

KINETIC STUDY ON ADSORPTION OF MONOETHANOLAMINE (MEA) WASTEWATER TREATMENT USING ACTIVATED CARBON, CHITOSAN, AND RICE HUSK VIA BACTH PROCESS

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ABSTRACT

In petrochemical industry, monoethanolamine (MEA) is a common solvent used as absorption medium to remove carbon dioxide (CO₂) from the gaseous stream. In the absorber the reaction between CO₂ and MEA will generate some salt and increased the amount of the suspended solids in an absorber due to direct contact between gas and liquid (two fluid phases). This phenomenon can cause a sudden foaming where will decreasing the absorption efficiency, increasing amine loses, reduced quality of product gas, and the MEA sometimes is not appropriate to feed back into the stripper because of the properties deterioration and gives difficulties in optimizing the absorption processes and it has been removed as wastewater. This study had been conducted to examine the best method of treating the MEA wastewater. Adsorption method had been chosen in this treatment with here different adsorbents that are activated carbon, chitosan and rice husk. Three different variables that are adsorbent dosage, mixing time and mixing speed were varied to examine the effect of residue oil and MEA concentration. Then, the kinetic and isotherm model of adsorption of residue oil had been conducted. The result showed activated carbon is the best adsorbent in treating MEA wastewater followed by chitosan and rice husks. The MEA concentration in all adsorbent used in this study does not affected by the adsorption treatment.

Keywords: MEA, Adsorption, Adsorbent, Kinetic and Isotherm

INTRODUCTION

Carbon dioxide (CO₂) is one of the major greenhouse gases and it is main contributor factor of increasing the earth's surface temperature which tends to cause global warming (Sedghi et al, 2011; Chunbo et al, 2012). Large amounts of CO₂ are produced annually in various industries due to burning of fossil fuels (Mortahab et al, 2012) such as in industrial processes for example oil refineries, cement works, and steel and iron production (IPCC, 2005).

Monoethanolamine (MEA) is an organic compound with including primary amine and primary alcohol due to amino group and hydroxyl group. It is widely use in the manufacture of cosmetics, surface active agents, emulsifiers, pharmaceuticals, and plasticizing agents for