

Preview Sheet for Test 3
Entropy, Gibbs Energy, and Predictions of Spontaneous and Equilibrium Processes
Wednesday, March 29, starting at 8:00 a.m.

- Lectures from 3/1 to 3/24
- Problem Sets 5 and 6 (see course web page for answer keys)
- Reading
 - While Chapters 7 and 8 were (mostly) covered on Test 2, the material on Test 3 builds so much on this “previous” material that it would be good to review it. Also note the “new” material from Chapter 7:
 - Chapter 7: pp. 7-1 to 7-2; 7-17 to 7-19
 - Chapter 9: All
 - Chapter 10: All (except for drawing vector graphs)
 - Chapter 11: Skip for now; we will pick up its key ideas when discussing electrochemistry
 - Chapter 12: Focus only on those topics discussed in class (including topics presented in demonstrations) and/or covered on Problem Set 6
- Test Format
 - Calculations: 45 points
 - Qualitative discussion questions (especially the construction and interpretation of GT curves): 55 points

Studying strategies:

- Focus on your lecture notes and homework. Use your textbook only as a reference.
- Make sure you understand the significance and use of the reference information that will be given to you in the back of the test booklet (see back).
- Do extra problems at the ends of the chapters. If you would like to look up an answer for a problem, please see the answer keys on the bulletin board next to Prof. Fischer’s office.
- It is also important to understand concepts from lecture not covered explicitly in the homework problems. These may be covered by short-answer or essay questions.
- If a topic was not covered in homework or in lecture, you are not responsible for it! Please e-mail me if you cannot figure out if a particular topic is “fair game” for the test.

Student Tutoring Schedule (in Olin-Rice 341)

Sunday: 1:00 – 10:00 p.m.

Monday - Thursday: 7:00 – 10:00 p.m.

Extra Office Hours with Prof. Fischer

Tuesday: 7:30 – 9:30 p.m.

[Instructions from the test booklet:]

1. Your exam booklet should have **eight** pages total, with questions on Pages 2-5, and a periodic table and other reference data on Pages 6-8. Check to see you have eight pages now. If you do not, ask for another copy of the exam.
2. Write your name in the space above and on the backs of Pages 2-5.
3. This exam is closed-everything.
4. You may use programmable calculators, but chemical data should not be stored in them.
5. You have up to **90 minutes** to work on this exam, if you start work at 8:00 a.m.

What not to memorize (they will be provided):

- (1) A periodic table
- (2) IMT Table 7.1 and Table 9.1
- (3) The information below:

$$\frac{n_j}{n_i} = e^{-(E_j - E_i)/kT} = e^{-\Delta E_i/kT} \quad PV = nRT \quad P\Delta V = (\Delta n)RT$$

$$T(\text{K}) = T(^{\circ}\text{C}) + 273.15 \text{ K} \quad T(^{\circ}\text{F}) = 1.800T(^{\circ}\text{C}) + 32.00$$

$$\Delta S = nR \ln \frac{V_2}{V_1} \quad \Delta S = -nR \ln \frac{P_2}{P_1} \quad \Delta S = -nR \ln \frac{[\text{X}]_2}{[\text{X}]_1}$$

$$S_x = S_x^{\circ} - R \ln P_x / \text{bar} \quad S_x = S_x^{\circ} - R \ln [\text{X}] / \text{M} \quad S_{\text{liq}} = S_{\text{liq}}^{\circ} - R \ln x_{\text{H}_2\text{O}}$$

$$\Delta_r S = \Delta_r S^{\circ} - R \ln Q \quad q_{\text{sys}} = -q_{\text{surr}} \quad \Delta S_{\text{surr}} = \frac{q_{\text{surr}}}{T}$$

$$\Delta S_{\text{univ}} = \Delta S_{\text{sys}} + \Delta S_{\text{surr}} \geq 0 \quad H = U + PV \quad \Delta H = \Delta U + P\Delta V = q$$

$$G = H - TS \quad \Delta G = \Delta H - T\Delta S \leq 0$$

$$k = 1.381 \times 10^{-23} \text{ J K}^{-1} \quad R = 0.08315 \text{ L bar mol}^{-1} \text{ K}^{-1} = 8.315 \text{ J mol}^{-1} \text{ K}^{-1}$$

$$N_A = 6.022 \times 10^{23} \text{ mol}^{-1} \quad 1 \text{ kJ} = 10^3 \text{ J}$$

Test-Taking Tips

- Show up at 8:00 a.m.! You should always give yourself as much time as possible to work on an exam.
- Pace yourself. Try to make your effort on a given problem proportional to the number of points that it is worth.
- Read the problems carefully.
- If you can't figure out how to begin a problem after thinking about it for a couple of minutes, go on to the next problem.
- Please ask Prof. Fischer if a question doesn't make sense.