CHEM 112 – Exam Study Strategies

EXAM FORMAT
- 40 multiple choice (no true answer)
- Mix of calculations and pure theory questions

KEY TOPICS
Fall Semester:
- Rates: balancing equations, stoichiometry, reaction equations, etc.
- Gases
- Atoms: Quantum theories, etc.
- MOLECULAR: Lewis dots, bonding, octet rule, molecular orbitals, etc.
- Thermodynamics: heat capacity, entropy, etc.
- Phase transitions: physical equilibrium, intermolecular forces, vapor pressure, etc.

Winter/Semester:
- Equilibrium: Equilibrium constants and reaction quotients
- The thermodynamics of electrolyte solutions, irreversible processes, phase transitions, Gibbs energy, Van’t Hoff equations, etc.
- Solubility and Equilibrium: solubility of weak acids and bases, buffers, self-ionization of water, etc.
- Electrochemistry: oxidation numbers, REDOX equations, electrochemical cells, standard cell potentials, Nernst equations, etc.
- Organic Reactions: general mechanisms, substitution vs. elimination, aromatic groups, etc.
- Kinetics: rate law and order, Arrhenius equation and reaction mechanisms, catalysis, etc.

Looking at syllabus/course outline for a more comprehensive list of topics. If you’re overwhelmed or stressed for time, pick your top 10% and weakest 10% of the topics. Focus your efforts accordingly: work on the tough material first, then review the easy material if you have time.

HOW TO STUDY
- Focus on the topics you are most comfortable with
- Gauge your understanding by explaining the concepts aloud or by trying to teach it to a friend or by solving if you can answer practice questions.
- Understand the theory for content-based multiple choice questions

Doing practice questions:
- Write a set of instructions for each problem (in ways that you would use to teach someone else how to do the question).
- Look at previous exam questions (e.g., solving with ICE tables is very similar to each question, general mechanisms for organic reactions).
- Use the decision steps summary method, which asks you to describe why you’re taking steps as well as doing calculations. Look at the right-hand column below.

Example Question: Use Decision Steps
A 500 mL container of Freon-12 (CF2Cl2) was heated in boiling water (100.0°C) until the container burst. If the container was not defective, and had a burst rating of 103.8 bar, what minimum amount of Freon-12 was in the container, assuming no volume change before bursting?

1. Burst point P (measured) < stack point P* (103.8 bar)

2. Set up point 1 to 2: PV = nRT

3. Use ideal gas equation PV = nRT because the gas is (100.0°C), Temperature = (100.0°C), and volume = (500 mL)

\[ PV = nRT \]

4. Find n and \( \text{mass} \) because the question asks for amount

\[ \text{mass} = \frac{\text{molar mass}(M)}{\text{number of moles}(n)} \]

5. Look up molar mass of Freon-12, molar number of moles, \( n \), to mass, m.

COMMON MISTAKES
- Not completing enough practice questions
- Understand the steps for each question
- Know the definitions/variables and how to apply them to formulas
- Check out Exam Bank for past exam questions
- Getting too bogged down in small details
- Again, reference past exam questions to see patterns in the types of questions asked. Focus on those question topics and styles.
- Don’t be fooled by the exam structure (40 multiple choice questions), place out your timing before starting to answer the questions.

RESOURCES
- Get help from:
  - TAs, ASUS peer tutors, friends in class (form a study group)
  - Department of Chemistry’s resources for undergraduates: http://lryl.com/queenschem
  - Online help resources such as Khan Academy’s free chemistry lessons: https://www.khanacademy.org/science/chemistry

SASS Resources:
- Learning strategies appointments can help you prepare for and take exams efficiently and effectively. Book on SASS website.

PLANS FOR NEXT YEAR
- Start studying early to avoid cramming. Make effective note-taking and regular review a summary part of your studying routine.
- Rewrite notes the same day as class to create your own “lecture copybook.” Look over it and add more work as per need.
- When profs are doing in-class examples, don’t just copy the math, also write down explanation for what they’re doing and why (i.e., why that formula, where values are coming from). You’ll be able to apply this information in any context, not just when you see a familiar question.

FINDING PRACTICE QUESTIONS
- Exam Bank
- Textbook review
- Online homework
- Examples from class
- Tutorial quiz, questions