

# DIVE Chemistry Quarterly Exam 1 Practice (Sample)

## Study Guide



**Everything you need from our exam experts!**

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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. In a line spectrum, what is represented?**
  - A. All colors blended**
  - B. Continuous range**
  - C. Specific frequencies of light**
  - D. Random frequencies**
  
- 2. What happens to the particles of a substance during condensation?**
  - A. They move freely and expand.**
  - B. They lose energy and get closer together.**
  - C. They move rapidly and gain energy.**
  - D. They transition from solid to liquid.**
  
- 3. In scientific experiments, what is the purpose of a treatment?**
  - A. To provide a control factor**
  - B. To manipulate the independent variable**
  - C. To observe dependent changes**
  - D. To establish a hypothesis**
  
- 4. What principle states that two electrons in the same orbital must have opposing spins?**
  - A. Hund's rule**
  - B. Pauli exclusion principle**
  - C. Aufbau principle**
  - D. Heisenberg uncertainty principle**
  
- 5. Which term refers to the number of protons in an atom and is constant for that element?**
  - A. Mass number**
  - B. Atomic number**
  - C. Isotope**
  - D. Ionic charge**

6. Which term describes the degree of closeness between a measured value and its actual value?

- A. Precision
- B. Accuracy
- C. Reliability
- D. Consistency

7. Which periodic table uses different A and B designations and labels families differently compared to the North American Convention?

- A. Traditional Periodic Table
- B. IUPAC Periodic Table
- C. European Convention Periodic Table
- D. North American Convention Periodic Table

8. What is an ion called when it carries a positive charge?

- A. Ion
- B. Neutral atom
- C. Anion
- D. Cation

9. Which property describes the ability of a substance to undergo a chemical reaction?

- A. Solubility
- B. Reactivity
- C. Density
- D. Conductivity

10. As you move from left to right across a period in the periodic table, how do electron affinity values typically change?

- A. They decrease
- B. They remain constant
- C. They increase
- D. They fluctuate randomly

## **Answers**

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

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## **Explanations**

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**1. In a line spectrum, what is represented?**

- A. All colors blended**
- B. Continuous range**
- C. Specific frequencies of light**
- D. Random frequencies**

In a line spectrum, specific frequencies of light are represented, which correspond to particular wavelengths emitted or absorbed by substances as they transition between different energy levels. Each line in the spectrum corresponds to a distinct energy transition of electrons within an atom or molecule. These transitions occur when an electron absorbs energy and moves to a higher energy level, or releases energy when returning to a lower energy state. As a result, the emitted or absorbed light creates sharp lines at specific frequencies or wavelengths, rather than a continuous spectrum. This characteristic of line spectra allows scientists to identify elements and compounds based on the unique patterns of light they emit or absorb, making it an invaluable tool in fields such as spectroscopy and astrophysics for understanding the composition of distant stars and other celestial bodies.

**2. What happens to the particles of a substance during condensation?**

- A. They move freely and expand.**
- B. They lose energy and get closer together.**
- C. They move rapidly and gain energy.**
- D. They transition from solid to liquid.**

During condensation, particles lose energy as the substance transitions from a gas to a liquid. This loss of energy reduces the kinetic energy of the particles, causing them to slow down and come closer together. As a result, the arrangement of the particles becomes more ordered compared to their gaseous state, which is characterized by greater movement and separation. In contrast, the other processes described in the incorrect choices depict different states of matter or processes that do not align with the behavior of particles during condensation. For instance, the movement of particles that freely expands or transitions rapidly does not occur during condensation, as the process specifically involves a decrease in energy and a move towards a more compact arrangement. Additionally, transitioning from solid to liquid refers to melting, which is a distinct phase change involving different conditions and energy dynamics. Overall, the behavior of particles that lose energy and get closer together is the defining characteristic of condensation.

**3. In scientific experiments, what is the purpose of a treatment?**

- A. To provide a control factor**
- B. To manipulate the independent variable**
- C. To observe dependent changes**
- D. To establish a hypothesis**

The purpose of a treatment in scientific experiments is to manipulate the independent variable, which is vital for testing the effects on the dependent variable. Treatments are specific conditions or interventions applied to experimental subjects to observe how these changes impact the outcome of the study. By systematically altering the independent variable, researchers can gather data on how it affects various responses, helping to establish cause-and-effect relationships. For instance, if a scientist is studying the effect of sunlight on plant growth, different amounts of sunlight provided to different groups of plants would represent various treatments. This manipulation allows for direct observation of how changes in one variable influence another, leading to more precise conclusions. In contrast, the control factor acts as a baseline for comparison but does not itself involve a treatment. Observing dependent changes refers to the outcomes that result from the treatments applied, and establishing a hypothesis is part of the preliminary research process rather than a direct manipulation during the experiment.

**4. What principle states that two electrons in the same orbital must have opposing spins?**

- A. Hund's rule**
- B. Pauli exclusion principle**
- C. Aufbau principle**
- D. Heisenberg uncertainty principle**

The principle stating that two electrons in the same orbital must have opposing spins is the Pauli exclusion principle. This fundamental concept in quantum mechanics highlights that no two electrons in an atom can have the same set of four quantum numbers, which inherently includes their spin. In any given orbital, which can hold a maximum of two electrons, the spins of these electrons must differ; one will have a spin value of  $+1/2$  and the other  $-1/2$ . This requirement arises from the fermionic nature of electrons, which are classified as fermions, meaning they obey the Pauli exclusion principle and cannot occupy the same quantum state. In contrast, Hund's rule states that electrons will fill degenerate orbitals (orbitals of the same energy) singly, with the same spin, before pairing up. The Aufbau principle concerns the order in which electrons fill orbitals based on increasing energy levels. The Heisenberg uncertainty principle addresses the limits of measuring the position and momentum of particles, stating that they cannot be precisely determined simultaneously. These concepts, while significant in the framework of quantum mechanics and atomic structure, do not pertain specifically to the requirement of opposing spins in a single orbital.

