# CHEMISTRY CFE PRACTICE TEST (SAMPLE)

## STUDY GUIDE

## SAMPLE STUDY GUIDE WITH LIMITED QUESTIONS

**VISIT US ONLINE FOR THE FULL VERSION STUDY GUIDE**

https://chemistrycfe.examzify.com

# Table of Contents

# 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

**1. Which set of quantum numbers describes electron orbitals, and what does each indicate?**

A. n, l, m_s, m_l; energy level, subshell shape, orbital orientation, and electron spin.

B. k, l, m_l, s; energy level, subshell shape, orbital orientation, and spin.

C. n, l, m_l, m_s; energy level, subshell shape, orbital orientation, and electron spin.

D. n, l, m_l; energy level, subshell shape, and orbital orientation.

**2. Actual yield is**

A. The theoretical yield

B. The predicted yield from a calculation

C. The amount of product obtained from an experiment

D. The mass of unreacted reactants

**3. Valence electrons are electrons located in which region?**

A. Core electrons

B. Neutrons

C. Outermost energy level

D. Nuclear shell

**4. In the isotopes Potassium-39 and Potassium-40, which quantity is different between the two?**

A. Protons

B. Electrons

C. Neutrons

D. Mass number

**5. What does Ksp stand for?**

A. The solubility product; the product of ion concentrations at saturation.

B. The sum of ion concentrations at saturation.

C. The rate constant for precipitation.

D. The equilibrium constant for gas dissolution.

**6. Which orbital holds 6 electrons at maximum occupancy?**

A. S orbital

B. P orbital

C. D orbital

D. F orbital

**7. Which statement correctly describes electron transfer in ionic bonding?**

A. Electrons are equally shared between two nonmetals

B. Electrons are donated from nonmetal to metal

C. Electrons are transferred from metal to nonmetal

D. Electrons are not involved in the bond

**8. How many electrons can a p subshell hold at most?**

A. 2

B. 6

C. 10

D. 14

**9. Wavelength and Energy are related in what way?**

A. Inversely related

B. Directly related

C. Not related

D. They are independent

**10. How can you determine the percent yield of a reaction?**

A. Percent yield is defined as actual yield divided by theoretical yield, multiplied by 10.

B. Percent yield is defined as the theoretical yield divided by the actual yield, multiplied by 100.

C. Percent yield is defined as the actual yield minus the theoretical yield (absolute value) multiplied by 100.

D. Percent yield is defined as (Actual yield / Theoretical yield) × 100%.

# Answers

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

# Explanations

## 1. Which set of quantum numbers describes electron orbitals, and what does each indicate?

A. n, l, m_s, m_l; energy level, subshell shape, orbital orientation, and electron spin.

B. k, l, m_l, s; energy level, subshell shape, orbital orientation, and spin.

C. n, l, m_l, m_s; energy level, subshell shape, orbital orientation, and electron spin.

D. n, l, m_l; energy level, subshell shape, and orbital orientation.

*The four quantum numbers n, l, m_l, m_s specify an electron's state in an atom. n determines the energy level and roughly the size of the orbital. l identifies the subshell type and the orbital's shape (0 for s, 1 for p, 2 for d, 3 for f). m_l gives the orbital's orientation in space within that subshell, with values from -l to +l. m_s describes the electron's intrinsic spin direction, with possible values of +1/2 or -1/2. Together, these four numbers uniquely describe the orbital and the spin state of the electron. This set uses the standard symbols and order, corresponding to energy level, subshell shape, orbital orientation, and electron spin. Other options either replace n with an unfamiliar symbol, omit the spin quantum number, or position the spin value before the orbital orientation, which does not align with how these quantum numbers are defined.*

## 2. Actual yield is

A. The theoretical yield

B. The predicted yield from a calculation

C. The amount of product obtained from an experiment

D. The mass of unreacted reactants

*Actual yield is the amount of product you actually obtain from a reaction run in the lab. Theoretical yield is the maximum amount that could be formed from the given reactants, calculated by stoichiometry assuming the reaction goes to completion with no losses. A predicted yield from a calculation usually refers to that theoretical amount, not what you recover in reality. Leftover reactants represent what you didn't convert into product, not the yield itself. In real experiments, the actual yield is often lower than the theoretical yield due to incomplete reactions, side reactions, and losses during purification or transfer. To assess efficiency, you compare actual yield to theoretical yield using percent yield = (actual yield / theoretical yield) × 100%.*

## 3. Valence electrons are electrons located in which region?

A. Core electrons

B. Neutrons

C. Outermost energy level

D. Nuclear shell

*Valence electrons are the electrons in the outermost energy level of an atom. They sit farthest from the nucleus and are the ones most readily involved in bonding, so they largely determine an element's chemical properties. Inner, or core, electrons stay closer to the nucleus and don't participate in bonding to the same extent. Neutrons are not electrons at all; they reside in the nucleus and don't affect chemical bonding. The outermost energy level, or highest principal quantum number shell, is where these valence electrons live, and that's why this region is key to reactivity. For example, sodium has one valence electron in its outer shell, while chlorine has seven, which helps explain their tendency to form NaCl.*

