Mata Kuliah: Termodinamika Dasar 02 (ENME600004)

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Responsi 2

Soal Termodinamika

1. An insulated tank is divided into two parts by a partition. One part of the tank contains 2.5 kg of compressed likuid water at 60°C and 600 kPa while the other part is evacuated. The partition is now removed, and the water expands to fill the entire tank. Determine the final temperature of the water and the volume of the tank for a final pressure of 10 kPa.
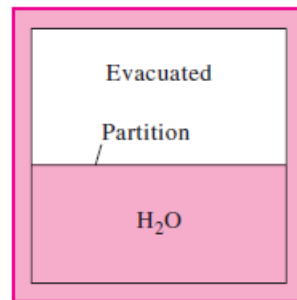
2. A piston–cylinder device initially contains 0.8 m3 of saturated water vapor at 250 kPa. At this state, the piston si resting on a set of stops, and the mass of the piston is such that a pressure of 300 kPa is required to move it. Heat is now slowly transferred to the steam until the volume doubles. Show the process on a *P-v* diagram with respect to saturation lines and determine (*a*) the final temperature, (*b*) the work done during this process, and (*c*) the total heat transfer.

3. A piston–cylinder device contains 0.8 kg of nitrogen initially at 100 kPa and 27°C. The nitrogen is now compressed slowly in a polytropic process during which $PV^{1.3}$ constant until the volume is reduced by one-half. Determine the work done and the heat transfer for this process.

4. Consider a well-insulated horizontal rigid cylinder that is divided into two compartments by a piston that is free do move but does not allow either gas to leak into the other side. Initially, one side of the piston contains 1 m3 of N2 gas at 500 kPa and 80°C while the other side contains 1 m3 of He gas at 500 kPa and 25°C. Now thermal equilibrium is established in the cylinder as a result of heat transfer through the piston. Using constant specific heats at room temperature, determinis the final equilibrium temperature in the cylinder. What would your answer be if the piston were not free to move?