

ENSC 388

Assignment #3

Assignment date: Wednesday Sept. 30, 2009

Due date: Wednesday Oct. 7, 2009

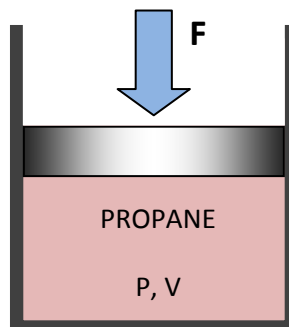
Problem 1

A cylinder fitted with a piston contains propane ($T_{cr} = 370\text{ K}$, $P_{cr} = 4.26\text{ MPa}$, $R = 0.1885\text{ kJ/kg}\cdot\text{K}$) gas at 100 kPa and 300 K , where the total volume of the system is 200 L . The gas is now slowly compressed according to the relation:

$$PV^{1.1} = \text{constant}$$

until the final temperature reaches 340 K .

- What is the final pressure?
- Elaborate on why the ideal gas assumption can be used?
- How much work is done during the process?



Problem 2

Water contained in a piston-cylinder assembly undergoes two processes in series from an initial state where the pressure is 10 *bar* and the temperature is 400°C.

Process 1-2: The water is cooled as it is compressed at constant pressure of 10 *bars* to the saturated vapour state.

Process 2-3: The water is cooled at constant volume to 150°C.

- Sketch both processes on T - v and P - v diagrams.
- For the overall process determine the work, in kJ/kg .
- For the overall process determine the heat transfer.

