

Chemistry 2290, Winter 2012, G. Schreckenbach

Practice problems –3–

Thermochemistry

Engel and Reid, 2nd ed.:

Questions on concepts: Q4.3, Q4.6, Q4.8, Q4.11

Problems: P4.1, P4.2, P4.4, P4.6, P4.7, P4.8, P4.11, P4.12, P4.14, P4.17, P4.23

Notes:

- As before, the above is again a sample of questions and problems – there are many other good examples in Engel & Reid. So, if you want more practice, by all means do extra problems!!!
- For some of the above problems from chapter 4, you will need to use data from the tables provided.

Second Law: Carnot Cycle

Practice problems from Laidler/ Meiser

(Problems adapted from Laidler, Meiser, Sanctuary, Physical Chemistry, 4th ed., Houghton Mifflin)

LM15. A reversible Carnot cycle that is based on an ideal gas operates between the two temperatures $T_{\text{hot}} = 1000\text{K}$ and $T_{\text{cold}} = 200\text{K}$. The heat absorbed at the high temperature is 150 kJ. ? (Assume three significant figures.)

- What is the thermodynamic efficiency of the machine?
- How much heat is rejected at the lower temperature, 200K, during the isothermal compression?
- What is the entropy increase during the isothermal expansion at 1000K?
- What is the entropy decrease during the isothermal compression at 200K?
- What is the overall entropy change for the entire cycle?
- What is the increase in Gibbs energy during the isothermal expansion at 1000K?

LM16. In class, we discussed the Carnot cycle using a pressure-volume diagram. Sketch the corresponding entropy-temperature diagram, labeling the individual steps.

LM17. Suppose that a reversible Carnot engine operates between 300K and a higher temperature T_{hot} . If the engine produces 10kJ of work per cycle and the entropy change in the isothermal expansion at T_{hot} is 100 JK^{-1} , what are T_{hot} , q_{hot} and q_{cold} ? (Assume three significant figures.)

Second Law: Carnot Cycle and Calculation of Entropy Changes

Engel and Reid, 2nd ed.:

Questions on concepts: Q5.1, Q5.2, Q5.6, Q5.7, Q5.13, Q5.14

Problems: P5.2a, P5.6, P5.7, P5.8, P5.9, P5.10, P5.11, P5.12, P5.16, P5.18, P5.19, P5.22, P5.23, P5.26, P5.32, P5.34, P5.35, P5.37, P5.40, P5.41, P5.44