

HESI A2 CHEMISTRY PRACTICE TEST (SAMPLE)

STUDY GUIDE



SAMPLE STUDY GUIDE WITH LIMITED QUESTIONS

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THE FULL VERSION STUDY GUIDE**

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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 term for a substance that changes directly from solid to gas?**
 - A. Sublimation
 - B. Condensation
 - C. Evaporation
 - D. Deposition

- 2. What type of solution has a higher concentration of solute compared to another solution?**
 - A. Isotonic solution
 - B. Hypertonic solution
 - C. Hypotonic solution
 - D. Concentrated solution

- 3. What describes the emission of particles from an unstable nucleus?**
 - A. Nuclear fission
 - B. Radioactivity
 - C. Electromagnetic radiation
 - D. Chemical reaction

- 4. What is a covalent bond?**
 - A. A bond formed when two atoms gain electrons
 - B. A bond formed through the transfer of protons
 - C. A bond formed when two atoms share electrons
 - D. A bond that involves only ionic transfer

- 5. What do you call a combination of two or more pure substances?**
 - A. Solution
 - B. Mixture
 - C. Compound
 - D. Homogeneous Mixture

6. What defines a saturated solution?

- A. A solution that can dissolve more solute at a given temperature
- B. A solution that contains the maximum amount of solute that can dissolve at a given temperature
- C. A solution that does not contain any solute
- D. A solution that contains a specific concentration of solute

7. Which term refers to the decomposition of a neutron, producing high-energy electrons?

- A. Alpha Radiation
- B. Gamma Radiation
- C. Beta Radiation
- D. Radiation emission

8. What is the main difference between an alkane and an alkene?

- A. Alkenes contain only single bonds
- B. Alkanes are more reactive than alkenes
- C. Alkanes have only single bonds, while alkenes contain at least one double bond
- D. Alkenes have higher molecular weight than alkanes

9. According to the law of conservation of mass, what occurs during a chemical reaction?

- A. Mass is created
- B. Mass is transformed into energy
- C. Mass is neither created nor destroyed
- D. Mass can only be lost

10. What is the atomic number of an element?

- A. The number of electrons in the atom
- B. The number of protons in the nucleus of an atom
- C. The total number of subatomic particles
- D. The mass of the atom in atomic mass units

Answers

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

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Explanations

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1. What is the term for a substance that changes directly from solid to gas?

- A. Sublimation**
- B. Condensation
- C. Evaporation
- D. Deposition

The term for a substance that changes directly from solid to gas is sublimation. This process skips the liquid phase altogether. A common example of sublimation is dry ice, which is solid carbon dioxide; it transitions directly into carbon dioxide gas when exposed to ambient conditions. This unique phase change occurs under specific temperature and pressure conditions, allowing the substance to maintain its identity without becoming a liquid first. Sublimation is an important concept in both physical chemistry and various applications, such as freeze drying and certain types of manufacturing processes, where control over phase transitions is crucial. Understanding sublimation helps to differentiate substances based on their behavior under varying environmental conditions, making it a vital topic in chemistry studies.

2. What type of solution has a higher concentration of solute compared to another solution?

- A. Isotonic solution
- B. Hypertonic solution**
- C. Hypotonic solution
- D. Concentrated solution

A hypertonic solution is defined as a solution that has a higher concentration of solute relative to another solution, typically compared to a cell's internal environment or another solution surrounding it. In biological contexts, understanding hypertonic solutions is crucial because when cells are placed in a hypertonic solution, water will move out of the cells into the surrounding solution in order to achieve equilibrium. This movement of water can lead to cell shrinkage, also known as crenation. The importance of recognizing what constitutes a hypertonic solution lies in various applications, such as medical treatments involving intravenous solutions, where the osmotic balance can impact cellular health. It's vital for individuals studying chemistry or related fields to grasp these concepts, especially for scenarios involving osmosis and solutions' effects on living organisms. In contrast, isotonic solutions have equal solute concentrations, while hypotonic solutions have lower solute concentrations compared to the reference solution. A concentrated solution, while indicating a high amount of solute, is not necessarily in comparison to another solution; thus, it doesn't specifically address the relationship between two solutions. Understanding these distinctions helps clarify the nature and behavior of different solutions in various contexts.

