MEDICAL CHEMISTRY PRACTICE TEST (SAMPLE)

STUDY GUIDE



SAMPLE STUDY GUIDE WITH LIMITED QUESTIONS

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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.

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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!

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Questions

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1. If the energy of a bonding molecular orbital is lower than the atomic orbitals from which it formed, what does that imply about bond formation?

A. Endothermic

B. Exothermic

C. No energy change

D. Bond cannot form

2. The oxidation state of Cr in [Cr(NH3)4Cl2]- is

A. +2

B. +3

C. +4

D. +1

3. What are the products of the reaction between methanol and ethanoic acid?

A. Methyl ethanoate and water

B. Ethyl ethanoate and water

C. Methyl formate and water

D. Dimethyl ether

4. According to the priority list, which functional group comes directly after alcohols in priority?

A. Carboxylic acids

B. Aldehydes

C. Thiol

D. Amines

5. An atom of carbon-12 and an atom of carbon-14 differ in

A. number of protons

B. mass number

C. number of electrons

D. atomic number

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6. In the redox reaction $SnO_2 + 4Cl^- + 4H^+ = SnCl_2 + Cl_2 + 2H_2O$, which species loses electrons?

A. SnO_2

B. H^+

C. Cl^-

D. Cl_2

7. Select the incorrect statement regarding terminal alkynes.

A. Terminal alkynes are generally more acidic than alkanes

B. Terminal alkynes are not as acidic as alkanes

C. Terminal alkynes can be deprotonated by strong bases

D. Terminal alkynes have sp hybridization

8. According to the priority list, which functional group has higher priority: carboxylic acids or aldehydes?

A. Carboxylic acids

B. Aldehydes

C. Alcohols

D. Alkanes

9. What is the process called when a liquid changes into a solid?

A. Melting

B. Freezing

C. Boiling

D. Condensation

10. Sp3 hybridization involves the hybridization of how many atomic orbitals?

A. 3

B. 2

C. 1

D. 4

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Answers

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

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Explanations

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1. If the energy of a bonding molecular orbital is lower than the atomic orbitals from which it formed, what does that imply about bond formation?

A. Endothermic

B. Exothermic

C. No energy change

D. Bond cannot form

When atoms form a bond, electrons occupy a bonding molecular orbital that lies lower in energy than the original atomic orbitals. This energy drop means the system becomes more stable and energy is released to the surroundings, so the process is exothermic. If the bonding orbital were higher in energy than the atomic orbitals, energy would have to be absorbed, making it endothermic. If there were no energy change, there would be no net stabilization to drive bond formation.

2. The oxidation state of Cr in [Cr(NH3)4Cl2]- is

A. +2

B. +3

C. +4

D. +1

The oxidation state is found by balancing the charges of the ligands with the overall charge of the complex. Ammonia is a neutral ligand, while each chloride ligand carries a -1 charge. There are two chloride ligands, contributing -2 in total. The complex is shown with an overall charge of -1, so the chromium oxidation state must satisfy x + (-2) = -1, giving x = +1. So the chromium is in the +1 oxidation state. The result would match a complex with the overall charge +1, such as [Cr(NH3)4Cl2]+, where chromium would be +3; the discrepancy here suggests the bracketed complex is paired with the wrong outside charge.

3. What are the products of the reaction between methanol and ethanoic acid?

A. Methyl ethanoate and water

B. Ethyl ethanoate and water

C. Methyl formate and water

D. Dimethyl ether

Fischer esterification is the key idea here: a carboxylic acid reacts with an alcohol in the presence of an acid catalyst to form an ester and water. When methanol (the alcohol) reacts with ethanoic acid (the carboxylic acid), the product is the ester methyl ethanoate (methyl acetate) and water, with the reaction often driven forward by removing the water or using excess methanol. The other options correspond to different substances: ethanol with ethanoic acid would give ethyl ethanoate; formic acid with methanol would give methyl formate; dimethyl ether comes from dehydration of methanol, not from esterification with a carboxylic acid.

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4. According to the priority list, which functional group comes directly after alcohols in priority?

A. Carboxylic acids

B. Aldehydes

C. Thiol

D. Amines

In naming by functional group priority, higher-priority groups define the main suffix, while lower-priority groups are named as substituents. Alcohols have higher priority than thiols, so when both groups are present, the molecule is named as an alcohol and the thiol is treated as a substituent (as the mercapto prefix). That's why the group that comes directly after alcohols in the priority sequence is the thiol. For example, a molecule with both –OH and –SH is named with the -ol suffix and the –SH group shown as mercapto- as a substituent. Carboxylic acids and aldehydes sit higher in priority and are not the next after alcohols, and amines are lower than thiols, so they wouldn't be the immediate follower in the priority order.

