

Study on the Applicability of Gas-Solid Reaction Models in the Gasification of Inner Mongolian Lignite with CO₂ in the presence Alkali Metals and Transition Metal Salts

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Catalytic gasification of Inner Mongolian lignite with CO₂ was investigated in a thermogravimetric analyzer at 600C–900C at 5% to 15% wt loading via physical mixing. Catalysts used were K₂CO₃, Na₂CO₃, K₂SO₄ and FeSO₄. In this study, the (1) homogeneous (HM), (2) shrinking core (SCM), (3) random pore (RPM), (4) modified (MVM) and (5) extended modified volumetric models (EMVM) were evaluated and goodness of fit for the conversion behavior was measured from the root mean square deviation, R². In most catalytic gasification runs, the RPM, MVM and EMVM showed goodness of fit and the EMVM approaches the MVM at higher temperatures. This study further confirms the applicability of EMVM for high-temperature uncatalyzed gasification (Wu et al, 2009) and further suggests its applicability to catalyzed gasification as well.