3. What describes the emission of particles from an unstable nucleus?

- A. Nuclear fission
- B. Radioactivity**
- C. Electromagnetic radiation
- D. Chemical reaction

The emission of particles from an unstable nucleus is best described by radioactivity. This phenomenon occurs when unstable atomic nuclei lose energy by emitting radiation, which can involve alpha particles, beta particles, or gamma rays. Radioactive decay is a natural process that occurs in certain isotopes, leading to the transformation of one element into another or a simpler form of itself. In contrast, nuclear fission involves the splitting of a large atomic nucleus into smaller nuclei, along with the release of energy, but it specifically pertains to a reaction initiated under certain conditions rather than a general emission from an unstable nucleus. Electromagnetic radiation refers to a form of energy that travels through space as a wave and can be emitted by various processes, but it is not limited to emissions from unstable nuclei. A chemical reaction involves the rearrangement of atoms and the formation or breaking of chemical bonds, which is unrelated to nuclear processes. Hence, radioactivity is the term that accurately characterizes the specific emission of particles from unstable nuclei.

4. What is a covalent bond?

- A. A bond formed when two atoms gain electrons
- B. A bond formed through the transfer of protons
- C. A bond formed when two atoms share electrons**
- D. A bond that involves only ionic transfer

A covalent bond is characterized by the sharing of electrons between two atoms. This sharing allows each atom to attain a more stable electronic configuration, often resembling that of a noble gas. In covalent bonding, the atoms involved typically have similar electronegativities, which means they are both able to attract the shared electrons fairly equally. As a result, this kind of bond primarily occurs between nonmetals. The shared electrons help to hold the two atoms together, creating a strong bond that forms molecules, such as water (H₂O) and carbon dioxide (CO₂). The other options do not accurately describe a covalent bond. For example, gaining electrons typically refers to ionic bonds, where one atom donates an electron to another, leading to the formation of charged ions. The transfer of protons is not relevant to covalent bonding, as it pertains more to reactions involving acids and bases or certain types of chemical reactions. Lastly, the mention of only ionic transfer ignores the nature of covalent bonds, which are defined specifically by electron sharing rather than transfer. Thus, option C is the accurate description of a covalent bond.

5. What do you call a combination of two or more pure substances?

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

A combination of two or more pure substances is referred to as a mixture. Mixtures can consist of different substances that retain their individual properties and can be separated by physical means. For example, when sand and salt are combined, both the sand and salt maintain their distinct characteristics and can be filtered apart. There are two main types of mixtures: homogeneous mixtures, where the components are evenly distributed (like saltwater), and heterogeneous mixtures, where the components are not uniformly distributed (like a salad). The term "mixture" encompasses both of these categories, making it the broad term for any physical combination of substances, as opposed to a single compound, which results from a chemical reaction between elements that cannot be separated by physical means. Other terms like solution and homogeneous mixture refer to specific types of mixtures but do not cover all possible combinations of pure substances, while a compound indicates a specific chemical combination of elements that results in a substance with different properties from those of its constituent elements.

6. What defines a saturated solution?

- A. A solution that can dissolve more solute at a given temperature
- B. A solution that contains the maximum amount of solute that can dissolve at a given temperature**
- C. A solution that does not contain any solute
- D. A solution that contains a specific concentration of solute

A saturated solution is defined as one that contains the maximum amount of solute that can dissolve in a solvent at a specific temperature and pressure. This means that if more solute is added beyond this point, it will not dissolve and will instead remain as a solid, indicating that the solution has reached its saturation limit. The concept of saturation is crucial in understanding solubility, as solubility varies with temperature, meaning that a solution could become saturated at low temperatures and become unsaturated when heated, allowing more solute to dissolve. In contrast, a solution that can dissolve more solute at a given temperature would be considered unsaturated, and one that does not contain any solute would simply be a pure solvent. Furthermore, a solution with a specific concentration of solute does not necessarily indicate that it is saturated; it could be either saturated, unsaturated, or supersaturated. Thus, the defining characteristic of a saturated solution is that it has reached the maximum capacity of solute for the given conditions.

