# TEXAS A&M UNIVERSITY (TAMU) CHEM107 GENERAL CHEMISTRY FOR ENGINEERING STUDENTS EXAM 2 PRACTICE (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 does the principal quantum number (n) signify in an atom?**

A. Energy level of electron

B. Shape of the orbital

C. Magnetic orientation

D. Type of atomic bond

**2. In thermodynamics, which equation is utilized for calculating changes in state variables?**

A. PV = nRT

B. DRC = PMW

C. 3/2 * k * T

D. PV/T = constant

**3. What analogy is used to explain bonding energy?**

A. A loan for a car

B. Bail money for a friend

C. The cost of admission to a concert

D. The price of a flight ticket

**4. What is the Speed of Light equation?**

A. c = wavelength + frequency

B. c = wavelength / frequency

C. c = wavelength * frequency

D. c = frequency - wavelength

**5. What is the term for the mass of one mole of a substance?**

A. Atomic weight

B. Molar mass

C. Formular mass

D. Gravitational mass

**6. Which of the following best defines a cation?**

A. A positively charged ion

B. A negatively charged ion

C. An atom with an uneven number of neutrons

D. A neutral molecule

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**7. If two gases are at the same temperature, which of the following statements is true regarding their molecular speeds?**

A. Molecules with higher molecular weight have higher speed

B. Molecules with lower molecular weight have higher speed

C. All gas molecules have equal speed

D. Molecules speed is independent of temperature

**8. What are intermolecular forces?**

A. Forces that determine the boiling point of a solvent

B. Forces of attraction or repulsion between neighboring particles

C. Forces that occur only during chemical reactions

D. Forces affecting the density of a substance

**9. What does Le Chatelier's principle explain?**

A. If equilibrium is disturbed, the system will shift to counteract the change

B. The rate of a reaction is constant at equilibrium

C. The effect of temperature change on the solubility of solids

D. The relationship between concentration and vapor pressure

**10. What atomic characteristic is often associated with paramagnetic materials?**

A. Complete electron pairs

B. Presence of unpaired electrons

C. Inert electron configuration

D. High density

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# Answers

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

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# Explanations

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## 1. What does the principal quantum number (n) signify in an atom?

A. Energy level of electron

B. Shape of the orbital

C. Magnetic orientation

D. Type of atomic bond

*The principal quantum number, denoted as \( n \), signifies the energy level of an electron in an atom. It indicates the relative distance of an electron from the nucleus and the overall size of the electron cloud surrounding the nucleus. Higher values of \( n \) correspond to higher energy levels, meaning that the electron is likely to be found further away from the nucleus. In the context of atomic structure, as \( n \) increases, the energy gap between the levels also generally increases, which reflects the increasing potential energy of the electron. This quantum number is crucial for determining the energy distribution of electrons within an atom and plays a significant role in defining the electronic structure of elements. The other options pertain to different quantum characteristics. The shape of the orbital is represented by the angular momentum quantum number, magnetic orientation by the magnetic quantum number, and atomic bond types are defined by the nature of the interactions between atoms, which are unrelated to the designation of energy levels. Thus, understanding the role of the principal quantum number enhances the comprehension of atomic behavior and electron configuration.*

## 2. In thermodynamics, which equation is utilized for calculating changes in state variables?

A. PV = nRT

B. DRC = PMW

C. 3/2 * k * T

D. PV/T = constant

*The equation used for calculating changes in state variables, particularly in the context of ideal gases, is the equation of state represented by PV = nRT. This equation connects pressure (P), volume (V), temperature (T), and the number of moles of gas (n) through the ideal gas constant (R). This relationship allows you to derive various state variables under different conditions by rearranging the equation. For instance, if you know the initial state of a gas (P1, V1, T1) and some final state (P2, V2, T2), you can analyze how changes in one variable affect the others by using this equation. In contrast, the other options listed do not adequately describe the calculation of changes in state variables in a straightforward manner. For example, the second option does not have a standard connection to state variables, and while the third option relates to kinetic energy and temperature, it is not focused on the state changes of gases. The fourth option, while hinting at a principle of thermodynamics concerning the relationship of pressure, volume, and temperature, is more specific to isothermal processes rather than general state variable changes. Thus, PV = nRT stands out as the most comprehensive and applicable equation for*

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## 3. What analogy is used to explain bonding energy?

