions from feed stream into the concentrate stream.

These desalting technologies still have some disadvantages. Distillation consumes intense energy leading to high operating cost and ion exchange required frequently chemical regeneration of resin resulting in high maintenance cost, while the electrodialysis is limited to low conductivity condition. Moreover, distillation, if uses to treate high saline solution for high purity and yield, can cause reboiler fouling due to the accumulation of impurities in the reboiler.

Electrodeionization or EDI technique is a combination of ion exchange resins, ion exchange membranes and electrodes without the need of chemicals for resin regeneration. In the operation, feed is separated to mainly 2 streams, product stream which the ions are removed and concentrate stream that receive ions from product. EDI uses the ion exchange resin to provide high ionic conductivity to the normally high resistance found in the Product stream of an electrodialysis cell. The resin's high ionic capacity increases the residence time of the ionic contaminants inside the cell allowing more time for the transport of these ions into the concentrate stream. The electrodes generate a potential gradient for ionic movement within the

cell. At cation/anion, interfaces water is dissociated into its constituent ions. H+ and OH-, which regenerate the resins on-line, so there is no down time or need for regenerative chemicals as in ion exchange.

Since the EDI require solid removal from feed, therefore ultrafiltration is utilized to remove the impurities or matter organic non-glycerol (MONG) before the feed entering to the EDI module. This technique is also useful for reboiler fouling prevention.

This experiment aim to study the feasibility of using EDI technique for salt removing in glycerol obtained from biodiesel production and to find the optimum condition for operation.