

57. The change in entropy in transferring a certain amount of heat  $Q$  from a heat reservoir at  $T_1$  to another one at  $T_2$  is  $\Delta S = \Delta S_1 + \Delta S_2 = Q(1/T_2 - 1/T_1)$ .

(a)  $\Delta S = (260 \text{ J})(1/100 \text{ K} - 1/400 \text{ K}) = 1.95 \text{ J}$ .

(b)  $\Delta S = (260 \text{ J})(1/200 \text{ K} - 1/400 \text{ K}) = 0.650 \text{ J}$ .

(c)  $\Delta S = (260 \text{ J})(1/300 \text{ K} - 1/400 \text{ K}) = 0.217 \text{ J}$ .

(d)  $\Delta S = (260 \text{ J})(1/360 \text{ K} - 1/400 \text{ K}) = 0.072 \text{ J}$ .

(e) We see that as the temperature difference between the two reservoirs decreases, so does the change in entropy.