

HESI A2 CHEMISTRY PRACTICE TEST (SAMPLE)

STUDY GUIDE



Prepare with structure. Pass with confidence



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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 defines a chemical reaction?**
- A. A change in the physical state of matter
 - B. A process where reactants convert into products
 - C. The formation of ionic bonds
 - D. A phase change without altering chemical properties
- 2. What is the chemical formula for ammonia?**
- A. NH_4
 - B. NH_2
 - C. NH_3
 - D. N_2H_6
- 3. What type of bond involves the sharing of electron pairs between atoms?**
- A. Ionic bond
 - B. Covalent bond
 - C. Metallic bond
 - D. Hydrogen bond
- 4. What is an oxidation-reduction reaction commonly known as?**
- A. Synthesis reaction
 - B. Decomposition reaction
 - C. Electrolysis
 - D. Redox reaction
- 5. What type of mixture has a uniform density throughout and no distinguishable components?**
- A. Heterogeneous Mixture
 - B. Homogeneous Mixture
 - C. Compound
 - D. Solution

6. What is the reaction called when carbon compounds are burned in the presence of oxygen?
- A. Oxidation reaction
 - B. Combustion reaction
 - C. Decomposition reaction
 - D. Synthesis reaction
7. The three forms of radiation include alpha, beta, and which other type?
- A. Ultraviolet Radiation
 - B. X-ray Radiation
 - C. Gamma Radiation
 - D. Neutron Radiation
8. What is the primary gas in the Earth's atmosphere?
- A. Oxygen (O₂)
 - B. Carbon dioxide (CO₂)
 - C. Nitrogen (N₂)
 - D. Argon (Ar)
9. What does "oxidation" refer to in terms of electron transfer?
- A. The gain of electrons by a substance
 - B. The loss of electrons from a substance
 - C. The transfer of protons between molecules
 - D. The neutralization of a chemical reaction
10. What describes the bond formed by attraction to a hydrogen atom by a highly electronegative element?
- A. Ionic bond
 - B. Covalent bond
 - C. Hydrogen bond
 - D. Polar bond

Answers

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

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Explanations

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1. What defines a chemical reaction?

- A. A change in the physical state of matter
- B. A process where reactants convert into products**
- C. The formation of ionic bonds
- D. A phase change without altering chemical properties

A chemical reaction is defined as a process where reactants are transformed into products. This transformation involves breaking and forming chemical bonds, leading to the creation of new substances with distinct properties. During a chemical reaction, the original substances (reactants) undergo a chemical change, resulting in different substances (products) that cannot simply be reversed by physical means. This definition encompasses a wide range of processes, including combustion, synthesis, decomposition, and displacement reactions, reflecting the fundamental nature of chemical reactions in terms of energy changes and rearrangement of atoms. Although changes in physical state or bond formation are involved in some reactions, they do not fully encapsulate the essence of a chemical reaction as the conversion of substances is the core characteristic that distinguishes it from physical changes.

2. What is the chemical formula for ammonia?

- A. NH_4
- B. NH_2
- C. NH_3**
- D. N_2H_6

Ammonia is a compound consisting of nitrogen and hydrogen, with the chemical formula representing one nitrogen atom bonded to three hydrogen atoms. This is distinctly reflected in the formula NH_3 , where the "N" stands for nitrogen and the three "H" symbols indicate the three hydrogen atoms that are covalently bonded to the nitrogen atom. In the context of the other options, NH_4 represents ammonium, which is a positively charged ion (cation) derived from ammonia but has a different structure. NH_2 describes the amide functional group, which does not encompass the full tetrahedral geometry or the characteristic properties of ammonia. N_2H_6 , on the other hand, suggests a molecular structure containing two nitrogen atoms and six hydrogen atoms, which is not representative of ammonia but rather a different compound called hydrazine. Thus, the formula NH_3 correctly identifies ammonia and reflects its molecular composition accurately.

3. What type of bond involves the sharing of electron pairs between atoms?

- A. Ionic bond
- B. Covalent bond**
- C. Metallic bond
- D. Hydrogen bond

The type of bond that involves the sharing of electron pairs between atoms is known as a covalent bond. In a covalent bond, two or more atoms share electrons in order to achieve a full outer shell of electrons, thereby reaching a more stable electronic configuration. This sharing of electron pairs leads to the formation of molecules and is particularly common between nonmetal atoms, which have similar electronegativities. For instance, in a water molecule (H_2O), the oxygen atom shares electron pairs with two hydrogen atoms. This interaction allows both the hydrogen atoms and the oxygen atom to effectively fill their outer electron shells, resulting in a stable structure. The characteristics of covalent bonds also include their directional nature, which influences the shape of the molecules formed, and their relatively lower melting and boiling points in comparison to ionic compounds.

4. What is an oxidation-reduction reaction commonly known as?

- A. Synthesis reaction
- B. Decomposition reaction
- C. Electrolysis
- D. Redox reaction**

An oxidation-reduction reaction is commonly known as a redox reaction. This term arises from the processes of oxidation, where a substance loses electrons, and reduction, where a substance gains electrons. In a redox reaction, these two processes are always linked; as one substance is oxidized, another is simultaneously reduced. The significant aspect of redox reactions is their role in various chemical processes, including combustion, respiration, and corrosion, among others. They can be identified by changes in oxidation states of the reactants involved. Understanding these reactions is crucial in both organic and inorganic chemistry, as well as in various applications such as battery technology and electrochemistry. In contrast, synthesis and decomposition reactions pertain to the combination or breakdown of compounds, respectively, while electrolysis specifically refers to the process of driving a chemical reaction by passing an electric current through a solution or molten compound. However, it is not synonymous with the broader category of redox reactions.

