MEDICAL COLLEGE ADMISSION TEST (MCAT) GENERAL CHEMISTRY PRACTICE EXAM (SAMPLE)

STUDY GUIDE

SAMPLE STUDY GUIDE WITH LIMITED QUESTIONS

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https://mcat-generalchemistry.examzify.com

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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

1. For a third order reaction, which plot represents its kinetics?

A. Concentration vs. time

B. 1/[A] vs. time

C. $1/(2[A]^2)$ vs. time

D. Ln[A] vs. time

2. What symbol represents internal energy?

A. U

B. E

C. H

D. S

3. The azimuthal quantum number designates which of the following?

A. The energy of the electron

B. The type of atomic orbital (s, p, d, f)

C. The specific electron within an orbital

D. The total number of electrons

4. How is temperature defined in a molecular context?

A. As the total energy of molecules

B. As the measurement of molecular motion

C. As the volume occupied by molecules

D. As the weight of molecules

5. Which of the following statements about ideal gases is incorrect?

A. Gas molecules exert no attractive forces

B. Gas volumes are negligible

C. Pressure and temperature can vary independently

D. All gas collisions are elastic

6. When Q is greater than K, what direction does the reaction shift?

A. The reaction shifts to the right to form more products.

B. The reaction shifts to the left to form more reactants.

C. No shift occurs in the reaction.

D. The equilibrium constant decreases.

7. In Le Chatelier's Principle, what effect does removing a reactant have on the system?

A. The reaction shifts to the left to form more reactants.

B. The reaction shifts to the right to favor products.

C. The system remains unchanged.

D. The moles of reactants will increase.

8. In a galvanic cell, where does oxidation occur?

A. At the cathode

B. In the salt bridge

C. At the anode

D. At the metal strip

9. At lower temperatures, which combination of ΔH and ΔS indicates a spontaneous reaction?

A. -ΔH and -ΔS

B. -ΔH and +ΔS

C. +ΔH and -ΔS

D. +ΔH and +ΔS

10. Which aspect does the van't Hoff factor consider for ionically dissociating compounds?

A. The total mass of the compound

B. The number of ions produced when completely dissociated

C. The speed of dissociation in solutions

D. The volatility of the compound

Answers

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

Explanations

1. For a third order reaction, which plot represents its kinetics?

A. Concentration vs. time

B. 1/[A] vs. time

C. 1/(2[A]²) vs. time

D. Ln[A] vs. time

For a third-order reaction, the relationship between the concentration of a reactant and time is represented through a specific plot based on the integrated rate law for third-order kinetics. The integrated rate law for a third-order reaction involving a single reactant A can be expressed as: \[\frac{1}{2[A]^2} = kt + \text{constant} \] This equation indicates that the plot of \(1/(2[A]^2)\) versus time (where "t" is the time elapsed) will yield a straight line. The slope of this line is \(k\), the rate constant for the reaction. This characteristic behavior arises from the mathematical nature of third-order kinetics, where the rate of reaction is proportional to the square of the concentration of the reactant. In contrast, the other plots do not yield straight lines for third-order reactions. Concentration versus time shows a non-linear decay that does not reflect a simple correlation for third-order behavior. The plot of \(1/[A]\) versus time corresponds to a second-order reaction, while the natural log of concentration versus time represents first-order kinetics. Therefore, the correct choice for a third-order reaction's kinetics is the plot of \(1/(2[A]^2

2. What symbol represents internal energy?

A. U

B. E

C. H

D. S

The symbol that represents internal energy is U. In thermodynamics, internal energy refers to the total energy contained within a system due to the kinetic and potential energies of its molecules. This energy can change as heat is added or removed from the system or work is done on or by the system. In contrast, E often represents energy in a more general sense and is not specifically designated for internal energy. H represents enthalpy, which is related to internal energy but also includes the effects of pressure and volume. S denotes entropy, a measure of the disorder or randomness in a system. Understanding these different symbols is crucial for deciphering equations and principles in thermodynamics and chemistry.

