UNIVERSITI TEKNOLOGI MARA

SIMULATION ON REMOVAL OF CARBON DIOXIDE FROM COAL POWER STATION

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ABSTRACT

Removal of carbon dioxide (CO_2) from Coal Power station has been discussed and simulated using Aspen HYSYS V8.8. This research was executed in order to investigate the consumption of energy in order to remove CO_2 emitted from Coal Power Station and to improve the efficiency of CO_2 removal from Coal Power Station by using aqueous blended solvent between monodiethanolamine (MDEA) and sulfolane. From the simulation that has been executed, it can be said blended solvent of MDEA-Sulfolane is the most efficient solvent to treat CO_2 when it is compared with other single solvent such as MDEA, DGA, DIPA, TEA, MEA and DEA. This is because the result obtained from this research shows that MDEA-Sulfolane used the lowest amount of energy to treat CO_2 when it is compared with those amine solvents with flowrate of $2000x10^5$ kg/h. This research also shows that the most suitable amount of blended MDEA-Sulfolane and water to be used is 19%,1% and 80% respectively.

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INTRODUCTION

1.1 Research Background

Carbon dioxide (CO_2) is a colorless acidic gas which naturally occurred in our atmosphere. The atmospheric CO_2 is a primary source of carbon for life on Earth. It is produced naturally through aerobic organisms by respiration. It can also be formed from the process of organic materials decay and the fermentation of sugars in bread. This type of gas is unwanted byproducts that are being released in many large scales industries. On the other hand, CO_2 also largely used for inert gas welding and fire extinguisher and can be used to produce dry ice that can be as a refrigerant and as an abrasive in dry-ice blasting. Excessive CO_2 release to atmosphere can cause many problems. The right amount of CO_2 is also required for the survival of all life in the world.

Simulation on Carbon Dioxide removal from industries are being executed and experimented nowadays in order to overcome the greenhouse effects problem. They are so many methods of separation such as separation with sorbents/solvents, separation with membrane and separation by cryogenic distillation that are being used in industries to treat and recovery Carbon Dioxide from being released to the atmosphere in a large concentration.

In this research, post-combustion capture technique using amines will be investigated. In this technology, CO_2 is captured by an amine solvent, a liquid comprising of water and amines, used to absorb CO_2 from the flue gas. Amine technology has been used for decades in CO_2 absorption process, therefore it is considered to have a moderate technical risk This research will evaluate opportunities for improvements in process design operations with the purpose to qualify the technology for use in large scale post-combustion plants. (Liv Lonne Dille, 2010)

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