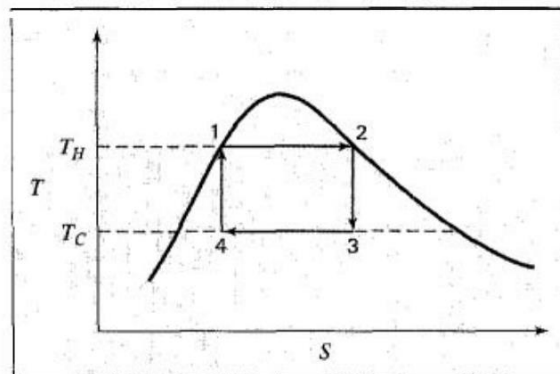


## TUGAS TERMODINAMIKA TEKNIK KIMIA II

1. A Carnot engine with H<sub>2</sub>O as the working fluid operates on the cycle shown in Fig. 8.2. The H<sub>2</sub>O circulation rate is 1 kg s<sup>-1</sup>. For  $T_H = 475$  K and  $T_C = 300$  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  $\eta$  of the cycle.



**Figure 8.2** Carnot cycle on a  $TS$  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).