

Preview Sheet for Test 1

Chapters 0, 1, 3, 4, 5, 27[, a little 29]

Lectures from 1/23 through 2/10; Problem Sets 1, 2, and 3

The test will be on Thursday, February 16, in Olin-Rice **150**, starting at 8:30 a.m. You will have 2 hours and 30 minutes to work on the exam.

Studying Strategies:

- Focus on your lecture notes and homework first, then look at your lab handout and textbook. (See the course web page for class overheads and homework keys.)
- Do extra problems at the ends of the chapters.
- It is important to understand concepts from lecture not covered explicitly in the homework problems. These will typically be covered by short essay questions.
- If a topic was not covered in homework or in lecture, you are not responsible for it!

Test Format: 55 points based on calculations, and 45 points based on true-false and short essay questions. Here's a preview of the instructions:

1. Write your name in the space above and on the backs of the other pages.
2. Your exam booklet should have **10 pages** total, with questions on pages 2-7, formulas and constants on p. 8, statistical tables on p. 9, and a periodic table on p. 10. Check to see you have 10 pages now. If you do not, ask for another copy of the exam.
3. You may use programmable calculators, but chemical data should not be stored in them.
4. If you need to solve a system of equations, you should demonstrate your work on paper—do not use algorithms built into your calculators. This is order to be fair to those who have not learned to use these functions on their calculators, or whose calculators lack this ability.
5. You are free to calculate means and standard deviations with your calculator, but do not use other statistical functions available on your calculator. Specifically, *t*-tests should be performed using the approaches presented in the class and in your text. This is to be fair to those who have not taken a statistics course, or who lack statistically savvy calculators.
6. You should always demonstrate your thought process in writing. You will be awarded credit only for clear, legible work.
7. You have **2 hours and 30 minutes** to work on this exam.

Also note the formulas and constants you will be given on the exam (on back):

$$PV = nRT \quad \bar{x} = \frac{\sum x_i}{n} \quad d_i = x_i - \bar{x} \quad s = \sqrt{\frac{\sum d_i^2}{n-1}} \quad y = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{(x-\mu)^2}{2\sigma^2}}$$

$$z = \frac{x - \mu}{\sigma} \quad CI = \bar{x} \pm z \frac{\sigma}{\sqrt{n}} \quad CI = \bar{x} \pm t \frac{s}{\sqrt{n}} \quad \text{standard error} = \frac{s}{\sqrt{n}}$$

$$t_{calc} = \frac{|\mu - \bar{x}| \sqrt{n}}{s} \quad (\text{Case 1}) \quad t_{calc} = \frac{|\bar{x}_1 - \bar{x}_2|}{s_{pooled}} \sqrt{\frac{n_1 n_2}{n_1 + n_2}} \quad (\text{Case 2})$$

$$s_{pooled} = \sqrt{\frac{s_1^2(n_1 - 1) + s_2^2(n_2 - 1)}{n_1 + n_2 - 2}} \quad t_{calc} = \frac{|\bar{d}| \sqrt{n}}{s_d} \quad (\text{Case 3}) \quad Q_{calc} = \frac{|\text{gap}|}{|\text{range}|}$$

$$e_y = \sqrt{\left(\frac{\partial y}{\partial x_1}\right)^2 e_{x_1}^2 + \dots + \left(\frac{\partial y}{\partial x_n}\right)^2 e_{x_n}^2} \quad e_y = a e_x \quad e_y = \sqrt{e_{x_1}^2 + e_{x_2}^2}$$

$$\frac{e_y}{y} = \sqrt{\left(\frac{e_{x_1}}{x_1}\right)^2 + \left(\frac{e_{x_2}}{x_2}\right)^2} \quad y_{LOD} = \bar{y}_{blank} + 3s \quad y_{LOQ} = \bar{y}_{blank} + 10s$$

$$N_A = 6.022 \times 10^{23} \text{ mol}^{-1} \quad R = 0.08206 \text{ L atm mol}^{-1} \text{ K}^{-1} \quad 1 \text{ atm} = 760 \text{ torr}$$

$$1 \text{ ppm} = 1 \text{ in } 10^6 \quad 1 \text{ ppb} = 1 \text{ in } 10^9 \quad 1 \text{ ppt} = 1 \text{ in } 10^{12}$$

$$1 \text{ L} = 1000 \text{ mL} = 1000 \text{ cm}^3 \quad T(\text{K}) = T(^{\circ}\text{C}) + 273.15$$