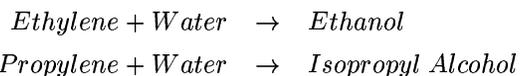


Stoichiometric Reactor Problem

Consider the following gas phase reactions in a reactor:



Methane is an inert compound that is present in the feed to the reactor. The reactor and the feed are at temperature of 590 K and a pressure of 69 bar. The conversion of ethylene to ethanol is 7% and the conversion of propylene to isopropyl alcohol is 0.7%.

1. Write down the mass balance for each species in this reactor.
2. If the feed has the following composition:

Compound	Feed rate (mol/s)
Methane	200
Ethylene	1289
Propylene	268.6
Ethanol	0.56
Diethyl Ether	0.0
Isopropyl Alcohol	0
Water	773.4

what is the composition of the stream exiting the reactor?

3. Suppose the following *additional* reaction occurs in series:



with a conversion of 5%. What is the composition of the stream exiting the reactor?

4. Verify your results in CHEMCAD.