

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.

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. What is the formula for the perchlorate ion?**
- A. $\text{ClO}_4(-)$
 - B. $\text{ClO}_3(-)$
 - C. $\text{ClO}_2(-)$
 - D. $\text{Cl}(-)$
- 2. What characterizes covalent compounds?**
- A. They form through the transfer of electrons
 - B. They exist as neutral molecules
 - C. They are composed of charged ions
 - D. They can conduct electricity when dissolved in water
- 3. Can the composition of a compound ever change?**
- A. Yes, always
 - B. No, it stays constant
 - C. Only in extreme conditions
 - D. Yes, depending on the mixture
- 4. What is a pure substance?**
- A. A mixture of various components
 - B. A substance with multiple properties
 - C. A substance that contains only one component
 - D. A substance that always changes composition
- 5. Which type of radioactive particle is described as a high energy photon of light?**
- A. Alpha particle
 - B. Beta particle
 - C. Gamma ray
 - D. Neutron
- 6. What is the formula to determine the neutron number in an atom?**
- A. Atomic Number + Atomic Mass
 - B. Atomic Mass - Atomic Number
 - C. Atomic Mass * Atomic Number
 - D. Atomic Number / Atomic Mass

7. Which of the following pairs are classified as diatomic molecules?

- A. Hydrogen and helium
- B. Nitrogen and argon
- C. Oxygen and fluorine
- D. Chlorine and iodine

8. What is the formula for arsenite?

- A. $\text{AsO}_3(3-)$
- B. $\text{AsO}_4(3-)$
- C. $\text{BO}_3(3-)$
- D. $\text{PO}_4(3-)$

9. Which statement accurately reflects the composition of an atomic nucleus?

- A. It contains only protons
- B. It contains only neutrons
- C. It contains protons and electrons
- D. It contains protons and neutrons

10. What property defines malleability?

- A. The ability to lose electrons
- B. The ability to be pulled into wire
- C. The ability to be molded into shapes
- D. The ability to conduct heat

Answers

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

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Explanations

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1. What is the formula for the perchlorate ion?

- A. $\text{ClO}_4(-)$**
- B. $\text{ClO}_3(-)$
- C. $\text{ClO}_2(-)$
- D. $\text{Cl}(-)$

The formula for the perchlorate ion is $\text{ClO}_4(-)$. This ion consists of one chlorine atom (Cl) surrounded by four oxygen atoms (O). The negative charge indicates that the ion has one more electron than protons, giving it an overall negative charge of one. Understanding the naming and structure of polyatomic ions can help clarify this: "per" in perchlorate indicates that it has the maximum number of oxygen atoms typically associated with chlorine in its highest oxidation state, which, in this case, is +7. The chlorate ion ($\text{ClO}_3(-)$) has one less oxygen than perchlorate, indicating it holds a lower oxidation state for chlorine. Similarly, the chlorite ($\text{ClO}_2(-)$) and chloride ($\text{Cl}(-)$) ions have even fewer oxygen atoms and represent lower states or simpler forms of chlorine oxidation, making them distinctly different from perchlorate. Recognizing the systematic naming conventions based on oxygen content allows one to confidently identify the formula for the perchlorate ion as $\text{ClO}_4(-)$.

2. What characterizes covalent compounds?

- A. They form through the transfer of electrons
- B. They exist as neutral molecules**
- C. They are composed of charged ions
- D. They can conduct electricity when dissolved in water

Covalent compounds are characterized by the sharing of electrons between atoms, which leads to the formation of neutral molecules. This sharing occurs primarily between nonmetals, resulting in compounds that do not have a net charge. Since the electrons are shared rather than transferred, the molecules remain neutral overall. In contrast, the transfer of electrons is indicative of ionic compounds, which involve the formation of charged ions. Ionic compounds typically exist in a lattice structure rather than as individual neutral molecules. Additionally, many covalent compounds do not conduct electricity when dissolved in water, as they do not produce ions that can move freely in the solution. Thus, the defining feature of covalent compounds is that they exist as neutral molecules formed through the sharing of electron pairs between atoms.

3. Can the composition of a compound ever change?

- A. Yes, always
- B. No, it stays constant**
- C. Only in extreme conditions
- D. Yes, depending on the mixture

The composition of a compound is defined by the specific ratio of its constituent elements, and this ratio remains constant regardless of the physical state or sample size. A compound is formed through chemical bonds between elements, and their properties, including composition, are determined by these relationships. For example, water is always composed of two hydrogen atoms and one oxygen atom (H_2O). This ratio does not change whether you're looking at a glass of water, an ice cube, or steam. Any variation in composition would imply a change in the chemical identity of the substance, meaning it would no longer be classified as that particular compound. In contrast, mixtures can have varying compositions, which is a main distinguishing factor between mixtures and compounds. This principle is fundamental in chemistry, as it underpins the law of definite proportions, stating that a chemical compound always contains the same proportion of elements by mass. Therefore, the assertion that a compound's composition stays constant is indeed correct.

4. What is a pure substance?

- A. A mixture of various components
- B. A substance with multiple properties
- C. A substance that contains only one component**
- D. A substance that always changes composition

A pure substance is defined as a material that consists of only one type of particle or component throughout. This singularity means that all its physical and chemical properties are consistent and uniform. For example, elements like gold (Au) or compounds like water (H₂O) are considered pure substances because they are made up entirely of one type of atom or one type of molecule, respectively. In contrast, a mixture contains two or more different substances that are physically combined, which is characterized by the presence of multiple components varying in proportion. This variability leads to different properties in different samples of a mixture. Additionally, a pure substance does not vary in composition; it remains constant regardless of the sample size or form. Therefore, recognizing that a pure substance is composed exclusively of a single component clarifies why the choice that identifies a pure substance in this manner is the correct one.

