CHAPTER V
CONCLUSIONS AND RECOMMENDATION

The objective of this study was to characterize physical properties of the sol-gel alumina prepared by the hydrolysis of aluminum alkoxide with various calcination temperatures and calcination times, and determine dynamic water and hydrocarbons adsorption behaviors on this sol-gel alumina through simulated natural gas system.

The results indicated that the temperature dependent in the calcination stage during the alumina preparation significantly affected the sol-gel alumina properties. The BET surface area and the pore volume decreased markedly with the increase of the calcination temperature. The static water adsorption strongly depended on pore volume of adsorbent. The characteristics of γ-Al_2O_3 of this sol-gel alumina were reported by the interpretation of the XRD results.

Capillary condensation plays an important role in the dynamic water adsorption of microporous sol-gel alumina. Hydrocarbons were adsorbed with a very trace amount at the beginning, but later desorbed out by the replacement of water molecules because of water higher affinity. Water composition in the gas stream affects the adsorption behavior of hydrocarbons. Regeneration of this alumina for ten times did not obviously change its water adsorption capacity.

The water removal by the adsorption via sol-gel alumina was carried out in this study. However, there are other impurities, such as mercury that still left in the natural gas stream and must be removed. Modification of alumina surface by loading some metals, which provide the capability to capture those impurities, might be an excellent solution for this problem. With this idea, it will result in an adsorbent, which can be used to remove water and other impurities in only one process.