

### Kinetic Study on Catalytic Steam Gasification of Lignite: Evaluation of Various Gas-Solid Reaction Models

Vergel Bungay, 송병호\*, 김상돈<sup>1</sup>, 손정민<sup>2</sup>, 심현민<sup>3</sup>,  
김용준<sup>3</sup>, 김규태<sup>3</sup>, 박삼룡<sup>3</sup>  
군산대학교 화학공학과; <sup>1</sup>KAIST;  
<sup>2</sup>전북대학교 자원에너지공학과; <sup>3</sup>(주)SK에너지  
(bhsong@kunsan.ac.kr\*)

Kinetic study on catalytic lignite-steam gasification was done in the presence of 5% wt loading K<sub>2</sub>CO<sub>3</sub> at temperatures ranging from 600°C to 900°C. The gasification was performed in a thermobalance reactor at ambient pressure using steam-N<sub>2</sub> mixture of 50% steam partial pressure. Kinetic parameters were measured using homogeneous model (HM), shrinking core model (SCM), random pore model (RPM), modified volumetric model (MVM) and extended modified volumetric model (EMVM). In most of the runs, RPM, MVM and EMVM yielded goodness of fit with square correlation index values of 0.9974, 0.9950 and 0.9964, respectively. The best fit result by RPM indicates that the mechanism of catalyzed gasification of lignite with steam involves growth and opening of overlapping cylindrical pore surfaces resulting to rate enhancement and increase in catalyst surface area.