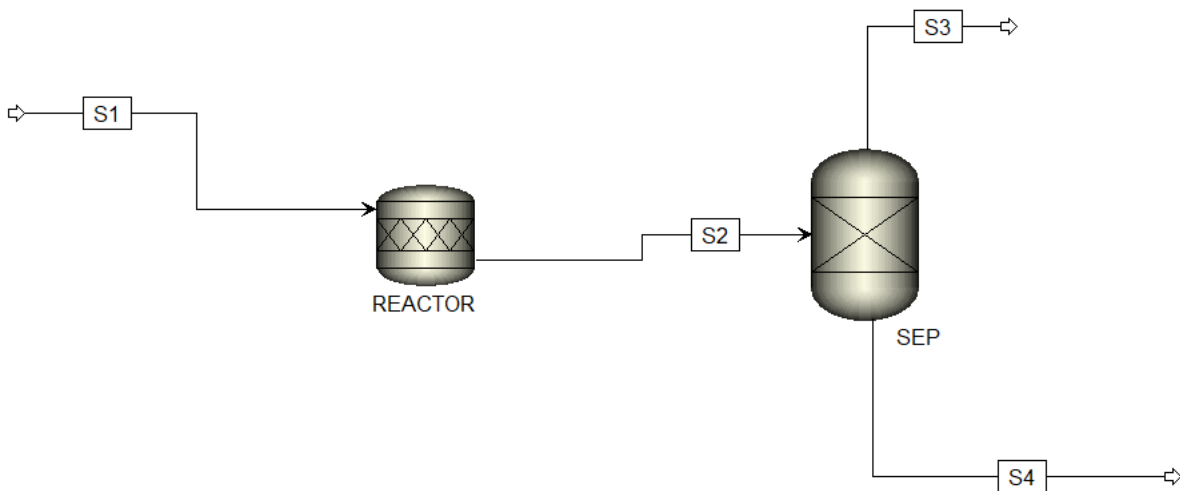


CHE494 Special Topics III Chemical Process Simulation and Applications

Example 1: Mass-Balance Only with Standard Input

Combustion of Methane: $\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$



A process feed consisting of 10 mol% H_2 , 40 mol% CH_4 , and 50 mol% O_2 enters a reactor that allows methane combustion to occur with 100% conversion. The remaining liquid stream enters a flash vessel to remove the light gases and allow most of the water to leave the bottom which exits the process.

Standard input data are:

1. Total flow rate (100 lbmol/hr) and composition of the process feed
2. Reactor: stoichiometry of the reaction and the fractional conversion
3. Component split fractions of the flash vessel (as a separator block) – Based on the inlet into the flash vessel, 99 mol% of H_2 , 95 mol% of CO_2 , 90 mol% of CH_4 , and 2 mol% of H_2O go to the overhead of the vessel.

		S1	S2	S3	S4
From			REACTOR	SEP	SEP
To		REACTOR	SEP		
Stream Class		CONVEN	CONVEN	CONVEN	CONVEN
Average MW		22.618092	22.618092	26.994444	18.554035
Mole Flows	lbmol/hr	100	100	48.15	51.85
CH4	lbmol/hr	40	15	13.5	1.5
O2	lbmol/hr	50	0	0	0
CO2	lbmol/hr	0	25	23.75	1.25
H2O	lbmol/hr	0	50	1	49
H2	lbmol/hr	10	10	9.9	0.1
Mole Fractions					
CH4		0.4	0.15	0.2803738	0.0289296
O2		0.5	0	0	0
CO2		0	0.25	0.4932503	0.024108
H2O		0	0.5	0.0207684	0.9450338
H2		0.1	0.1	0.2056075	0.0019286
Mass Flows	lb/hr	2261.8092	2261.8092	1299.7825	962.0267