3. The azimuthal quantum number designates which of the following?

A. The energy of the electron

B. The type of atomic orbital (s, p, d, f)

C. The specific electron within an orbital

D. The total number of electrons

The azimuthal quantum number, often represented by the symbol \(l \), is essential in quantum mechanics and atomic theory, as it determines the shape of an atomic orbital and describes the type of orbital present in an atom. Specifically, it can take on integer values starting from zero up to \(n-1 \), where \(n \) is the principal quantum number. Each value of \(l \) corresponds to a different type of orbital: \(l = 0 \) for an s orbital, \(l = 1 \) for a p orbital, \(l = 2 \) for a d orbital, and \(l = 3 \) for an f orbital. Understanding the role of the azimuthal quantum number is crucial for visualizing electron distribution and chemical bonding. The shape of these orbitals influences how atoms interact with one another, impact chemical properties, and play a significant role in determining the structure of molecules and their stability. In contrast, while the energy of an electron is influenced by multiple factors, including the principal quantum number and electrostatic interactions, it is not solely represented by the azimuthal quantum number. The specific electron within an orbital requires a designation using the magnetic quantum number and spin quantum number for

4. How is temperature defined in a molecular context?

A. As the total energy of molecules

B. As the measurement of molecular motion

C. As the volume occupied by molecules

D. As the weight of molecules

Temperature, in a molecular context, is defined as a measurement of the average kinetic energy of the molecules in a substance. This means that temperature reflects how fast the molecules are moving—higher temperatures indicate faster molecular motion, while lower temperatures indicate slower movement. When the thermal energy of a substance increases, the average speed of its molecules increases as well, resulting in a higher temperature reading. Conversely, if the thermal energy decreases, the average kinetic energy also decreases, leading to a lower temperature. This relationship is fundamental to understanding heat transfer and the behavior of gases, liquids, and solids at various temperatures. The other options do not accurately capture the definition of temperature in a molecular context. For instance, stating temperature as the total energy of molecules conflates kinetic energy with potential energy and does not specify the average kinetic energy component relevant to temperature. Similarly, defining temperature by the volume occupied by molecules overlooks the motion aspect and does not include any information about energy, and referring to the weight of molecules does not relate to temperature at all.

5. Which of the following statements about ideal gases is incorrect?

A. Gas molecules exert no attractive forces

B. Gas volumes are negligible

C. Pressure and temperature can vary independently

D. All gas collisions are elastic

The statement that pressure and temperature can vary independently is incorrect regarding ideal gases. In the context of ideal gas behavior, there is a defined relationship between the pressure, volume, and temperature of a gas, as articulated by the ideal gas law ($PV = nRT$). In an isolated system, if the volume is held constant, changing the temperature of a gas will directly affect its pressure according to this relationship. Therefore, pressure and temperature do not vary independently under constant volume conditions. The other statements about ideal gases are accurate. Gas molecules indeed do not exert significant attractive or repulsive forces upon each other, meaning that intermolecular forces are negligible, which is foundational to the concept of an ideal gas. Additionally, the volume occupied by gas molecules themselves is typically much smaller compared to the volume of the container, which justifies the assumption that gas volumes are negligible when analyzing gas behavior. Finally, the principle that all collisions between gas molecules are elastic signifies that there is no net loss of kinetic energy in these collisions, an assumption consistent with ideal gas behavior.

6. When Q is greater than K, what direction does the reaction shift?

A. The reaction shifts to the right to form more products.

B. The reaction shifts to the left to form more reactants.

C. No shift occurs in the reaction.

D. The equilibrium constant decreases.

When the reaction quotient (Q) is greater than the equilibrium constant (K), this indicates that the concentration of products is higher than what is present at equilibrium relative to the concentrations of reactants. In this situation, the system is not at equilibrium and will adjust to restore balance. To achieve this balance, the reaction will shift in the direction that decreases the concentration of products and increases the concentration of reactants. This means that the system shifts to the left, favoring the formation of more reactants until Q decreases and approaches K, eventually reaching equilibrium. This concept is rooted in Le Chatelier's principle, which states that if a system at equilibrium is disturbed, the system will respond by attempting to counteract that disturbance and restore equilibrium. Therefore, when Q is greater than K, the reaction shifts left to form more reactants, moving towards restoring the equilibrium state.

