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16/ENG01/014

Chemical Engineering

Plant Design Assignment

1) Shift Reaction Set: Shift 1: $\text{CO} + \text{H}_2\text{O} \rightleftharpoons \text{CO}_2 + \text{H}_2$

In the absence of a catalyst and at 430°C, the rate of reaction number 1 ($\text{CH}_4 + \text{H}_2\text{O} \longrightarrow \text{CO} + 3\text{H}_2$) in the Shift Reactor is negligible.

2) Methanator Reaction Set: Meth 1: $\text{CO} + 3\text{H}_2 \longrightarrow \text{H}_2\text{O} + \text{CH}_4$

3) Reformer Reaction Set: Reform 2: $\text{CO} + \text{H}_2\text{O} \rightleftharpoons \text{CO}_2 + \text{H}_2$

4) Reformer Reaction Set: Reform 1: $\text{CH}_4 + \text{H}_2\text{O} \rightleftharpoons \text{CO} + 3\text{H}_2$