

Chapter 20 The Second Law of Thermodynamics

Example 1:

Calculate the efficiency of the following cycle: $P_1 = P_2 = 6 \text{ atm}$, $P_3 = P_4 = 1 \text{ atm}$, $V_1 = V_4 = 200 \text{ L}$ and $V_2 = V_3 = 500 \text{ L}$. There are 3 moles of a diatomic gas.

Example 2:

Calculate the efficiency of a Carnot engine operating between $20 \text{ }^\circ\text{C}$ and $660 \text{ }^\circ\text{C}$.

Example 3:

A Carnot engine has a power output of 200 kw. If it operates between 300 K and 1200 K, how much energy is input each minute and how much heat energy is lost each minute?

Example 4:

What is the change in entropy when one mole of aluminum is melted? (melting point for aluminum is $660 \text{ }^\circ\text{C}$; latent heat of aluminum is $3.97 \times 10^5 \text{ J/kg}$)

Example 5:

What is the change in entropy when 20 grams of $10 \text{ }^\circ\text{C}$ water is added to 40 grams of $100 \text{ }^\circ\text{C}$ water?

Example 6:

What is the change in entropy when 2 moles of a diatomic gas are heated at a constant volume from 300 K to 400 K?

Example 7:

What is the change in entropy when two moles of a polyatomic gas are compressed at a constant pressure from 30 L to 15 L if the initial temperature is $20 \text{ }^\circ\text{C}$?