

Chapter 19:

If in one cycle an engine extracts 1000 J from a 400 K region and dumps 800 J into a 300 K region (our world), what is ΔS per cycle?

Answer: +0.17 J/K.

1 kg of ice melts completely to water. What is the resulting ΔS of the water?

Answer: +1220 J/K.

The ice is melting on a table in our world at 300 K. What is ΔS_{world} , in other words the total entropy change during the process of melting?

Answer: +110 J/K.

A metal with heat capacity 50 J/K-kg at 100° C and mass of 1 kg is dropped into 10 kg of a liquid with heat capacity of 200 J/K-kg at 20° C. When the system comes to equilibrium, by how much has the entropy increased?

Answer: 1.9 J/K.

An engine extracts 10^3 J per cycle from a 400 K region and dumps 9×10^2 J per cycle into a 300 K

region. What is its actual efficiency, and what would be its Carnot efficiency?

Answer: 10%, 25%.

A monatomic gas is heated from 100 K to 500 K at constant pressure. If there is 1 mole of the gas, how does its entropy change?

Answer: $\Delta S = +33.5 \text{ J/K}$.