A. A loan for a car

B. Bail money for a friend

C. The cost of admission to a concert

D. The price of a flight ticket

*The analogy of bail money for a friend effectively illustrates bonding energy by highlighting the concept of investment in a relationship, akin to the investment energy required to form a chemical bond. Just as bail money represents a form of commitment to secure a friend's temporary freedom, bonding energy reflects the amount of energy needed to bring two atoms together to form a stable bond. In this analogy, if the situation is favorable (the atoms are close enough to bond), the energy can be seen as a "cost" necessary for stability. When the bond is formed, energy is released, similar to how a friend might feel grateful or relieved when they are bailed out, which represents a release of energy in this context. This comparison helps clarify the concept of bonding energy as a measure of stability and the energy changes associated with the formation and breaking of bonds between atoms. Other choices, while they involve monetary transactions or costs, do not capture the essence of the commitment and energy investment involved in chemical bonding as effectively as the bail money analogy.*

## 4. What is the Speed of Light equation?

A. c = wavelength + frequency

B. c = wavelength / frequency

C. c = wavelength * frequency

D. c = frequency - wavelength

*The Speed of Light equation describes the relationship between the speed of light, its wavelength, and its frequency. The correct equation is expressed as c = wavelength * frequency, where 'c' represents the speed of light in a vacuum, 'wavelength' denotes the distance between successive crests of a wave, and 'frequency' refers to how many wave cycles occur per unit time. This equation is fundamental to understanding wave phenomena, including electromagnetic waves such as light. By recognizing that the speed of light is constant in a vacuum, this relationship demonstrates that as the wavelength increases, the frequency must decrease in order to maintain the equality. Conversely, if the frequency increases, the wavelength must decrease. The other options do not correctly represent the relationship between these terms. The first option incorrectly uses addition, while the second option inverts the multiplication necessary for the relationship. The last option suggests a subtraction operation that does not apply in this context, as speed, wavelength, and frequency are multiplicative rather than additive or subtractive. Understanding this multiplication aspect is crucial for solving many physics and chemistry problems relating to wave behavior.*

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## 5. What is the term for the mass of one mole of a substance?

A. Atomic weight

B. Molar mass

C. Formular mass

D. Gravitational mass

*The term for the mass of one mole of a substance is referred to as molar mass. Molar mass is defined as the mass of one mole of a given substance, typically expressed in grams per mole (g/mol). It is an important concept in chemistry because it allows chemists to convert between the mass of a substance and the number of moles, facilitating stoichiometric calculations in chemical reactions. Molar mass is calculated by summing the atomic weights of the individual elements in a compound, each multiplied by the number of times that element appears in the formula. This concept is essential for understanding the relationships between mass and quantity in chemical substances. In contrast, atomic weight refers specifically to the weighted average mass of the isotopes of an element and is dimensionless. Formula mass is a similar concept, usually used when referring to ionic compounds or the mass of a molecular formula but typically does not focus on the quantity associated with one mole. Gravitational mass is a concept relating to the gravitational force an object experiences and is not relevant to the mass of substances in chemical terms.*

## 6. Which of the following best defines a cation?

A. A positively charged ion

B. A negatively charged ion

C. An atom with an uneven number of neutrons

D. A neutral molecule

*A cation is best defined as a positively charged ion. This occurs when an atom or molecule loses one or more electrons, resulting in a net positive charge due to the imbalance between the number of protons (positively charged) and electrons (negatively charged). When an atom loses electrons, it becomes a cation because the loss of negatively charged particles increases the overall positive charge of the atom. Cations play a critical role in various chemical reactions and are important in fields such as electrochemistry and biochemistry. In contrast, a negatively charged ion would be identified as an anion, which is formed when an atom gains electrons. Options regarding an uneven number of neutrons pertain to isotopes, and a neutral molecule has no overall charge, which does not align with the definition of a cation. Therefore, identifying a cation as a positively charged ion is foundational to understanding ionic behavior in chemical processes.*

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## 7. If two gases are at the same temperature, which of the following statements is true regarding their molecular speeds?

