NANTEL CHEMISTRY CERTIFICATION – ENGINEERING FUNDAMENTALS PRACTICE TEST (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.

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 term describes impurity sources such as leaks, foreign materials, and corrosion products entering a system?

A. Ion Exchangers

B. Impurity

C. Impurity sources

D. Water quality equilibrium

2. How can you identify an electrolyte from a compound's behavior?

A. Does not conduct electricity in any state.

B. Conducts electricity in aqueous solution or when melted; ionic compounds and strong acids/bases are electrolytes.

C. Only melts conduct electricity but not in solution.

D. Aqueous solutions always conduct electricity, regardless of solute.

3. Which statement best describes covalent compounds?

A. They generally have high melting points and conduct electricity when melted.

B. They typically have lower melting points and do not conduct electricity in solution or melt.

C. They ionize completely in water to form electrolytes.

D. They always have high melting points and do not conduct electricity in molten form.

4. Which statement correctly contrasts ionic and covalent bonds?

A. Ionic bonds result from a complete transfer of electrons between atoms, forming ions that attract each other.

B. Covalent bonds involve the transfer of electrons to form charged ions.

C. Ionic bonds involve sharing electron pairs between atoms.

D. Covalent bonds produce lattice structures with high melting points.

5. Which items are commonly used as personal protective equipment in a chemistry laboratory?

A. Safety glasses or goggles; lab coat; chemical-resistant gloves.

B. Safety glasses or goggles; lab coat; but no gloves.

C. Safety glasses or goggles; lab coat; chemical-resistant gloves; depending on task, face shield, respirator, and closed-toe shoes.

D. No PPE.

6. Which corrosion occurs as local corrosion in small surface irregularities, often with pitting in stagnant water?

A. Flow accelerated corrosion

B. Pitting corrosion

C. Crevice corrosion

D. Microbiologic corrosion

7. A solution contains 2.00 g solute in 100.0 g solution. What is the mass percent of solute?

A. 2.00%.

B. 0.50%.

C. 20.0%.

D. 200%.

8. In pressurized water reactors, a leakage path from the primary to the secondary side is referred to as what?

A. Secondary System Impurities

B. PWR primary to secondary leakage

C. Primary to feedwater leakage

D. Steam generator leakage

9. In chemistry, which statement best defines a cation?

A. Molecule

B. Cation

C. Neutral atom

D. Anion

10. Which term describes the combination of elements formed by transferring or sharing electrons?

A. Element

B. Mixture

C. Compound

D. Solution

Answers

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

Explanations

1. Which term describes impurity sources such as leaks, foreign materials, and corrosion products entering a system?

A. Ion Exchangers

B. Impurity

C. Impurity sources

D. Water quality equilibrium

Impurities entering a system come from specific origins, and the term used to describe those origins is impurity sources. This focuses on where contamination is coming from, rather than the contaminants themselves or the methods used to remove them. Leaks, foreign materials, and corrosion products are examples of impurity sources because they act as the entry points that introduce contaminants into the system. Seeing it this way helps distinguish between the contaminants (impurities) and their sources. Ion exchangers are devices that remove impurities, and water quality equilibrium describes the balance of dissolved species—neither term names the origin of contamination.

2. How can you identify an electrolyte from a compound's behavior?

A. Does not conduct electricity in any state.

B. Conducts electricity in aqueous solution or when melted; ionic compounds and strong acids/bases are electrolytes.

C. Only melts conduct electricity but not in solution.

D. Aqueous solutions always conduct electricity, regardless of solute.

Electrolytes are substances that form mobile ions in a medium, so they can carry an electric current. You can identify them by their conductivity: if a compound conducts electricity when dissolved in water or when melted, it is producing ions in that medium. Ionic compounds dissociate into ions in aqueous solution, and strong acids and bases also dissociate completely into ions, making the solution a good conductor. When an ionic compound is melted, the solid's ions are free to move, so melting also allows conduction. In contrast, most covalent compounds that do not ionize—like sugar in water—don't produce free ions and thus do not conduct electricity, so they're non-electrolytes. There are also weak electrolytes that only partially ionize and conduct only weakly, but the guiding behavior is the presence of free ions in solution or melt.

3. Which statement best describes covalent compounds?

A. They generally have high melting points and conduct electricity when melted.

B. They typically have lower melting points and do not conduct electricity in solution or melt.

C. They ionize completely in water to form electrolytes.

D. They always have high melting points and do not conduct electricity in molten form.

Covalent compounds are made of molecules held together by covalent bonds, so they don't form free ions easily. This leads to two typical trends: weaker forces between molecules compared to ionic lattices, and lack of charged particles to carry current. As a result, they usually melt and boil at lower temperatures than ionic substances, and they don't conduct electricity in either the solid or melted state (they're often non-electrolytes when dissolved). There are exceptions—some covalent substances can ionize in water (like certain acids) or exist as network solids with high melting points—but the general pattern for covalent compounds is lower melting points and nonconductivity. The other statements describe ionic behavior (high melting points with molten conductivity or complete ionization in water), which doesn't fit covalent compounds as a broad rule.

