

METHANOL SYNTHESIS IN A THREE PHASE REACTOR. Dr. Martin B. Sherwin, Dr. David B. Blum. Chem Systems Inc., 275 Hudson Street, Hackensack, New Jersey 07601.

Chem Systems, under the sponsorship of the Electric Power Research Institute, is developing what it considers to be both an efficient and reliable system to manufacture methanol for peak shaving power generation from coal-derived synthesis gas. The reaction scheme consists of a three-phase fluidized bed reactor. Synthesis gas containing CO, CO<sub>2</sub> and H<sub>2</sub> is passed upward in the reactor cocurrent to an inert liquid which serves to both fluidize the catalyst and absorb the exothermic heat of reaction. The conversion level is limited by equilibrium considerations but a close approach should be obtainable by this system. At 800-1000 psig and 260°-300°C, about 25-30% conversion should be realized by utilizing a commercially available copper-based catalyst. The exothermic heat of reaction is taken up by the liquid as sensible heat and by vaporization. The overhead product gases are condensed to remove the product methanol and water and to recover any vaporized liquid for recycle. The main liquid flow is circulatory through a heat exchanger for temperature control. Unreacted synthesis gas can either be recycled to the reactor or burned directly for base-load power generation.