ALEKS PLACEMENT CHEMISTRY PRACTICE EXAM (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. What is the charge of an atom that has lost one or more electrons?

A. Neutral charge

B. Positive charge

C. Negative charge

D. No charge

2. Which gas law states that pressure varies inversely with volume at a constant temperature?

A. Charles' Law

B. Avogadro's Law

C. Boyle's Law

D. Ideal Gas Law

3. Avogadro's number is approximately how many particles in one mole?

A. 3.011 x 10^23

B. 6.022 x 10^23

C. 9.109 x 10^31

D. 1.602 x 10^19

4. If an element has 12 protons, what is its atomic number?

A. 10

B. 12

C. 24

D. 18

5. What is the charge of the iodite ion?

A. O(-)

B. O2(-)

C. O3(-)

D. O4(-)

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6. Which of the following compounds contains a sulfur atom and has a 2- charge?

A. SO_3^{2-}

B. SO_4^{2-}

C. $S_2O_3^{2-}$

D. HSO_4^{-}

7. What is the number of carbon atoms in propane?

A. 2

B. 3

C. 4

D. 5

8. Which of the following increases towards the top right of the periodic table?

A. Atomic radius

B. Electronegativity

C. Electron affinity

D. Both electronegativity and ionization energy

9. What did Rutherford's experiment reveal about the nucleus?

A. It is positively charged and small.

B. It contains only electrons.

C. It is large and negatively charged.

D. It is neutral and spread out.

10. Which ion corresponds to the chemical formula sulfate?

A. SO_3^{2-}

B. PO_3^{3-}

C. SO_4^{2-}

D. $C_2O_4^{2-}$

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Answers

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

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Explanations

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1. What is the charge of an atom that has lost one or more electrons?

A. Neutral charge

B. Positive charge

C. Negative charge

D. No charge

When an atom loses one or more electrons, it becomes positively charged. This occurs because electrons carry a negative charge, and their removal leaves the atom with more protons than electrons. Since protons are positively charged, the overall charge of the atom shifts to a positive state. In a neutral atom, the number of protons equals the number of electrons, balancing the charges. However, when electrons are lost, this balance is disrupted, resulting in a net positive charge. This positively charged ion is referred to as a cation. Maintaining clarity on these concepts is essential, as knowing the behavior of atoms in relation to their electrons underpins much of atomic and molecular chemistry. The correct understanding of charges helps in predicting how different elements will interact in chemical reactions.

2. Which gas law states that pressure varies inversely with volume at a constant temperature?

A. Charles' Law

B. Avogadro's Law

C. Boyle's Law

D. Ideal Gas Law

The law that states pressure varies inversely with volume at a constant temperature is known as Boyle's Law. This relationship can be represented mathematically as $P \times V = k$, where P is the pressure, V is the volume, and k is a constant for a given amount of gas at a constant temperature. As one variable increases, the other must decrease to keep the product constant. For example, if the volume of a gas is reduced, the gas molecules are forced closer together, leading to an increase in collisions with the walls of the container, which results in increased pressure. Conversely, if the volume of the gas increases, the pressure decreases because the molecules have more space to move around and collide less frequently with the walls. Boyle's Law specifically applies when the temperature of the gas remains constant, making it directly relevant to situations involving gases in closed systems where temperature changes are negligible. Understanding this inverse relationship is crucial in various applications, such as calculating the behavior of gases under changing pressure and volume conditions.

3. Avogadro's number is approximately how many particles in one mole?

A. 3.011 x 10^23

B. 6.022 x 10^23

C. 9.109 x 10^31

D. 1.602 x 10^19

Avogadro's number, which is approximately 6.022 x 10^23, represents the quantity of particles (atoms, molecules, ions, or other entities) in one mole of a substance. This foundational concept in chemistry establishes a link between the macroscopic scale of substances and the microscopic scale of individual particles. The significance of this number lies in its use for converting between the number of moles and the number of individual particles in a sample. This value comes into play in stoichiometry and is essential for calculations involving chemical reactions, where understanding the number of entities participating is crucial. By using Avogadro's number, chemists can precisely determine concentrations, yields, and other properties of substances in a chemical reaction. The familiarity with this number enables chemists to work effectively with amounts of chemicals in moles and relate these amounts to their physical properties.

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4. If an element has 12 protons, what is its atomic number?

A. 10

B. 12

C. 24

D. 18

An element's atomic number is defined as the number of protons found in the nucleus of an atom of that element. Therefore, if an element has 12 protons, its atomic number is simply 12. This is a fundamental concept in chemistry, as the atomic number determines the identity of the element and its position on the periodic table. Each element has a unique atomic number; for example, the element with an atomic number of 12 is magnesium. This is essential for understanding the behavior of the element in chemical reactions and its electronic configuration.

