

## A First Course on Kinetics and Reaction Engineering

### Problem 1.6

#### Problem Purpose

This problem will help you determine whether you have mastered the learning objectives for this unit.

#### Problem Statement

Steam reforming of methane, reaction (1) is used commercially to manufacture hydrogen. Suppose a 10 L reactor initially contains a gas mixture with 70% steam and 30% methane at 2 atm and 375 °C.



Assuming reaction (1) is the only reaction that takes place and that the temperature is constant, (a) calculate the final concentration of hydrogen if 95% of the carbon monoxide is converted. (b) Derive an expression for the concentration of steam in terms of the reactor volume, the initial moles of steam, the initial moles of carbon monoxide and the final moles of carbon monoxide.