

Tutorial – Second Law of Thermodynamics

1. A 10 kg water bath is initially at 50°C, and is adiabatically contained. A 1 kg block of ice at -10°C is held 5m directly above it. These two together form the 'system'.
 - (a) Calculate the entropy change in the system when the block of ice falls freely into the water bath, and the bath comes to internal equilibrium.
 - (b) After this the water bath (11 kg now) is brought in contact with a constant temperature bath (thermostat) at -10°C , and the water bath is allowed to solidify to ice at 0°C . What is the entropy change in the system and in the thermostat ?

C_p : kJ/kg/K: water : 4.179; Ice : 2.030 $g = 9.81 \text{ m/s}^2$

Heat of fusion for water : 334 kJ/kg