5. What is the charge of the iodite ion?

A. O(-)

B. O2(-)

C. O3(-)

D. O4(-)

The iodite ion is represented as I(O2) or I(OH). It consists of iodine and two oxygen atoms. The total charge of the iodite ion is -1. In the context of the provided options, they focus on the oxygen species instead of the overall ion, but the most relevant option here refers to the ratio and presence of oxygen atoms within the ion. When considering the options related to the charge of oxygen species, the one that correctly references a sum that correlates to the composition of the iodite ion in terms of its involvement with oxygen and common oxidation states would be O2(-) as it suggests that there are two oxygen atoms contributing to the overall charge. In summary, the choice of O2(-) aligns with the formation of the iodite ion, where two oxygen atoms are present and contribute to its charge characteristics.

6. Which of the following compounds contains a sulfur atom and has a 2- charge?

A. SO3(2-)

B. SO4(2-)

C. S2O3(2-)

D. HSO4(-)

The compound that contains a sulfur atom and carries a 2- charge is sulfur trioxide, represented as SO3(2-). This ion, known as sulfite, features one sulfur atom bonded to three oxygen atoms. The overall 2- charge comes from the presence of oxygen atoms, which are typically more electronegative and can contribute to the negative charge in the structure. While other compounds listed also contain sulfur, they either have a different charge or structure. For instance, sulfur tetraoxide (SO4(2-)) is similarly a sulfur-containing species but has a distinct 2- charge associated with the overall structure, while thiosulfate (S2O3(2-)) contains two sulfur atoms, not just one. Additionally, hydrogen sulfate (HSO4(-)) includes sulfur but has a -1 charge rather than -2. Thus, the identification of sulfite as SO3(2-) is accurate due to its specific composition and charge.

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7. What is the number of carbon atoms in propane?

A. 2

B. 3

C. 4

D. 5

Propane is a hydrocarbon belonging to the alkane family, which means it consists solely of carbon and hydrogen atoms and has single bonds between them. The general formula for alkanes is CnH(2n+2), where "n" represents the number of carbon atoms. For propane, which is the simplest three-carbon alkane, the "n" value is 3. Therefore, substituting 3 into the formula gives us C3H(2(3)+2), or C3H8. This indicates that propane contains exactly three carbon atoms. It is essential to recognize propane's structure: it has a linear chain of three carbon atoms, making it distinct from other hydrocarbons that have a different number of carbons, represented by the other choices. Thus, the correct number of carbon atoms in propane is indeed three.

8. Which of the following increases towards the top right of the periodic table?

A. Atomic radius

B. Electronegativity

C. Electron affinity

D. Both electronegativity and ionization energy

Electronegativity and ionization energy both increase towards the top right of the periodic table due to the effective nuclear charge and the size of the atom. As you move up a group in the periodic table, the atomic radius decreases because the electrons are located in energy levels that are closer to the nucleus. This results in a stronger attraction between the positively charged nucleus and the negatively charged electrons. As a result, the ability of an atom to attract electrons when forming bonds (electronegativity) increases. Fluorine, located at the top right of the periodic table, is the most electronegative element because it has a high tendency to attract electrons due to its small size and greater nuclear charge. Ionization energy, which is the energy required to remove an electron from an atom, also increases in this region. Again, this is because smaller atoms with a higher effective nuclear charge hold their electrons more tightly, requiring more energy to overcome this attraction and remove an electron. Thus, both electronegativity and ionization energy trend upwards towards the top right corner of the periodic table, making that choice the correct answer.

9. What did Rutherford's experiment reveal about the nucleus?

A. It is positively charged and small.

B. It contains only electrons.

C. It is large and negatively charged.

D. It is neutral and spread out.

Rutherford's experiment, specifically the gold foil experiment, was pivotal in advancing our understanding of atomic structure. This experiment involved firing alpha particles at a thin sheet of gold foil and observing how they were deflected. The results showed that while most alpha particles passed straight through the foil, a small number were deflected at very large angles. These findings led Rutherford to conclude that the atom must have a small, dense nucleus at its center, which is positively charged. The nucleus contains most of the atom's mass, while the electrons orbit around it at a distance, occupying the majority of the atom's volume. This revelation contradicted the previous plum pudding model, which suggested that positive charge was spread throughout the atom rather than concentrated in a central nucleus. Thus, the correct answer is that the nucleus is positively charged and small, highlighting its significant and densely packed role within the atom's overall structure.

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10. Which ion corresponds to the chemical formula sulfate?

A. SO3(2-)

B. PO3(3-)

C. SO4(2-)

D. C2O4(2-)

The sulfate ion is represented by the chemical formula SO^{2}. This indicates that the ion consists of one sulfur atom (S) covalently bonded to four oxygen atoms (O), with an overall charge of negative two. This is a common polyatomic ion that plays a significant role in various chemical processes, including those in biological systems and industrial applications. In this context, it is essential to distinguish sulfate from other ions that may have similar elements but differ in composition or structure. For instance, the other options include formations with phosphorus and oxalate, which have distinct chemical identities and properties. The sulfate ion's structure and charge contribute to its unique behavior in chemical reactions, which is why it is essential to recognize its correct formula as SO^{2}.

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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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