## 4. In the isotopes Potassium-39 and Potassium-40, which quantity is different between the two?

A. Protons

B. Electrons

C. Neutrons

D. Mass number

*Isotopes differ in the number of neutrons while keeping the same number of protons. Potassium has 19 protons, so a neutral potassium atom also has 19 electrons. The two isotopes shown have mass numbers 39 and 40, which means their neutron counts are 39 − 19 = 20 and 40 − 19 = 21, respectively. Therefore, the quantity that differs is the number of neutrons. Since neutrons change, the mass number also changes, but the defining difference between isotopes is the neutron count.*

## 5. What does Ksp stand for?

A. The solubility product; the product of ion concentrations at saturation.

B. The sum of ion concentrations at saturation.

C. The rate constant for precipitation.

D. The equilibrium constant for gas dissolution.

*Ksp is the solubility product constant for a sparingly soluble salt, representing the equilibrium condition when the solid is present and the solution is saturated. For a dissolution like MX(s) M+(aq) + X−(aq), Ksp = [M+][X−]. More generally, for a salt with stoichiometry aA^(n+) + bB^(m−) ... the Ksp is the product of the ion concentrations raised to their coefficients, evaluated at saturation. This product is constant at a given temperature, reflecting the balance between dissolution and precipitation. The concept here is that the dissolved ion concentrations settle to fixed values that satisfy this product, regardless of how much solid remains or is consumed, as long as the system is at equilibrium. So the statement that Ksp is the product of ion concentrations at saturation captures the essence: it's the equilibrium constant for the dissolution process, not a simple sum of concentrations, not a rate constant for precipitation, and not a constant for gas dissolution.*

## 6. Which orbital holds 6 electrons at maximum occupancy?

A. S orbital

B. P orbital

C. D orbital

D. F orbital

*Occupancy limits for orbitals come from how many distinct orbitals exist in each subshell. An s subshell has one orbital, so it can hold 2 electrons. A p subshell has three degenerate orbitals (px, py, pz); each can hold 2 electrons, giving a total of 6. A d subshell has five orbitals (total 10), and an f subshell has seven orbitals (total 14). Therefore, the maximum occupancy of 6 electrons is achieved by the p subshell, which can accommodate six electrons in total.*

## 7. Which statement correctly describes electron transfer in ionic bonding?

A. Electrons are equally shared between two nonmetals

B. Electrons are donated from nonmetal to metal

C. Electrons are transferred from metal to nonmetal

D. Electrons are not involved in the bond

*In ionic bonding, electron transfer from a metal to a nonmetal is what holds the compound together. Metals have low ionization energy and readily lose electrons to form positive ions, while nonmetals have high electron affinity and gain electrons to complete their valence shells, becoming negative ions. Once these oppositely charged ions are created, they attract each other strongly through electrostatic forces, forming the ionic bond and typically a solid lattice. This mechanism is distinct from covalent bonding, where electrons are shared rather than transferred, and it's not accurate to say electrons aren't involved at all. A classic example is sodium chloride, where sodium donates an electron to chlorine, producing Na+ and Cl− that stay bound by ionic attraction.*

## 8. How many electrons can a p subshell hold at most?

A. 2

B. 6

C. 10

D. 14

*In a p subshell there are three orbitals (px, py, pz), corresponding to ml values of -1, 0, and +1. Each orbital can hold two electrons with opposite spins, so the total capacity is 3 × 2 = 6. Therefore, a p subshell can hold at most six electrons. (For contrast, s holds 2, d holds 10, f holds 14, following 2(2l+1).)*

## 9. Wavelength and Energy are related in what way?

A. Inversely related

B. Directly related

C. Not related

D. They are independent

*The key idea is that energy per photon is inversely related to wavelength. In quantum terms, a photon carries energy E = hv, where h is Planck's constant and v is the frequency. Since light's speed is c = vλ, the frequency is v = c/λ. Substituting gives E = h c / λ. This means shorter wavelengths correspond to higher energy per photon, and longer wavelengths correspond to lower energy per photon. For example, blue light (shorter wavelength) has more energetic photons than red light (longer wavelength). The inverse relationship here is fundamental for photons, even though the total energy of a beam also depends on how many photons are present.*

## 10. How can you determine the percent yield of a reaction?

A. Percent yield is defined as actual yield divided by theoretical yield, multiplied by 10.

B. Percent yield is defined as the theoretical yield divided by the actual yield, multiplied by 100.

C. Percent yield is defined as the actual yield minus the theoretical yield (absolute value) multiplied by 100.

D. Percent yield is defined as (Actual yield / Theoretical yield) × 100%.

*Percent yield tells you how efficient a reaction was by comparing the actual amount of product you recovered to the theoretical maximum predicted by stoichiometry. To determine it, you need the actual yield (the mass or moles of product you isolated after purification) and the theoretical yield (the amount of product predicted from the balanced equation using the limiting reagent). Convert the starting amounts to moles, identify which reactant limits the product, and then convert that amount of product to the same units as your actual yield. The percent yield is (actual yield ÷ theoretical yield) × 100%. For example, if the theoretical yield is 2.0 g and you actually obtain 1.5 g, the percent yield is 75%. Values are usually below 100%, though a value over 100% can indicate impurities or measurement errors.*

# 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://chemistrycfe.examzify.com

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