Abstract

Title: **CO_2 CAPTURE FROM FLUE GAS BY PHASE TRANSITIONAL ABSORPTION**

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OBJECTIVES

The ultimate objective of this proposed program is to develop a low-cost viable process to capture CO_2 based on Phase Transitional Absorption. In order to achieve this objective expediently and in a cost effective manner, a specific program is designed for this phase (1) to identify a set of activated agent/solvent system for the process via screening test, (2) to search the appropriate absorption conditions, such as, temperature, activated agent/solvent ratio, liquid agitation speed, CO_2 partial pressure etc., (3) to study the regeneration of the absorbent, such as, the conditions and method of absorbent regeneration, heat of disassociation of CO_2 from absorbent, the time takes to liberate all of the CO_2 from absorbent, (4) to compare the Phase Transitional Absorption with industrial benchmark monoethnolamine process. The comparison includes the absorption mechanism, absorption process, absorption rate, CO_2 loading capacity, absorbent loss, regeneration, operation energy costs.

ACCOMPLISHMENTS TO DATE

A set of activated agent/solvent has been screened out. The absorption rate was measured at different temperature, different activated agent/solvent ratios, different liquid agitation speeds. The experimental results showed that there is no significant change in absorption rate caused by temperature change. However, the higher the temperature, the higher the vapor pressure of the absorbent, the higher the loss of the absorbent or the more cost of the recovery of the absorbent. The influence from the activated agent/solvent ratio on absorption rate was significant. The optimum activated agent/solvent ratio was obtained. The study of the influence by liquid agitation speed on absorption rate indicated that the higher liquid agitation speed, the higher the mass transfer, the higher the absorption rate.

Our study showed that the CO_2 rich absorbent decomposed CO_2 at about 70 ^oC. The regeneration rate was highly depended on liquid mass transfer. The large surface area and high liquid mass transfer coefficient were favorable to regeneration. The heat for release CO_2 from absorbent was 180 Btu/lb.

FUTURE WORK

The future work on this project includes further investigate the regeneration for the optimum regeneration condition and the comparison of the Phase Transitional Absorption with industrial benchmark monoethnolamine process.

LIST OF PAPER PUBLISHED, U.S. PATENT/PATENT APPLICATION(S)

Phase Transitional Absorption method
Liang Hu, U.S. Patent pending, 2005.3

CONFERENCE PRESENTATIONS, AWARDS RECEIVED AS A RESULT OF SUPPORTED RESEARCH,

No.

STUDENTS SUPPORTED UNDER THIS GRANT

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