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 AIR PRODUCTS & CHEM INC

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 Improved prodn. of methanol - in gas phase synthesis loop from syn-  
 gas feed  
 C86-150375

In a gas phase synthesis loop for the prodn. of MeOH from a syn-gas feed contg. CO<sub>2</sub> and H<sub>2</sub>, the novelty comprises:

- passing the syngas feed, in a single pass, to a liq. phase MeOH reactor to convert a portion of the syngas to MeOH, thus forming a MeOH-contg. syngas reactor effluent;
- cooling the effluent to condense the MeOH, thus producing a first MeOH stream and an unreacted syngas stream;
- passing the unreacted syngas stream to a gas phase synthesis loop to produce a second MeOH stream; and
- recovering both the first and second MeOH streams.

#### ADVANTAGE

The process increases the capacity of a typical gas-phase MeOH synthesis loop.  
 By using various catalysts in the liq. phase reactor, the

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process can be designed to produce higher aliphatic alcohols as well as MeOH as prods.

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#### EXAMPLE

A computer simulation was developed to establish the effect of retrofitting a liq. phase MeOH reactor at the front end of a conventional gas phase synthesis loop.

The gas phase loop was designed to produce 2100 metric tons per day (MT/D) of MeOH from natural gas without supplemental CO<sub>2</sub> addn.

The feed is compressed to 490 psi and fed to the liq. phase reactor where about 33% of the CO and 7% of the CO<sub>2</sub> is converted to MeOH at a 10000 l/hr.-kg space velocity. The reactor effluent is cooled to condense the MeOH and the remaining feed is compressed to about 100 psi and fed to the gas phase synthesis loop for further MeOH synthesis.

From the results it was calculated that the overall prodn. of pure MeOH was increased to 2613 MT/D, of which 1974 MT/D came from the gas phase loop and 629 MT/D from the liq. phase reactor. This represents a 24.5% increase in MeOH prodn. over the previous rate of 2100 MT/D for the stand-alone gas phase loop. In addn., 11 MT/D of EtOH and higher alcohols would be produced. (5pp1738)AHDwgNo0/0.