CARBON DIOXIDE CAPTURE FROM REFORMING GASES USING
ACETIC ACID MODIFIED CHEMICAL ABSORBENTS

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ABSTRACT

Carbon dioxide gas is a major problem in the production of natural gas. It may also contributes to operation problems such as foaming, corrosion, high solution viscosity and fouling, thereby decreasing the plant life. This study presents experimental results on the evaluation of modified amine solution (Diethanolamine, DEA) for CO₂ absorption. In this study, the absorption capacity of this solvent was compared with traditional DEA, ammonia and acetic acid (C₂H₄O₂). Experiments were carried out at 25°C and 1 bar with DEA concentration between 0.5M and 2M, ammonia concentration varying 1M and 6M and the concentration of acetic acid between 1wt% and 15wt%. The results showed that carbon dioxide absorption by ammonia is better than that carried out by DEA and mixtures of NH₃, DEA and acetic acid. The most efficient absorbents (absorption capacity) were 6M NH₃, 2M DEA and a mixture of 6M NH₃ and 1wt% acetic acid at fixed gas flow rate of 80 ml/min and liquid flow rate of 22 l/h, where the CO₂ removal efficiency of 94.7%, 74% and 73% was obtained, respectively.
ABSTRAK

Gas karbon dioksida adalah masalah utama dalam pengeluaran gas asli. Ia juga boleh menyumbang kepada masalah operasi seperti bebuih, kakisan, kelikatan larutan yang tinggi dan kotoran, yang seterusnya mengurangkan jangka hayat loji. Kajian ini membentangkan keputusan eksperimen yang menilai larutan amin diubahsuai (Diethanolamin, DEA) untuk penyerapan CO$_2$. Dalam kajian ini, kapasiti penyerapan pelarut ini telah dibandingkan dengan ammonia (NH$_3$) dan asid asetik (C$_2$H$_4$O$_2$). Eksperimen telah dijalankan pada 25°C dan 1 bar dengan kepekatan DEA antara 0.5M dan 2M, kepekatan ammonia yang berlainan dari 1M ke 6M dan kepekatan asid asetik antara 1% berat dan 15% berat. Hasil kajian menunjukkan bahawa penyerapan karbon dioksida oleh ammonia adalah lebih baik berbanding DEA dan campuran NH$_3$, DEA dan asid asetik. Penyerap yang paling berkesan (kapasiti penyerapan) adalah 6M NH$_3$, 2M DEA dan campuran 6M NH$_3$ dan 1% berat asid asetik pada kadar aliran gas yang tetap 80 ml/min dan kadar aliran cecair 22 l/j, di mana kecekapan penyingkiran CO$_2$ masing-masingnya ialah 94.7%, 74% dan 73% telah diperolehi.