4. Which statement correctly contrasts ionic and covalent bonds?

A. Ionic bonds result from a complete transfer of electrons between atoms, forming ions that attract each other.

B. Covalent bonds involve the transfer of electrons to form charged ions.

C. Ionic bonds involve sharing electron pairs between atoms.

D. Covalent bonds produce lattice structures with high melting points.

The main idea being tested is how electron arrangement distinguishes ionic and covalent bonds. Ionic bonds form when one atom donates electrons to another, creating ions that attract each other through electrostatic forces. This transfer and resulting charged particles are what hold ionic compounds together, and it's why they often form crystalline solids with high melting points. This description directly contrasts with covalent bonds, where atoms share electron pairs rather than transfer electrons to form ions. In covalent bonds, electrons are shared to achieve stability, so the atoms stay as neutral entities rather than becoming ions. The bond strength comes from the shared electrons rather than an electrostatic attraction between ions. Because of this fundamental difference, covalent compounds can exist as discrete molecules or network structures with a range of melting points, not inherently defined by lattice formation and strong ionic attractions. The other statements mischaracterize the contrasts. Covalent bonds do not involve transferring electrons to form charged ions. Saying covalent bonds involve sharing electron pairs is correct for covalent bonds, but it doesn't describe the contrasting idea with ionic bonds. And while some covalent networks have high melting points, lattice structures with high melting points are not the defining contrast between ionic and covalent bonding.

5. Which items are commonly used as personal protective equipment in a chemistry laboratory?

A. Safety glasses or goggles; lab coat; chemical-resistant gloves.

B. Safety glasses or goggles; lab coat; but no gloves.

C. Safety glasses or goggles; lab coat; chemical-resistant gloves; depending on task, face shield, respirator, and closed-toe shoes.

D. No PPE.

Protecting eyes, skin, and breathing is the central idea behind PPE in a chemistry lab. The most appropriate set includes safety glasses or goggles to shield the eyes, a lab coat to protect skin and clothing from spills, and chemical-resistant gloves to prevent direct contact with hazardous substances. Some tasks or hazards require extra protection, so a face shield can be added for splashes, a respirator for inhalation hazards, and sturdy closed-toe shoes for foot protection. This combination covers the main exposure routes and adapts to different experiments. Choosing with too little protection—like skipping gloves or PPE entirely—risks exposure, which is why the more comprehensive option is the best choice.

6. Which corrosion occurs as local corrosion in small surface irregularities, often with pitting in stagnant water?

A. Flow accelerated corrosion

B. Pitting corrosion

C. Crevice corrosion

D. Microbiologic corrosion

Pitting corrosion is a highly localized form of attack that starts at tiny surface defects where the protective oxide film on a metal, such as stainless steel, breaks down. In water that is stagnant and contains chlorides, this breakdown at the defect creates a small anodic area while the surrounding metal remains passive and relatively oxygenated, forming a differential aeration cell. Inside the developing pit, oxygen is scarce and chloride ions are concentrated, promoting continued dissolution of metal and pit growth downward. The pit can become deep while the surrounding surface looks intact, making it particularly insidious. This type is common in stainless steels and aluminum in chloride-containing environments when water is stagnant. In contrast, flow accelerated corrosion involves erosion under flow, crevice corrosion occurs at gaps where differential aeration exists within a crevice, and microbiologic corrosion is driven by microbial activity; those scenarios describe different conditions than localized pits in small surface irregularities.

7. A solution contains 2.00 g solute in 100.0 g solution. What is the mass percent of solute?

A. 2.00%.

B. 0.50%.

C. 20.0%.

D. 200%.

Mass percent measures how much of the total solution mass is the solute, calculated as (mass of solute / mass of solution) × 100%. Here the solute mass is 2.00 g and the total mass of the solution is 100.0 g. So 2.00 g ÷ 100.0 g = 0.020, and multiplying by 100% gives 2.00%. Therefore the solution is 2.00% solute by mass.

8. In pressurized water reactors, a leakage path from the primary to the secondary side is referred to as what?

A. Secondary System Impurities

B. PWR primary to secondary leakage

C. Primary to feedwater leakage

D. Steam generator leakage

In a pressurized water reactor, the boundary between the primary coolant loop and the secondary steam system is the steam generator tubes. A leakage path from primary to secondary is called primary-to-secondary leakage. This term specifically describes a transfer of coolant (and any radioactivity it carries) across that boundary, usually through steam generator tubes that have developed a leak. It's a critical indicator of boundary integrity and radiological safety, because contaminants from the primary side can enter the secondary loop and reach the turbine and other parts of the plant. Other terms either describe contaminants in the secondary system (not the transfer path), a leakage that doesn't cross the primary–secondary boundary, or a leakage within the steam generator itself without stating the cross-boundary transfer. So the conventional and most precise way to name this path is primary-to-secondary leakage.

9. In chemistry, which statement best defines a cation?

A. Molecule

B. Cation

C. Neutral atom

D. Anion

A cation is a positively charged ion. This means it has more protons than electrons, giving it a net positive charge. It forms when an atom or a group of atoms loses electrons. For example, when sodium loses an electron it becomes Na+, a positively charged cation. This distinguishes it from a neutral atom, which has equal numbers of protons and electrons and therefore no net charge, and from an anion, which is a negatively charged ion formed when an atom gains electrons. A molecule isn't defined by charge alone, and while charged species can be part of larger molecules, the term cation specifically refers to the positively charged form.

10. Which term describes the combination of elements formed by transferring or sharing electrons?

A. Element

B. Mixture

C. Compound

D. Solution

When atoms come together by transferring or sharing electrons, they form chemical bonds that hold them in a definite arrangement. This creates a substance made from two or more elements in fixed proportions, known as a compound. The key idea is that the elements are chemically bonded, giving new properties that are different from the individual elements. An element is just a pure type of atom. A mixture is a physical combination of substances that are not bonded, so its components can usually be separated by physical means. A solution is a special kind of mixture where one substance dissolves in another at the molecular level, but the components are not chemically bonded to each other. Therefore, the term that describes two or more elements bonded together to form a new substance is a compound.

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://nantelchemengrfundamentals.examzify.com

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