

TUGAS TERMODINAMIKA TEKNIK KIMIA II

1. A Carnot engine with H_2O as the working fluid operates on the cycle shown in Fig. 8.2. The H_2O circulation rate is 1 kg s^{-1} . For $T_H = 475 \text{ K}$ and $T_C = 300 \text{ K}$, determine:
 - (a) The pressures at states 1, 2, 3, and 4.
 - (b) The quality x_u at states 3 and 4.
 - (c) The rate of heat addition
 - (d) The rate of heat rejection.
 - (e) The mechanical power for each of the four steps.
 - (f) The thermal efficiency η_1 of the cycle.

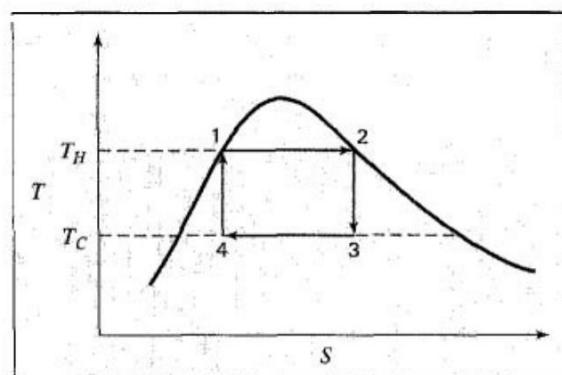


Figure 8.2 Carnot cycle on a $T S$ diagram

2. A refrigeration system requires 1.5 kW of power for a refrigeration rate of 4 kW.
 - (a) What is the coefficient of performance?
 - (b) How much heat is rejected in the condenser?
 - (c) If heat rejection is at 313.15 K (40°C), what is the lowest temperature the system can possibly maintain?
3. Assuming Raoult's law to be valid, prepare a P-x-y diagram for a temperature of 363.15 K (90°C) and a t-x-y diagram for a pressure of 90 kPa for one of the following systems: (a) Benzene(l)/ethylbenzene(2); (b) 1-Chlorobutane(l)/chlorobenzene(2).