

AC-HPAT CHEMISTRY PRACTICE TEST (SAMPLE)

STUDY GUIDE



SAMPLE STUDY GUIDE WITH LIMITED QUESTIONS

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THE FULL VERSION STUDY GUIDE

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Introduction

Preparing for a certification exam can feel overwhelming, but with the right tools, it becomes an opportunity to build confidence, sharpen your skills, and move one step closer to your goals. At Examzify, we believe that effective exam preparation isn't just about memorization, it's about understanding the material, identifying knowledge gaps, and building the test-taking strategies that lead to success.

This guide was designed to help you do exactly that.

Whether you're preparing for a licensing exam, professional certification, or entry-level qualification, this book offers structured practice to reinforce key concepts. You'll find a wide range of multiple-choice questions, each followed by clear explanations to help you understand not just the right answer, but why it's correct.

The content in this guide is based on real-world exam objectives and aligned with the types of questions and topics commonly found on official tests. It's ideal for learners who want to:

- Practice answering questions under realistic conditions,
- Improve accuracy and speed,
- Review explanations to strengthen weak areas, and
- Approach the exam with greater confidence.

We recommend using this book not as a stand-alone study tool, but alongside other resources like flashcards, textbooks, or hands-on training. For best results, we recommend working through each question, reflecting on the explanation provided, and revisiting the topics that challenge you most.

Remember: successful test preparation isn't about getting every question right the first time, it's about learning from your mistakes and improving over time. Stay focused, trust the process, and know that every page you turn brings you closer to success.

Let's begin.

How to Use This Guide

This guide is designed to help you study more effectively and approach your exam with confidence. Whether you're reviewing for the first time or doing a final refresh, here's how to get the most out of your Examzify study guide:

1. Start with a Diagnostic Review

Skim through the questions to get a sense of what you know and what you need to focus on. Your goal is to identify knowledge gaps early.

2. Study in Short, Focused Sessions

Break your study time into manageable blocks (e.g. 30 – 45 minutes). Review a handful of questions, reflect on the explanations.

3. Learn from the Explanations

After answering a question, always read the explanation, even if you got it right. It reinforces key points, corrects misunderstandings, and teaches subtle distinctions between similar answers.

4. Track Your Progress

Use bookmarks or notes (if reading digitally) to mark difficult questions. Revisit these regularly and track improvements over time.

5. Simulate the Real Exam

Once you're comfortable, try taking a full set of questions without pausing. Set a timer and simulate test-day conditions to build confidence and time management skills.

6. Repeat and Review

Don't just study once, repetition builds retention. Re-attempt questions after a few days and revisit explanations to reinforce learning. Pair this guide with other Examzify tools like flashcards, and digital practice tests to strengthen your preparation across formats.

There's no single right way to study, but consistent, thoughtful effort always wins. Use this guide flexibly, adapt the tips above to fit your pace and learning style. You've got this!

Questions

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1. A 1.00 mol sample of an ideal gas occupies 2.00 L at 298 K. What is the pressure? ($R = 0.0821 \text{ L atm mol}^{-1} \text{ K}^{-1}$)
- A. 1.22 atm
 - B. 12.2 atm
 - C. 24.5 atm
 - D. 0.122 atm
2. Over-The-Counter markets primarily trade which type of securities?
- A. Listed securities on exchanges
 - B. Unlisted securities
 - C. Exchange-traded funds
 - D. Government bonds
3. Compute the molar mass of ammonium sulfate, $(\text{NH}_4)_2\text{SO}_4$.
- A. 132.14 g/mol
 - B. 110.12 g/mol
 - C. 144.16 g/mol
 - D. 122.10 g/mol
4. If $\Delta G^\circ < 0$, what does it indicate about spontaneity at standard conditions?
- A. The reaction is spontaneous
 - B. The reaction is non-spontaneous
 - C. The reaction is at equilibrium
 - D. The reaction requires a catalyst
5. Which oxidation state is common for oxygen in most compounds?
- A. -2
 - B. 0
 - C. +1
 - D. +2

6. In BF_3 , what is the hybridization of boron and the approximate bond angle around boron?
- A. sp^3 ; about 109.5 degrees
 - B. sp^2 ; about 120 degrees
 - C. sp ; about 180 degrees
 - D. dsp^3 ; about 109.5 degrees
7. In the Beer-Lambert law, what does the symbol c represent?
- A. Concentration (mol/L)
 - B. Absorbance
 - C. Path length
 - D. Molar absorptivity
8. What best describes Physical Location Stock Exchanges?
- A. Formal organizations with tangible physical locations that conduct auctions in listed securities
 - B. Large electronic networks for unlisted securities
 - C. A centralized clearinghouse for currency swaps
 - D. An electronic trading platform for commodities
9. What is the primary goal of financial managers?
- A. Maximize Firms' Stock Prices
 - B. Maximize Dividends
 - C. Maximize Revenue
 - D. Minimize Taxes
10. Henderson-Hasselbalch: For a buffer with $\text{pK}_a = 4.75$, what $[\text{A}^-]/[\text{HA}]$ ratio yields $\text{pH} = 4.00$?
- A. 0.178
 - B. 1.78
 - C. 4.75
 - D. 0.021

