



SASS

# CHEM 112 – Exam Study Strategies

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## EXAM FORMAT

- 40 multiple choice (no short answer)
- Mix of calculations and pure theory questions

## KEY TOPICS

- Fall Semester**
  - Basics:** balancing equations, stoichiometry, nomenclature, etc.
  - Gases**
  - Atoms:** Quantum theories, etc.
  - Molecules:** Lewis dots, bonding, octet rule/exceptions, bond order, valence bond, etc.
  - Thermochemistry:** calorimetry, enthalpy, etc.
  - Phase transitions:** physical equilibrium, intermolecular forces, vapour pressure, etc.
- Winter Semester**
  - Equilibrium:** Equilibrium constants and reaction quotients
  - Thermodynamics:** entropy, reversible processes, phase transitions, Gibbs energy, Van 't Hoff equation, etc.
  - Solubility & Complexation Equilibria**
  - Acid Base Equilibrium:** conjugate acid-base systems, 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, leaving groups, etc.
  - Kinetics:** rate, rate law and order, Arrhenius equation and reaction mechanisms, catalysis, etc.

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

## HOW TO STUDY

- Focus on the topics that you are most uncomfortable with
- Gauge your understanding by explaining the concept aloud or trying to teach it to a friend, or by seeing 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 a way that you could use to teach someone else how to do the question)
- Look at patterns in solving questions (e.g. solving with ICE tables is very similar for 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 50.0 mL canister of Freon-12 ( $\text{CF}_2\text{Cl}_2$ ) was heated in boiling water (100.0°C) until the canister burst. If the canister was not defective, and had a burst rating of 103.4 bar, what minimum amount of Freon-12 was in the canister, assuming no volume change before bursting?

- ⊖ Burst point P (pressure) just rises past 103.4 bar
- So at that point, can do  $PV = nRT$  because we know P (= 103.4 bar), Temperature (= 100.0°C) and volume (= 50.0 mL)

$$PV = nRT$$

$$n = \frac{PV}{RT}$$

$$n = \dots$$

$$m = n \times M$$

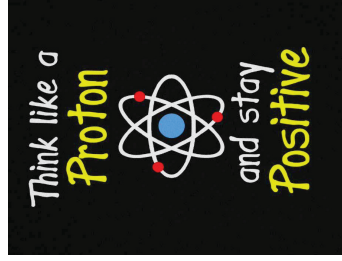
$$m = \dots$$

We need to find n because the question asks for amount

Use molar mass (M) to convert number of moles, n, to mass, m.

## COMMON MISTAKES

- Not completing enough practice questions!
- Understand the steps for each question
- Know the definitions/terms 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 these question topics and styles.
- Don't be fooled by the exam structure (40 multiple choice questions); plan out your timing before starting to answer the questions



## FINDING PRACTICE QUESTIONS

- Exam Bank
- Textbook questions
- Online homework
- Examples from class
- Tutorial quizzes/questions

## RESOURCES

### Get help from:

- TAs, ASUS peer tutors, friends in class (form a study group)
- Department of Chemistry's resources for undergraduates: <http://tinyurl.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 notetaking and regular review and summary part of your studying routine
- Rewrite notes the same day as class to create your own "textbook." Look over it and address weak areas regularly
- When professor is 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