5. What type of mixture has a uniform density throughout and no distinguishable components?

- A. Heterogeneous Mixture
- B. Homogeneous Mixture**
- C. Compound
- D. Solution

A homogeneous mixture has a uniform density throughout and no distinguishable components. This means that the composition is consistent across the entire mixture, making it appear uniform to the naked eye. An example of a homogeneous mixture would be salt water, where the salt is completely dissolved in the water, resulting in a consistent concentration and appearance. In contrast, heterogeneous mixtures contain components that are distinguishable and vary in composition. For example, a salad is a heterogeneous mixture because you can see and separate the individual ingredients. Compounds consist of two or more elements that are chemically bonded together in a fixed ratio, and while they can be homogeneous in their composition (like water), they are not mixtures as they can't be physically separated. Solutions are a specific type of homogeneous mixture, but the broader category of a homogeneous mixture encompasses both solutions and other uniform mixtures.

6. What is the reaction called when carbon compounds are burned in the presence of oxygen?

- A. Oxidation reaction
- B. Combustion reaction**
- C. Decomposition reaction
- D. Synthesis reaction

The correct answer is a combustion reaction. This type of reaction specifically involves the burning of carbon-containing compounds, typically in the presence of oxygen. During combustion, the carbon compounds react with oxygen to produce carbon dioxide and water, releasing energy in the form of heat and light. This process is fundamental in various applications, such as in engines and power generation. Combustion reactions are characterized by their rapidity, release of energy, and production of gases, which distinguishes them from other types of chemical reactions. Oxidation reactions involve the loss of electrons or an increase in oxidation state, which can happen in combustion, but not all oxidation reactions are combustion reactions. Decomposition reactions refer to the breakdown of a compound into simpler substances, while synthesis reactions involve combining simpler substances to form more complex molecules. Therefore, the specific nature of burning carbon compounds in the presence of oxygen defines it as a combustion reaction.

7. The three forms of radiation include alpha, beta, and which other type?

- A. Ultraviolet Radiation
- B. X-ray Radiation
- C. Gamma Radiation**
- D. Neutron Radiation

The correct answer is gamma radiation, which is one of the three main types of radiation emitted during radioactive decay, along with alpha and beta radiation. Gamma radiation consists of high-energy photons, which are electromagnetic waves. These photons have no mass and no charge, allowing them to penetrate materials more effectively than either alpha or beta particles. Unlike alpha particles, which are clusters of two protons and two neutrons, and beta particles, which can be electrons or positrons emitted from a nucleus, gamma rays provide a form of energy without any associated particle mass. This ability to penetrate materials makes gamma radiation particularly significant in various fields, including medical imaging and radiation therapy, as well as in nuclear science and safety. Understanding the characteristics of gamma radiation, alongside alpha and beta radiation, is crucial because it helps in grasping the broader implications of radiation in both theoretical physics and practical applications such as radiation protection measures.

8. What is the primary gas in the Earth's atmosphere?

- A. Oxygen (O₂)
- B. Carbon dioxide (CO₂)
- C. Nitrogen (N₂)**
- D. Argon (Ar)

The primary gas in the Earth's atmosphere is nitrogen (N₂), which makes up about 78% of the atmosphere by volume. Nitrogen is an inert gas, meaning it does not readily react with other substances under normal conditions, and it plays a crucial role in various biological processes. While oxygen is essential for life and constitutes about 21% of the atmosphere, nitrogen's abundance makes it the predominant component contributing to the overall composition. Carbon dioxide and argon are present in much smaller amounts, with carbon dioxide being crucial for plant photosynthesis and argon being a noble gas that has minimal chemical activity. Understanding the proportions of these gases helps explain various atmospheric processes, including the role of nitrogen in maintaining atmospheric stability and balance.

9. What does "oxidation" refer to in terms of electron transfer?

- A. The gain of electrons by a substance
- B. The loss of electrons from a substance**
- C. The transfer of protons between molecules
- D. The neutralization of a chemical reaction

Oxidation refers specifically to the loss of electrons from a substance during a chemical reaction. This process is a key part of redox (reduction-oxidation) reactions, where one species is oxidized (loses electrons) and another is reduced (gains electrons). The concept is rooted in the historical definition where the term was initially associated with the addition of oxygen to a substance, which often involved the loss of electrons. In a redox reaction, when a substance undergoes oxidation, its oxidation state increases, indicating that it has lost one or more electrons. This loss can occur in various chemical contexts, such as in combustion, respiration, and corrosion. Hence, understanding oxidation as the loss of electrons provides clarity in the study of chemical reactions involving electron transfer.

10. What describes the bond formed by attraction to a hydrogen atom by a highly electronegative element?

- A. Ionic bond
- B. Covalent bond
- C. Hydrogen bond**
- D. Polar bond

The bond formed by the attraction to a hydrogen atom by a highly electronegative element is known as a hydrogen bond. This type of bond occurs when a hydrogen atom, which is covalently bonded to an electronegative atom (such as oxygen or nitrogen), experiences a weak attraction to another electronegative atom. Hydrogen bonds are significant in many biological and chemical processes, such as the structure of water and the stability of DNA. They are typically weaker than covalent and ionic bonds but play a crucial role in determining the properties of substances and the interactions between molecules. In contrast, ionic bonds involve the transfer of electrons between atoms, leading to the formation of charged ions. Covalent bonds occur when two atoms share electrons. Polar bonds result from a difference in electronegativity between two atoms sharing electrons unequally, contributing to molecular polarity but not specifically signifying the attraction to hydrogen. Thus, hydrogen bonds uniquely describe the specific interaction involving hydrogen and electronegative elements, making this option the most accurate.

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://hesia2chemistry.examzify.com>

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

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