Answers

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1. B
2. B
3. A
4. A
5. A
6. B
7. A
8. A
9. A
10. A

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Explanations

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1. A 1.00 mol sample of an ideal gas occupies 2.00 L at 298 K. What is the pressure? ($R = 0.0821 \text{ L atm mol}^{-1} \text{ K}^{-1}$)

- A. 1.22 atm
- B. 12.2 atm**
- C. 24.5 atm
- D. 0.122 atm

The pressure is found using $PV = nRT$, solving for P : $P = nRT / V$. With $n = 1.00 \text{ mol}$, $R = 0.0821 \text{ L atm mol}^{-1} \text{ K}^{-1}$, $T = 298 \text{ K}$, and $V = 2.00 \text{ L}$, compute $nRT = 1.00 \times 0.0821 \times 298 \approx 24.50 \text{ L} \cdot \text{atm}$. Divide by V : $24.50 / 2.00 \approx 12.25 \text{ atm}$. So the pressure is about 12.2 atm. The other values arise from arithmetic mistakes, such as not dividing by the correct volume or misplacing the decimal.

2. Over-The-Counter markets primarily trade which type of securities?

- A. Listed securities on exchanges
- B. Unlisted securities**
- C. Exchange-traded funds
- D. Government bonds

Over-The-Counter markets exist to trade securities that aren't listed on formal exchanges. The defining idea is that these trades happen through a network of dealers rather than on a centralized exchange. That makes unlisted securities—the stocks that don't appear on big exchanges—the primary type traded in the OTC space. These securities are often smaller or newer issuers, or instruments that don't meet exchange listing standards, and they rely on dealer quotes to find buyers and sellers. In contrast, listed securities are bought and sold on exchanges, and exchange-traded funds are designed to be traded on those same public platforms. Government bonds often trade through a dealer network as well, but the standout characteristic of the OTC space is handling securities that are not listed on an exchange.

3. Compute the molar mass of ammonium sulfate, $(\text{NH}_4)_2\text{SO}_4$.

- A. 132.14 g/mol**
- B. 110.12 g/mol
- C. 144.16 g/mol
- D. 122.10 g/mol

Molar mass is the total mass of one mole of a compound, found by adding the atomic masses of every atom in its formula. For ammonium sulfate, the formula has two ammonium units and one sulfate unit. So combine two times the mass of NH_4 with the mass of SO_4 : $2 \times (\text{N} + 4\text{H}) + (\text{S} + 4\text{O})$. Using standard atomic weights ($\text{N} \approx 14.01$, $\text{H} \approx 1.01$, $\text{S} \approx 32.07$, $\text{O} \approx 16.00$), that becomes $2 \times (14.01 + 4 \times 1.01) + (32.07 + 4 \times 16.00) = 2 \times (14.01 + 4.04) + (32.07 + 64.00) = 2 \times 18.05 + 96.07 \approx 36.10 + 96.07 \approx 132.17 \text{ g/mol}$, which rounds to about 132.14 g/mol depending on rounding. Therefore the molar mass is about 132.14 g/mol.

4. If $\Delta G^\circ < 0$, what does it indicate about spontaneity at standard conditions?

- A. The reaction is spontaneous
- B. The reaction is non-spontaneous
- C. The reaction is at equilibrium
- D. The reaction requires a catalyst

A negative standard Gibbs free energy change means the reaction tends to proceed on its own under standard conditions. The system releases free energy as it moves toward products, so no external energy input is required for the forward direction. Under standard conditions, ΔG° relates to the equilibrium constant by $\Delta G^\circ = -RT \ln K^\circ$. A negative ΔG° means K° is greater than 1, so products are favored at equilibrium. Keep in mind that spontaneity refers to thermodynamics, not speed— a catalyst can make the reaction go faster, but it doesn't change whether the process is spontaneous. Conversely, a positive ΔG° would indicate non-spontaneity under standard conditions, and $\Delta G^\circ = 0$ corresponds to equilibrium.

5. Which oxidation state is common for oxygen in most compounds?

- A. -2
- B. 0
- C. +1
- D. +2

Oxygen almost always carries a -2 oxidation state in most compounds because it is highly electronegative and tends to gain electrons to complete its octet. In typical oxides, water, and many organic and inorganic compounds, oxygen exists as O^{2-} to balance the charges of less electronegative elements. There are a few well-known exceptions that shift this value, such as in peroxides where the O–O bond reduces the oxidation state toward -1 for each oxygen, in compounds with fluorine like OF_2 where oxygen ends up with +2, and in superoxide species where the average oxidation state per oxygen is -1/2. But for ordinary oxides and most other oxygen-containing compounds, -2 is the standard oxidation state.

