Experimental Determination of the Equilibrium Water Content of CO_2 at High Pressure and Low Temperature

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Processes to reduce the CO_2 content of natural gas typically produce two product streams: a Sales Gas with low CO_2 content and a CO_2 Product with high CO_2 content. An important design question is to what extent the water content must be reduced to in order to ensure that hydrates do not form in pipeline transportation of the two products. Since there is considerable disagreement in the available data for the water solubility in CO_2, a round-robin data program was structured by Fluor Corporation to accurately establish the water solubility. Song and Kobayashi measured the water content of natural gas and NGL in an extensive research program for GPA over more than a decade, and GPA RR-99 [1] presents their measurements in the CO_2-rich phase. The experimental data of Song and Kobayashi indicate a strong pressure dependence of the water solubility. On the other hand, Seo, Kang and Lee [2] measured data in the relatively high-temperature region (274 to 294 K) and concluded that the pressure dependence of the solubility is weak. The strong pressure dependence of the Song and Kobayashi data was also questioned using a theoretical basis by Li, Jakobsen and Stang [3] and Mathias [4]. Since the data are extremely important to process design, Fluor solicited proposals for a round-robin data program to measure the equilibrium water content in CO_2 at low temperature (down to 228 K) and high pressures (172 to 276 bar). Two laboratories were chosen to independently make the measurements, and the results will be presented at the Nineteenth Symposium.

REFERENCES:

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