

### III. PROCESS VARIABLES

A rigorous analysis of the data discloses that the degree of conversion, that is, the disappearance of  $H_2$  and  $CO$ , may be affected by each one of the following factors:

1. Temperature
2. Gravelocity or Space Velocity
3. Recycle Ratio (Recycle rate/FF rate)
4. Catalyst Type and Composition
5. Catalyst Reduction
6. Fresh Feed Composition
  - a)  $H_2/CO$  Ratio
  - b)  $CO_2$  Content
  - c)  $CH_4$  Content
  - d)  $H_2O$  Content
7. Pressure
8. Reactor Design - Disposition of Cooling Surface, Linear Velocity, Catalyst Bed Depth, Etc.

Items 3 and 6, recycle ratio and fresh feed composition, can be combined into "Total Feed Composition" but for the purpose of practical application of correlations it is better to keep them separate since they can both be controlled independently. It will be clear of course, that the nature of the recycled material will be influenced by degree of conversion, separator conditions and any selective extraction of components from the wet gas before it is recycled. Such extractions or changes in temperature and pressure of the separator may have a profound effect on degree of conversion, product distribution, quality of product and catalyst life. In all the runs with which we are concerned here however, the wet gas was separated from the liquid at about atmospheric temperatures and a portion of the total wet gas stream was recycled without change in composition.