7. In Le Chatelier's Principle, what effect does removing a reactant have on the system?

A. The reaction shifts to the left to form more reactants.

B. The reaction shifts to the right to favor products.

C. The system remains unchanged.

D. The moles of reactants will increase.

Removing a reactant from a system at equilibrium causes a shift in the reaction's equilibrium position. According to Le Chatelier's Principle, when a system at equilibrium experiences a change (such as the removal of a reactant), the equilibrium will shift in a direction that counteracts that change. In this case, when a reactant is removed, the system reacts by shifting to the left, towards the reactants, in order to increase the concentration of that reactant and restore equilibrium. This compensatory change helps to re-establish a balance within the system. In contrast, if a reactant were to be added, the equilibrium would shift to the right, favoring the formation of products. Therefore, the correct interpretation of the process when a reactant is removed is that the system shifts to the left to form more reactants, thus moving towards restoring the equilibrium state.

8. In a galvanic cell, where does oxidation occur?

A. At the cathode

B. In the salt bridge

C. At the anode

D. At the metal strip

In a galvanic cell, oxidation takes place at the anode. This is a fundamental aspect of electrochemical cells. During the oxidation reaction, an atom or molecule loses electrons, resulting in an increase in oxidation state. The anode is designated as the electrode where this loss of electrons occurs. The electrons lost during oxidation then flow through the external circuit to the cathode, where reduction takes place. This movement of electrons from the anode to the cathode generates electrical energy, which can be harnessed for various purposes. The salt bridge acts as a pathway to maintain charge neutrality within the cell by allowing the flow of ions, but it is not the site of oxidation. The metal strip can refer to the anode or cathode, depending on the context, but it does not inherently specify where oxidation occurs without additional context. In summary, understanding the roles of the anode and cathode, as well as the salt bridge's function, clarifies why oxidation is specifically designated at the anode in galvanic cells.

9. At lower temperatures, which combination of ΔH and ΔS indicates a spontaneous reaction?

A. -ΔH and -ΔS

B. -ΔH and +ΔS

C. +ΔH and -ΔS

D. +ΔH and +ΔS

A spontaneous reaction is determined by the Gibbs free energy change (ΔG), which can be expressed as: ΔG = ΔH - TΔS where ΔH represents the change in enthalpy, ΔS is the change in entropy, and T is the temperature in Kelvin. For a reaction to be spontaneous, ΔG must be negative. Evaluating the combinations of ΔH and ΔS: When ΔH is negative (exothermic), it contributes to making ΔG more negative, favoring spontaneity. Meanwhile, if ΔS is positive, this indicates an increase in disorder in the system, which also contributes to a negative ΔG when multiplied by the temperature (T). Specifically, the combination of negative ΔH and positive ΔS results in a situation where both factors push ΔG to become negative, particularly at lower temperatures, where the impact of TΔS is less pronounced. Therefore, this combination is the most favorable for spontaneity under these conditions. The other combinations present scenarios where either the enthalpy change or the entropy change might hinder spontaneity, such as an increase in enthalpy without a significant rise in entropy or both being

10. Which aspect does the van't Hoff factor consider for ionically dissociating compounds?

A. The total mass of the compound

B. The number of ions produced when completely dissociated

C. The speed of dissociation in solutions

D. The volatility of the compound

The van't Hoff factor is a key concept in colligative properties of solutions, specifically for ionic compounds. It represents the number of particles (ions or molecules) that a compound produces when it dissociates in solution. For ionically dissociating compounds, this factor is particularly important because it directly influences properties such as boiling point elevation, freezing point depression, and osmotic pressure. When an ionic compound dissolves, it typically separates into its constituent ions. For example, table salt (NaCl) dissociates into sodium ions (Na) and chloride ions (Cl), yielding a total of two particles in solution. The van't Hoff factor for this compound would be 2. Thus, knowing the number of ions produced during dissociation allows for the accurate calculation of these colligative properties. The other aspects mentioned—total mass, speed of dissociation, and volatility—do not directly relate to the van't Hoff factor. While the total mass may affect overall concentration, it does not provide information on how many particles will be produced upon dissociation. Similarly, the speed of dissociation and volatility are pertinent to different aspects of chemical behavior and do not influence the measurement of colligative properties through the van't

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://mcat-generalchemistry.examzify.com

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