5. An atom of carbon-12 and an atom of carbon-14 differ in

A. number of protons

B. mass number

C. number of electrons

D. atomic number

Mass number is the total number of protons and neutrons in the nucleus. Carbon-12 and carbon-14 have the same number of protons (six), so they share the same atomic number and would have the same electron count in a neutral state. The difference lies in the neutrons: carbon-12 has six neutrons, while carbon-14 has eight. Adding those neutrons changes the mass number from twelve to fourteen, so the mass number differs between these isotopes.

6. In the redox reaction $SnO_2 + 4Cl^- + 4H^+ = SnCl_2 + Cl_2 + 2H_2O$, which species loses electrons?

A. SnO_2

B. H^+

C. Cl^-

D. Cl_2

Oxidation state changes reveal who's transferring electrons. Tin in SnO_2 is +4, while in $SnCl_2$ it's +2, so tin is reduced (gains electrons). The species that donates electrons is the one that gets oxidized. Chloride starts as Cl^- (-1) and ends up as Cl_2 (0) in the products, meaning it loses electrons (oxidized) to form chlorine gas. Those released electrons balance the tin's reduction. The protons mainly balance the charge and form water; they don't undergo a redox change here. So the chloride ion is the species that loses electrons.

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7. Select the incorrect statement regarding terminal alkynes.

A. Terminal alkynes are generally more acidic than alkanes

B. Terminal alkynes are not as acidic as alkanes

C. Terminal alkynes can be deprotonated by strong bases

D. Terminal alkynes have sp hybridization

Understanding acidity in terminal alkynes hinges on the hydrogen attached to a carbon that is part of a carbon–carbon triple bond. That terminal hydrogen sits on an sp-hybridized carbon, which has a high s-character (50%). This stabilizes the conjugate base after deprotonation, so the C–H bond in a terminal alkyne is significantly more acidic than a typical alkane C–H bond. In practical terms, the pKa of a terminal alkyne is about 25, while alkanes are around 50. Because of this, terminal alkynes can be deprotonated by strong bases such as sodium amide to form acetylide anions. Terminal alkynes do indeed have sp hybridization, which accounts for their linear geometry and the increased acidity. They can be deprotonated by strong bases, and they are more acidic than alkanes. The statement claiming they are not as acidic as alkanes is false for these reasons.

8. According to the priority list, which functional group has higher priority: carboxylic acids or aldehydes?

A. Carboxylic acids

B. Aldehydes

C. Alcohols

D. Alkanes

In naming organic compounds, the suffix is determined by the highest-priority functional group present. Carboxylic acids outrank aldehydes, alcohols, and alkanes, so the carboxyl group sets the main name. The carboxyl group is the most oxidized among these common groups and provides the -oic acid suffix, reflecting its dominance in the naming hierarchy. When both carboxylic acid and aldehyde are present, the molecule is named as a carboxylic acid, and the aldehyde is treated as a substituent (often called formyl) rather than influencing the suffix. Hence, carboxylic acids have higher priority.

9. What is the process called when a liquid changes into a solid?

A. Melting

B. Freezing

C. Boiling

D. Condensation

Freezing is the process by which a liquid becomes a solid. As temperature falls, the particles lose kinetic energy and the attractive forces bind them into a fixed, orderly arrangement, creating a solid structure. This phase change releases energy, known as latent heat of fusion, because the system becomes more ordered. Melting is the opposite (solid to liquid), boiling is liquid to gas, and condensation is gas to liquid, so those involve different directional changes of state. For many liquids like water, freezing occurs near 0°C under standard pressure, though impurities or pressure can shift the exact point.

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10. Sp3 hybridization involves the hybridization of how many atomic orbitals?

A. 3

B. 2

C. 1

D. 4

Sp3 hybridization involves mixing four atomic orbitals. Specifically, one s orbital combines with three p orbitals from the same atom to form four new equivalent sp3 hybrid orbitals. These four hybrids point toward the corners of a tetrahedron, which explains the typical tetrahedral arrangement of four substituents with about 109.5° angles, as seen in methane. So the number of orbitals involved in creating the sp3 set is four. By comparison, sp2 uses three orbitals (one s and two p) to make three hybrids with trigonal planar geometry, and sp uses two orbitals (one s and one p) to make two hybrids for a linear arrangement. The remaining unhybridized p orbitals can participate in pi bonding when present.

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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:

https://medicalchemistry.examzify.com

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

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