A. Molecules with higher molecular weight have higher speed

B. Molecules with lower molecular weight have higher speed

C. All gas molecules have equal speed

D. Molecules speed is independent of temperature

*At the same temperature, the average kinetic energy of gas molecules is equal, regardless of their molecular weights. The kinetic energy for a gas molecule can be expressed using the equation $KE = \frac{1}{2}mv^2$, where $m$ is the mass of the molecule and $v$ is its speed. Since the temperature is related to the average kinetic energy, if we consider molecules with different weights, lighter molecules will move faster to maintain the same average kinetic energy as heavier molecules. In this context, a gas molecule with a lower molecular weight is indeed able to achieve a higher speed than a gas molecule with a higher molecular weight at the same temperature. This relationship can also be understood through the derived root-mean-square speed formula, $v_{rms} = \sqrt{\frac{3RT}{M}}$, where $R$ is the universal gas constant, $T$ is the temperature in Kelvin, and $M$ is the molar mass. The equation clearly indicates that as the molar mass $M$ increases, the root-mean-square speed decreases, reinforcing the idea that lighter molecules travel faster.*

## 8. What are intermolecular forces?

A. Forces that determine the boiling point of a solvent

B. Forces of attraction or repulsion between neighboring particles

C. Forces that occur only during chemical reactions

D. Forces affecting the density of a substance

*Intermolecular forces are indeed the forces of attraction or repulsion that occur between neighboring particles, which can include atoms, molecules, or ions. These forces play a crucial role in determining the physical properties of substances, such as boiling points, melting points, and solubility. Understanding these forces helps explain phenomena like why some substances are liquids at room temperature while others are gases or solids. For instance, stronger intermolecular forces generally lead to higher boiling points because more energy is required to overcome these forces to convert a liquid into a gas. These forces include hydrogen bonding, dipole-dipole interactions, and London dispersion forces, all of which have different strengths and impacts on the behavior of substances. In contrast, the other options provided do not accurately define intermolecular forces. While these forces can influence boiling points and densities, they are not limited to a specific action or condition, such as being present only during chemical reactions or affecting density directly without considering the nature of the materials involved. Thus, the clarity and accuracy of defining intermolecular forces as attraction or repulsion between neighboring particles is what makes this choice correct.*

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## 9. What does Le Chatelier's principle explain?

A. If equilibrium is disturbed, the system will shift to counteract the change

B. The rate of a reaction is constant at equilibrium

C. The effect of temperature change on the solubility of solids

D. The relationship between concentration and vapor pressure

*Le Chatelier's principle states that if a dynamic equilibrium is disturbed by changing the conditions, the position of equilibrium shifts to counteract that change and restore a new equilibrium. This principle applies to changes in concentration, temperature, and pressure involving a system at equilibrium. For instance, if the concentration of a reactant in a chemical reaction at equilibrium is increased, the system will respond by shifting the equilibrium position toward the products to reduce the concentration of the added reactant. Similarly, if a change in temperature occurs, the system will favor the endothermic or exothermic direction to either absorb or release heat, thus attempting to maintain equilibrium. The other options, while related to equilibrium and chemical reactions, do not encapsulate the essence of Le Chatelier's principle. For example, while it is true that the rate of a reaction is constant at equilibrium, this statement does not describe how a system responds to disturbance. The effects of temperature on solubility and the relationship between concentration and vapor pressure are distinct concepts and do not directly relate to the shifts in equilibrium as outlined by Le Chatelier's principle.*

## 10. What atomic characteristic is often associated with paramagnetic materials?

A. Complete electron pairs

B. Presence of unpaired electrons

C. Inert electron configuration

D. High density

*Paramagnetic materials are characterized by their presence of unpaired electrons. When an atom or ion has unpaired electrons, it exhibits a magnetic moment due to the intrinsic angular momentum and spin of these electrons. This magnetic moment allows the material to be attracted to an external magnetic field. In contrast, materials that have all their electrons paired are typically diamagnetic and do not have significant magnetic properties. The unpaired electrons in paramagnetic substances can align with an external magnetic field, causing the material to exhibit paramagnetism. This property is crucial for understanding the magnetic behavior of various substances in both chemistry and materials science contexts. The other characteristics mentioned are associated with different properties: complete electron pairs indicate a lack of paramagnetism; an inert electron configuration generally refers to noble gases that are non-reactive and do not display magnetic properties; high density is a physical characteristic that does not inherently relate to a material's magnetic behavior.*

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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:

https://tamu-chem107exam2.examzify.com

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

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