

JQ.3.6.Setup

September 22, 2014

(3.6) C_3H_8 is burned with 10 times the stoichiometric air in a steady flow process. the reaction is complete, forming CO_2 and H_2O . The fuel and air are mixed at $400^\circ C$ before entering the combustor. The combustor is adiabatic. Specific heats are all constant, $c_p = 1J/(gK)$.

- (a) Calculate the stoichiometric air to fuel mass ratio.
- (b) Calculate the stoichiometric oxygen to fuel mass ratio.
- (c) If the flow rate of the C_3H_8 is 10 g/s, calculate the exit flow rate.
- (d) Calculate the C_3H_8 mass fraction at the inlet.
- (e) Calculate the exit temperature.
- (f) Calculate the enthalpy per unit mass for the $H_2O(g)$ in the exit stream (with respect to the $25^\circ C$ reference state).

Setup: With the exception of part (g), this problem is a continuation of previous problems and should not pose any particular conceptual challenges. Part (g) is not clear and I don't want you to do it.

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