440g Reversible Chemisorption of Carbon Dioxide

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The advent of hydrogen economy has renewed interest in novel ways of producing hydrogen by reforming of natural gas and by gasification of coal. Sorption Enhanced Reaction Processes (SERP) can have large impacts in achieving these goals. The SERP concepts use a reversible chemisorbent for selective removal of CO_2 from a hot gas (350-450 ^oC).

Hydrotalcites promoted by K_2CO_3 is a found to be an acceptable chemisorbent for this purpose. This paper reports the results of detailed column dynamic and TGA studies of high temperature sorption and desorption of CO_2 from N_2 on such a material. The chemisorption isotherms of CO_2 are Type I and the rate of chemisorption is fast. The desorption of chemisorbed CO_2 is governed essentially by local equilibrium. Thermodynamic models are proposed to describe the chemisorption process. Possible mechanisms of the surface reactions underlying the chemisorption process are discussed.