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FOLLOWING POINTS ARE COVERED

- CARNOT CYCLE / CARNOT ENGINE THEOREM
- CARNOT CYCLE P-V & T-S DIAGRAM
- CARNOT CYCLE EFFICIENCY

CARNOT CYCLE / CARNOT ENGINE THEOREM

- A French scientist Sadi Carnot, in 1824 proposed the research paper that
- "It is theoretical heat engine that converts maximum amount energy into the mechanical work."
- According to this theorem Efficiency of the cycle is depends on the difference between max temperature and min temperature reached during one cycle.
- Carnot cycle is also called as Reversible Cycle.

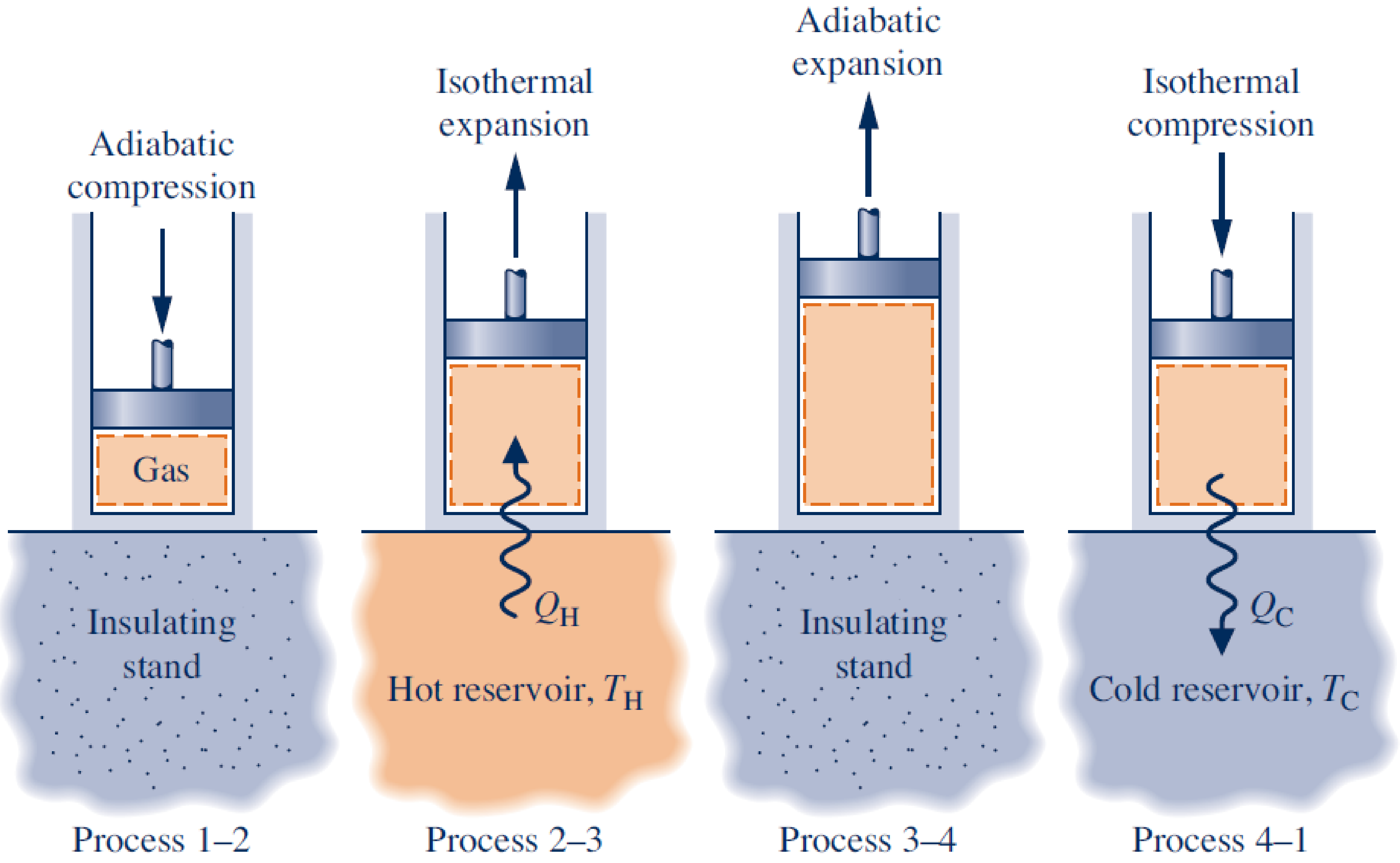
CARNOT THEOREM OR CARNOT PRINCIPLE

- No Engine can be efficient than reversible engine operating between two same temperature reservoir Or Carnot engine is most efficient engine among all.
- The efficiency of the all heat engines operating between the same temperature reservoir will be the same.