6. In BF_3 , what is the hybridization of boron and the approximate bond angle around boron?

- A. sp^3 ; about 109.5 degrees
- B. sp^2 ; about 120 degrees
- C. sp ; about 180 degrees
- D. dsp^3 ; about 109.5 degrees

The key idea is that boron in BF_3 has three regions of electron density around it: three B–F sigma bonds and no lone pairs. With three electron domains, the atoms arrange themselves in a trigonal planar geometry, which minimizes repulsion by spreading the bonds about 120 degrees apart. That arrangement is best described by sp^2 hybridization: three sp^2 hybrid orbitals form the three sigma bonds, and there is one unhybridized p orbital perpendicular to the plane (empty in BF_3), which helps explain its behavior as a Lewis acid when it accepts electron density from bases. So the boron-center geometry and bonding align with sp^2 hybridization and bond angles of about 120 degrees.

7. In the Beer-Lambert law, what does the symbol c represent?

A. Concentration (mol/L)

B. Absorbance

C. Path length

D. Molar absorptivity

In the Beer-Lambert law, how much light is absorbed depends on how many absorbing molecules are in the path and how far the light travels through the sample. The symbol c represents the concentration of the absorbing species in the solution, typically expressed in moles per liter. The law is $A = \epsilon lc$, where ϵ is the molar absorptivity, and l is the path length, so c is the variable that scales absorbance with how much of the absorbing substance is present. Absorbance itself is a unitless quantity derived from the light intensities, while path length and molar absorptivity are the distance the light travels and a property of the specific substance at a given wavelength, respectively.

8. What best describes Physical Location Stock Exchanges?

A. Formal organizations with tangible physical locations that conduct auctions in listed securities

B. Large electronic networks for unlisted securities

C. A centralized clearinghouse for currency swaps

D. An electronic trading platform for commodities

The main idea being tested is how stock exchanges differ by their trading environment. Physical location stock exchanges are formal organizations based in a specific building where trading of listed securities occurs, typically through on-floor auctions or opening/closing procedures that establish prices and liquidity. This setup centers on listed equities and a defined place where buyers and sellers meet under established rules and governance. The other scenarios describe venues that aren't about a fixed, on-site exchange for listed stocks: electronic networks for unlisted securities operate outside a central exchange and often deal with over the counter trading; a centralized clearinghouse for currency swaps handles post trade clearing rather than performing equity trading on a physical exchange; and an electronic platform for commodities relates to a different asset class, not stocks traded on a traditional stock exchange.

9. What is the primary goal of financial managers?

A. Maximize Firms' Stock Prices

B. Maximize Dividends

C. Maximize Revenue

D. Minimize Taxes

The main idea here is to maximize shareholder wealth, which is most clearly reflected in the market value of the firm's equity. When financial managers make decisions about investments, financing, and payout policies, they should aim to increase the present value of the expected future cash flows to shareholders. The stock price is the market's estimate of that value, incorporating both the expected profitability of the firm and the risk of its future cash flows. So, actions that raise the long-run value of the company, such as pursuing worthwhile projects (positive net present value) and financing them efficiently, tend to lift the stock price over time. Dividends can be a part of returning value to shareholders, but focusing on dividends alone can limit growth and doesn't guarantee a higher stock price if future cash flows or risk aren't improving. Revenue looks at how much the company sells, but without considering costs, investments, and risk, higher revenue doesn't necessarily raise value. Taxes are important for financial planning and can influence decisions, but they're a constraint rather than the primary objective.

10. Henderson-Hasselbalch: For a buffer with $pK_a = 4.75$, what $[A^-]/[HA]$ ratio yields $pH = 4.00$?

A. 0.178

B. 1.78

C. 4.75

D. 0.021

The Henderson-Hasselbalch equation links pH to pK_a and the base/acid ratio: $pH = pK_a + \log([A^-]/[HA])$. To get $pH = 4.00$ with $pK_a = 4.75$, the log term must be -0.75 . So $[A^-]/[HA] = 10^{-0.75} \approx 0.178$, i.e., about 0.18. This ratio being less than 1 means the acid form HA is more prevalent than its conjugate base A^- , which is consistent with a pH below the pK_a . The other given numbers would yield pH values further from 4.00 because they produce different log ratios (e.g., a larger ratio pushes pH higher; a much smaller ratio would push pH lower).

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Next Steps

Congratulations on reaching the final section of this guide. You've taken a meaningful step toward passing your certification exam and advancing your career.

As you continue preparing, remember that consistent practice, review, and self-reflection are key to success. Make time to revisit difficult topics, simulate exam conditions, and track your progress along the way.

If you need help, have suggestions, or want to share feedback, we'd love to hear from you. Reach out to our team at hello@examzify.com.

Or visit your dedicated course page for more study tools and resources:

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We wish you the very best on your exam journey. You've got this!

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