

CHEM 3410: Physical Chemistry I — Fall 2008

September 19, 2006

Lecture 8: Working with entropy

References

1. Levine, *Physical Chemistry*, Sections 3.2–3.7, 5.7

Key Concepts

- For a spontaneous process, the change in entropy for the universe is positive. This will lead us to the fact that entropy is maximized at equilibrium. This should make some qualitative sense now, but we'll get more quantitative soon.
- We show quantitatively using $dS_{system} = \frac{\partial q_{rev}}{T}$, that heat does indeed flow for a body at higher temperature to one at a lower temperature.
- We applied some of the quantitative relationships developed for understanding ΔU , q and w to determining entropy changes for different processes involving ideal gases. Some tricks/tips:
 - For a reversible process, $\Delta S_{univ} = 0$, so $\Delta S_{sys} = -\Delta S_{surr}$.
 - For an irreversible process connecting the same initial and final states as some reversible, the change in entropy for the system must be the same as in the reversible case. This is because entropy is a state function.
 - For calculating entropy changes for the surroundings, it is essential to use the actual heat transferred to the surroundings. S is a state function, but the surroundings end up in a different final state depending on the actual path of the process, therefore ΔS_{surr} will be different.

Related Exercises in Levine

Exercises 3.11, 3.14, 3.22