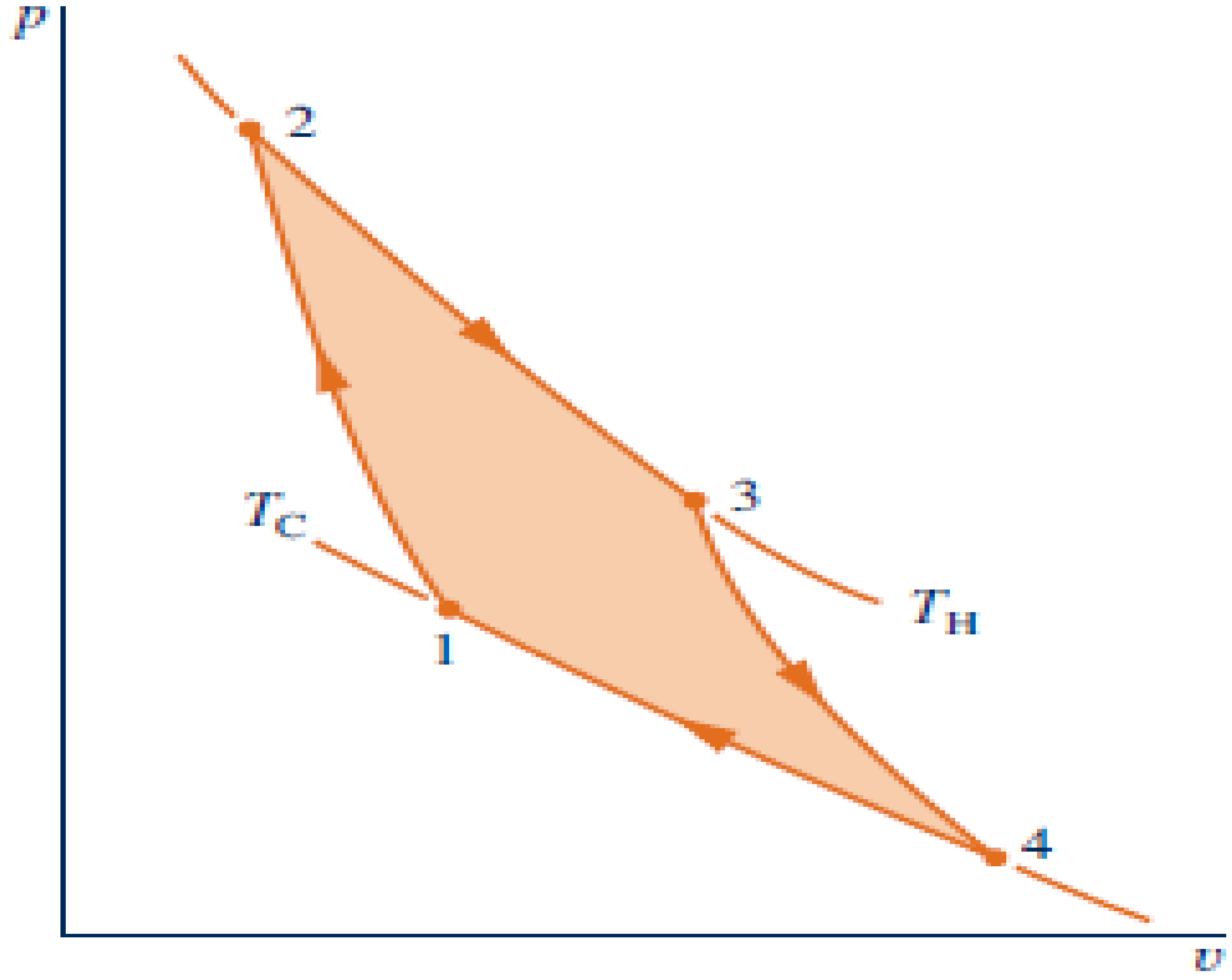
- **Carnot cycle is reversible process cycle.**
- **Carnot Engine is comprises of four reversible processes as given**