5. Which type of radioactive particle is described as a high energy photon of light?

- A. Alpha particle
- B. Beta particle
- C. Gamma ray**
- D. Neutron

The correct answer is gamma ray, which is a type of electromagnetic radiation, specifically a high-energy photon. Gamma rays are produced in nuclear reactions and are characterized by their very short wavelength and high frequency, resulting in high energy. Unlike alpha particles and beta particles, which are charged particles (alpha particles are helium nuclei and beta particles are high-energy electrons or positrons), gamma rays do not carry any charge and can penetrate materials much more effectively due to their non-particle nature. Neutrons, while also neutral like gamma rays, are not electromagnetic radiation but rather subatomic particles found in the nucleus of an atom. This distinction makes gamma rays unique among the options provided.

6. What is the formula to determine the neutron number in an atom?

- A. Atomic Number + Atomic Mass
- B. Atomic Mass - Atomic Number**
- C. Atomic Mass * Atomic Number
- D. Atomic Number / Atomic Mass

The formula used to determine the number of neutrons in an atom is derived from the relationship between atomic mass, atomic number, and neutron count. The atomic mass (which is approximately equal to the mass number) represents the total number of protons and neutrons in the nucleus. The atomic number, on the other hand, indicates the number of protons present in the nucleus of the atom. To find the number of neutrons, you subtract the atomic number (the number of protons) from the atomic mass (the total number of protons and neutrons). This gives you the equation: $\text{Number of Neutrons} = \text{Atomic Mass} - \text{Atomic Number}$. This formula allows you to calculate how many neutrons are present in an atom, which can vary between different isotopes of the same element, while the atomic number remains constant for a given element. Thus, using this reasoning, the correct method for determining the neutron count in an atom is by subtracting the atomic number from the atomic mass.

7. Which of the following pairs are classified as diatomic molecules?

- A. Hydrogen and helium
- B. Nitrogen and argon
- C. Oxygen and fluorine
- D. Chlorine and iodine**

Diatomic molecules are those that consist of two atoms, which can be of the same element or different elements. When considering the correct answer, chlorine and iodine are both elements that commonly exist as diatomic molecules in their natural forms. Chlorine exists as Cl_2 , meaning two chlorine atoms bond together to form a stable molecule. Similarly, iodine occurs as I_2 , with two iodine atoms bonded together. These diatomic forms are significant because many elements will naturally pair up to achieve stability through bonding, and in the case of chlorine and iodine, this is observed as they tend to be found in molecular forms in the gas and solid states, respectively. In contrast, while hydrogen is a diatomic molecule, helium is a noble gas that exists as individual atoms rather than a diatomic molecule. Similarly, nitrogen is diatomic as N_2 , but argon is also a noble gas that does not form diatomic molecules. Oxygen and fluorine are diatomic molecules (O_2 and F_2 , respectively), but chlorine and iodine are both halogens that commonly exist as diatomic molecules in nature. The choice of chlorine and iodine as diatomic molecules is made clear by their molecular forms and their tendency to bond with themselves.

8. What is the formula for arsenite?

- A. AsO_3^{3-}**
- B. AsO_4^{3-}
- C. BO_3^{3-}
- D. PO_4^{3-}

The formula for arsenite is AsO_3^{3-} . Arsenite refers to the arsenic species with a +3 oxidation state. In this case, arsenite ions consist of one arsenic atom bonded to three oxygen atoms, and the overall charge on the ion is -3. This is in contrast to other choices listed. For example, the formula AsO_4^{3-} would represent arsenate, which is a different species with arsenic in the +5 oxidation state. The other formulas, BO_3^{3-} (borate) and PO_4^{3-} (phosphate), do not have arsenic in them at all, so they are unrelated to arsenite. Thus, the correct identification of AsO_3^{3-} as the formula for arsenite is based on its composition and the oxidation state of arsenic within that ion.

9. Which statement accurately reflects the composition of an atomic nucleus?

- A. It contains only protons
- B. It contains only neutrons
- C. It contains protons and electrons
- D. It contains protons and neutrons**

The atomic nucleus is made up of protons and neutrons, collectively known as nucleons. Protons carry a positive charge, which contributes to the overall positive charge of the nucleus, while neutrons are neutral particles that provide stability to the nucleus. The presence of both types of particles allows the nucleus to maintain its structure, as neutrons help to mitigate the repulsive forces between the positively charged protons. Meanwhile, electrons are not part of the nucleus; they exist in orbitals around the nucleus, forming the outer region of an atom known as the electron cloud. Therefore, the options that mention only protons, only neutrons, or including electrons do not accurately represent the true composition of an atomic nucleus. Thus, the choice stating that the nucleus contains protons and neutrons captures the essential components accurately.

10. What property defines malleability?

- A. The ability to lose electrons
- B. The ability to be pulled into wire
- C. The ability to be molded into shapes
- D. The ability to conduct heat

Malleability is specifically defined as the ability of a material, usually metals, to be deformed under compressive stress. This property allows metals to be hammered or rolled into thin sheets without breaking. When a malleable substance is subjected to mechanical force, it can change shape while maintaining its integrity, making it possible to create various forms or shapes such as plates or foils. This characteristic is important in many industrial applications, where materials need to be shaped into specific forms for construction, manufacturing, or artistic purposes. For instance, gold and aluminum are known for their exceptional malleability, allowing them to be formed into intricate designs or items. While other options refer to different physical properties—such as the ability to conduct heat, which pertains to thermal conductivity; the ability to lose electrons, which relates to reactivity and ionization; and the ability to be pulled into wires, known as ductility—none of these descriptions accurately capture the essence of malleability, which focuses specifically on the ability to be molded or shaped.

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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