ME202 – THERMODYNAMICS

Home Study 3

Section: N/A
Due Date: N/A

PROBLEMS

1. A 1.8m^3 rigid tank contains steam at 220^oC. One-third of the volume is in the liquid phase and the rest is in the vapor form. Determine (a) the pressure of the steam, (b) the quality of the saturated mixture and (c) the density of the mixture.

2. 10kg of R-134a fill a 1.348m3 rigid container at an initial temperature of -40oC. The container is then heated until the pressure is 200kPa. Determine the final temperature and the initial pressure.

3. 10kPa of R134a at 300kPa fills a rigid container whose volume is 14L. Determine the temperature and the total enthalpy in the container. The container is now heated until the pressure is 600kPa. Determine the temperature and total enthalpy when the heating is completed.

4. Saturated steam coming off the turbine of a steam power plant at 40^oC condenses on the outside of a 3cm outer diameter, 35 m long tube at a rate of 130 kg/h. Determine the rate of heat transfer from the steam to the cooling water flowing through the pipe.

5. A piston-cylinder device initially contains 1.4 kg saturated liquid water at 200^oC. Now heat is transferred to the water until the volume quadruples and the cylinder contains saturated vapor only. Determine (a) the volume of the tank, (b) the final temperature and pressure and (c) the internal energy change of the water.

6. A piston-cylinder device initially contains 50L of liquid water at 40^oC and 200kPa. Heat is transferred to the water at constant pressure until the entire liquid is vaporized.

    a. What is the mass of the water?
    b. What is the final temperature?
    c. Determine the total enthalpy change.
    d. Show the process on a T-v diagram with respect to saturation lines.

best regards,

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