Answer on Question #66529-Physics-Molecular Physics-Thermodynamics

i) Draw a Carnot cycle on p-V diagram. Show that the amount of heat absorbed (rejected) in a reversible cycle is proportional to the temperature of source (sink).

Solution

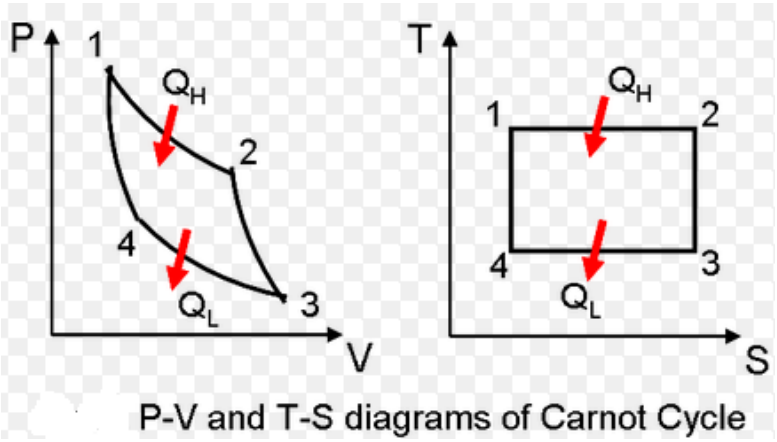
Carnot cycle is composed of four processes:

1-2. Isothermal heat addition (T=const)

2-3. Isentropic expansion (S=const)

3-4. Isothermal heat rejection (T=const)

4-1. Isentropic compression (S=const)



P-V and T-S diagrams of Carnot Cycle

The amount of heat absorbed from the T-S diagram is

$$Q_H = T_{source}(S_2 - S_1) \sim T_{source}.$$

The amount of heat rejected from the T-S diagram is

$$Q_H = T_{sink}(S_2 - S_1) \sim T_{sink}.$$