CYCLIC PROCESSES

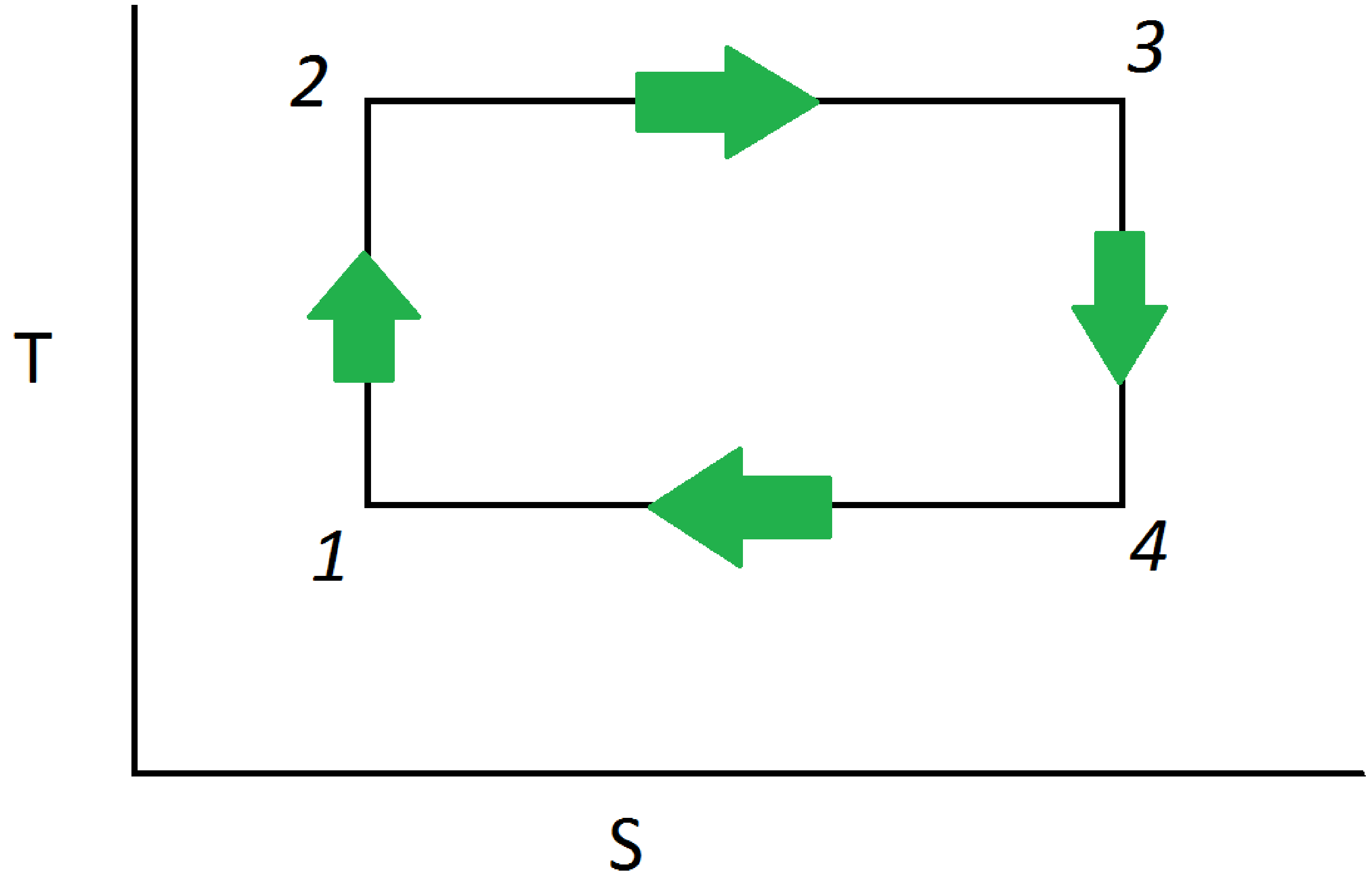
1. Reversible Isothermal Expansion
2. Reversible Adiabatic (Isentropic) Expansion
3. Reversible Isothermal Compression
4. Reversible Adiabatic (Isentropic) Compression


Adiabatic
compression
Gas
Insulating
stand
Process 1–2
Isothermal
expansion
Q_H
Hot reservoir, T_H
Process 2–3
Adiabatic
expansion
Insulating
stand
Process 3–4
Isothermal
compression
Q_C
Cold reservoir, T_C
Process 4–1

CARNOT CYCLE PV DIAGRAM



CARNOT CYCLE TS DIAGRAM



CARNOT CYCLE PROCESS

- Process 1–2: The gas is compressed adiabatically to state 2, where the temperature is TH.
- Process 2–3: The assembly is placed in contact with the reservoir at TH The gas expands isothermally while receiving energy QH from the hot reservoir by heat transfer.
- Process 3–4: The assembly is again placed on the insulating stand and the gas is allowed to continue to expand adiabatically until the temperature drops to TC.
- Process 4–1: The assembly is placed in contact with the reservoir at TC. The gas is compressed isothermally to its initial state while it discharges energy QC to the cold reservoir by heat transfer.

THERMAL EFFICIENCY OF CARNOT CYCLE

- Thermal Efficiency is performance measuring parameter.

- It is the Ratio of Carnot cycle Output to Carnot cycle Input.

$$\eta_{th} = \frac{Heat\ Engine\ Net\ Workdone}{Heat\ Supplied}$$

$$= \frac{W_{Net}}{Q_H}$$

$$= \frac{Q_H - Q_L}{Q_H}$$

$$= 1 - \frac{Q_L}{Q_H}$$

- $\eta_{th} = 1 - \frac{Q_L}{Q_H}$

Where **Q = M × C × ΔT**

- $\eta_{th} = 1 - \frac{M \times C \times T_L}{M \times C \times T_H}$

- $\eta_{th} = 1 - \frac{T_L}{T_H}$
- **This Equation shows that Efficiency of carnot cycle is only depends on the Source and Sink Temperature of the system.**
- **Efficiency will be maximum when Sink temperature is minimum that is O k but that is not possible. Because of it violates the Kelvin plank statement second law of thermodynamics.**

Today's Amazing Fact???????

Jupiter is only planet in the solar system that does not orbit the sun, Actually sun and Jupiter, both are orbiting the barycenter.

धन्यवाद

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