**5. Which term refers to the number of protons in an atom and is constant for that element?**

- A. Mass number**
- B. Atomic number**
- C. Isotope**
- D. Ionic charge**

The term that refers to the number of protons in an atom, which remains constant for a specific element, is the atomic number. Each element on the periodic table is defined by its atomic number, and it uniquely identifies the element. For example, all carbon atoms have an atomic number of 6, meaning they each have 6 protons in their nuclei. This consistency in the number of protons is fundamental because it determines the element's chemical properties and its place in the periodic table. In contrast, mass number refers to the total number of protons and neutrons in an atom's nucleus, which can vary among isotopes of the same element. An isotope specifically refers to variants of the same element that have the same number of protons but different numbers of neutrons, resulting in different mass numbers. Ionic charge relates to the net electrical charge of an atom after it has gained or lost electrons, and is not constant for a given element, as it can vary based on the atom's ionization state.

**6. Which term describes the degree of closeness between a measured value and its actual value?**

- A. Precision**
- B. Accuracy**
- C. Reliability**
- D. Consistency**

The term that describes the degree of closeness between a measured value and its actual value is accuracy. Accuracy reflects how close a measured result is to the true or accepted value. In scientific measurements, achieving high accuracy means that the results align closely with the true value, which is crucial for validating experimental outcomes and ensuring that conclusions drawn from data are sound. Precision, on the other hand, refers to the repeatability of measurements — that is, how consistently you can obtain the same value under the same conditions, regardless of whether that value is close to the true value. Reliability entails the consistency of a test or measurement across different trials or instances, while consistency focuses on the uniformity of results over time or across different measurements. Understanding these distinctions is essential in scientific practices, as ensuring both accuracy and precision is critical for obtaining valid and trustworthy data.

**7. Which periodic table uses different A and B designations and labels families differently compared to the North American Convention?**

- A. Traditional Periodic Table**
- B. IUPAC Periodic Table**
- C. European Convention Periodic Table**
- D. North American Convention Periodic Table**

The European Convention Periodic Table distinguishes itself by utilizing different A and B designations for the groups, which is not aligned with the North American Convention that employs a simple numbering system. In the European approach, the A groups typically include the main group elements, while the B groups correspond to transition metals. Additionally, the way families (or groups) are labeled in the European Convention may differ in terminology and categorization compared to how they are represented in North American contexts. This unique classification helps in the identification and study of different elemental behaviors and trends across various groups. Understanding these differences is crucial for anyone studying periodic trends and properties in chemistry from various global perspectives.

**8. What is an ion called when it carries a positive charge?**

- A. Ion**
- B. Neutral atom**
- C. Anion**
- D. Cation**

An ion that carries a positive charge is specifically termed a cation. This is because cations are formed 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 (which are positively charged) and electrons (which are negatively charged). The loss of negatively charged electrons leaves more protons than electrons, creating a positively charged ion. In contrast, anion refers to a negatively charged ion, which forms when electrons are gained. Neutral atoms, on the other hand, have an equal number of protons and electrons, thus having no overall charge. The general term "ion" encompasses both cations and anions, but it does not specify the charge. Therefore, the correct designation for a positively charged ion is cation.

**9. Which property describes the ability of a substance to undergo a chemical reaction?**

- A. Solubility**
- B. Reactivity**
- C. Density**
- D. Conductivity**

The property that describes the ability of a substance to undergo a chemical reaction is reactivity. Reactivity refers to how easily a substance can participate in chemical changes and interact with other substances to form new products. This can involve various types of chemical reactions, such as combustion, oxidation, or acid-base reactions. In contrast, solubility measures how well a substance dissolves in a solvent, density refers to the mass per unit volume of a substance, and conductivity indicates the ability of a substance to conduct electricity. While these properties are important in chemistry and can influence how substances behave, they do not directly describe the potential for a substance to engage in chemical reactions like reactivity does.

**10. As you move from left to right across a period in the periodic table, how do electron affinity values typically change?**

- A. They decrease**
- B. They remain constant**
- C. They increase**
- D. They fluctuate randomly**

As you move from left to right across a period in the periodic table, electron affinity values typically increase. This trend occurs due to the increasing nuclear charge that results from additional protons in the nucleus. As the effective nuclear charge increases, atoms have a stronger attraction for electrons. Consequently, the energy released when an electron is added to an atom—the definition of electron affinity—increases. For example, elements on the left side of a period, such as alkali metals, have a relatively low electron affinity as they are more inclined to lose an electron than gain one. In contrast, elements on the right side of a period, particularly the halogens, have a high electron affinity because they are more energetically favoring acquiring an electron to achieve a full valence shell, leading to a more stable electron configuration. This increasing trend is consistent across most periods in the periodic table, making it a reliable rule of thumb for understanding the behavior of elements as one moves from left to right.

# 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](mailto:hello@examzify.com).**

**Or visit your dedicated course page for more study tools and resources:**

**<https://divechemquarterly1.examzify.com>**

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

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