7. Which term refers to the decomposition of a neutron, producing high-energy electrons?

- A. Alpha Radiation
- B. Gamma Radiation
- C. Beta Radiation**
- D. Radiation emission

The correct answer is beta radiation, which is characterized by the process where a neutron decays into a proton while emitting a high-energy electron, known as a beta particle. This transformation involves the weak nuclear force and is a common form of radioactive decay. In beta radiation, the emitted high-energy electron carries significant energy, allowing it to penetrate various materials to some degree, unlike alpha particles which have low penetration power due to their larger mass and positive charge. In contrast, gamma radiation involves the emission of high-energy photons, not particles like electrons or protons, while radiation emission is a broader term that does not specify the type of decay or radiation involved. Alpha radiation pertains to the release of helium nuclei, which is a different process from the neutron decomposition described in the question. Understanding these distinctions highlights how beta radiation specifically involves the decomposition of a neutron to produce high-energy electrons.

8. What is the main difference between an alkane and an alkene?

- A. Alkenes contain only single bonds
- B. Alkanes are more reactive than alkenes
- C. Alkanes have only single bonds, while alkenes contain at least one double bond**
- D. Alkenes have higher molecular weight than alkanes

The main difference between an alkane and an alkene lies in their bonding structure. Alkanes are saturated hydrocarbons, meaning they consist solely of single bonds between carbon atoms. This structure allows them to have the maximum number of hydrogen atoms per carbon atom. In contrast, alkenes are unsaturated hydrocarbons and contain at least one double bond between carbon atoms. This double bond reduces the number of hydrogen atoms that can bond to the carbon atoms, making alkenes generally more reactive than alkanes. The presence of this double bond is significant because it allows alkenes to participate in various chemical reactions, such as addition reactions, that alkanes cannot undergo due to their single bond structure. Other aspects, such as molecular weight, are not the primary distinctions between these two classes of compounds, which is why they do not represent the main difference. The core characteristic that sets them apart is indeed the presence of double bonds in alkenes and only single bonds in alkanes, confirming the accuracy of the chosen answer.

9. According to the law of conservation of mass, what occurs during a chemical reaction?

- A. Mass is created
- B. Mass is transformed into energy
- C. Mass is neither created nor destroyed**
- D. Mass can only be lost

During a chemical reaction, the law of conservation of mass states that mass is neither created nor destroyed. This fundamental principle means that the total mass of the reactants before the reaction occurs will be equal to the total mass of the products after the reaction has taken place. Atoms are simply rearranged to form new substances, but the total number of atoms and the total mass remains constant throughout the process. This principle is pivotal in understanding chemical equations and reactions, as it highlights the importance of balancing equations to reflect the conservation of mass. For instance, in a balanced chemical reaction, each type of atom must appear in equal quantities on both sides of the equation, demonstrating that while substances change form, the overall mass remains constant. This concept is foundational in chemistry and is applicable to various scientific and real-world contexts concerning reactions and their products.

10. What is the atomic number of an element?

- A. The number of electrons in the atom
- B. The number of protons in the nucleus of an atom**
- C. The total number of subatomic particles
- D. The mass of the atom in atomic mass units

The atomic number of an element is defined as the number of protons present in the nucleus of an atom. This fundamental property not only identifies the element but also determines its position on the periodic table. Each element has a unique atomic number, which serves as the basis for the organization of the periodic table. For example, the atomic number for hydrogen is 1, meaning that every hydrogen atom has one proton. This characteristic is critical because it also indicates the number of electrons in a neutral atom, thereby influencing the chemical behavior and properties of the element. The atomic number plays a vital role in determining how atoms interact and bond with one another to form molecules, impacting various aspects of chemistry, including reactions and compounds. In contrast, the other options do not accurately reflect the definition of atomic number. The number of electrons refers to electron configuration in neutral atoms, total subatomic particles would include protons and neutrons, and mass in atomic mass units relates to the overall mass rather than the identifying number of protons.

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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