

DYNAMIC FLOW TREATMENT OF MONOETHANOLAMINE(MEA) WASTEWATER USING ACTIVATED CARBON, CHITOSAN AND RICE HUSK

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ABSTRACT

This paper presents the performance of activated carbon, chitosan and rice husk in treating monoethanolamine (MEA) wastewater in order to evaluate the feasible method for recycle and reuse the MEA in the carbon dioxide (CO₂) removal unit without affecting the amine concentration. This study focusing on the adsorption performance of activated carbon, chitosan and rice husk by varying the adsorbent dosage and circulation time. The parameter considered throughout this study were residue oil and amine concentration. Amine contaminated wastewater contains 2057 mg/L of residue oil and 65 % of amine concentration. The results showed that application of activated carbon managed to reduce the residue oil up to 95 % and maintained the amine concentration at the optimum condition (weight of adsorbent: 6 wt% , contact time: 8.5 h). For chitosan and rice husk, the results showed reduction of residue oil by up to 90 % and 71 % respectively. Meanwhile for amine concentration, both showed the same trending as activated carbon. Activated carbon showed the best adsorption performance compared to chitosan and rice husk.

Keywords: Monoethanolamine; Adsorption; Activated Carbon; Rice Husk; Chitosan; Residue Oil; Amine Concentration

INTRODUCTION

Monoethanolamine (MEA) is one of the most widely used alkanolamines for removing sour gases such as H₂S and CO₂ from natural gas during refining in the so-called 'sweetening process'. From the literature point of view, it is found that there is heavy hydrocarbon component could be carried over to the absorber with the feed gas which caused sudden foaming in the absorber. The reaction between CO₂ and MEA also contributed to the foaming problems because the reaction will produce some salt and increased the amount of suspended solids in absorber. Foaming problem lead to disturb the integrity of plant operation which were caused excessive loss of absorption solvents, decreased absorption efficiency, reduction in plant throughput, off-specification of products and reduced quality of product gas. In consequence, deterioration of MEA properties give difficulties in optimizing the absorption processes and need to be replaced (Thitakamol et al., 2009). However, MEA wastewater contains high oil and amine concentration. Therefore, it not possible to be sent to the wastewater treatment plant. Hence, MEA wastewater has to be stored for disposal which needs high costs for waste disposal handling besides to buy fresh MEA and thus, minimizes the profit margin (Razali.M.N. et al., 2010).