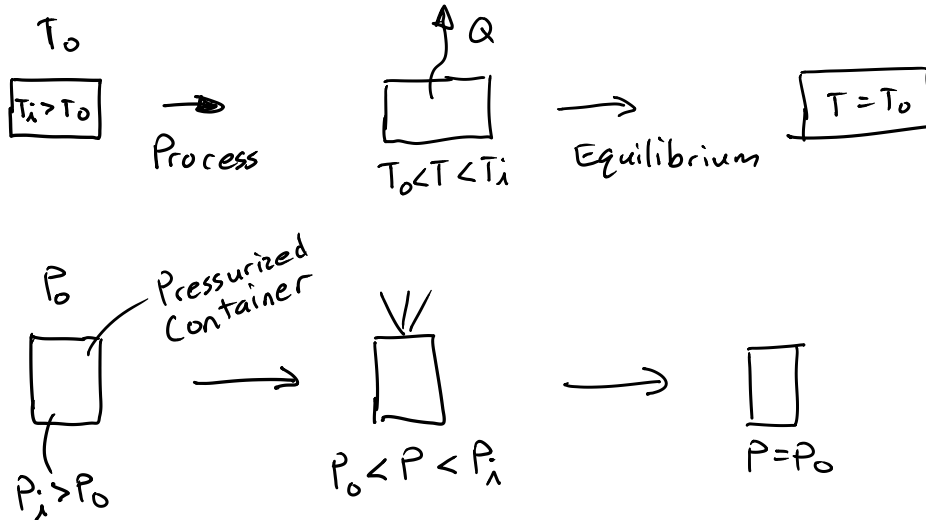


4.1) The Second Law of Thermodynamics

Examples



Second Law

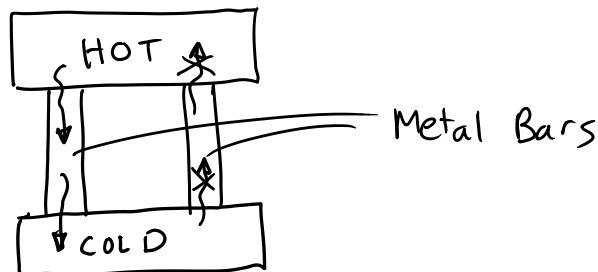
- Predict the direction of processes
- Establish conditions for equilibrium
- Determine the best theoretical performance of cycles
- Determine and analyze the factors that affect attaining the theoretical performance

Second Law Roles

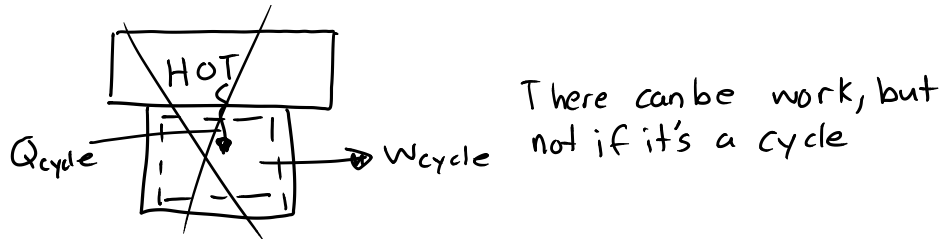
- Define a temperature scale that is independent of the properties of a substance
- Evaluate u and h in terms of properties that are more readily measured

Equivalent Statements of the Second Law

Clausius Statement



Kelvin-Planck Statement



Irreversibilities

- The system and all parts of its surroundings can't be exactly restored to their initial states after a process has occurred
- Irreversibilities = Losses

Reversible Process

- Theoretical (Frictionless pendulum in a vacuum)

Internally Reversible

- No irreversibilities within the system