

# SQA Higher Chemistry Practice Exam (Sample)

Study Guide



Everything you need from our exam experts!

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# Table of Contents

Copyright .....	1
Table of Contents .....	2
Introduction .....	3
How to Use This Guide .....	4
Questions .....	5
Answers .....	8
Explanations .....	10
Next Steps .....	16

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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 functional group is involved in the structure of carboxylic acids?
  - A. Hydroxyl group
  - B. Amino group
  - C. Carboxyl group
  - D. Carbonyl group
2. After the solid is dissolved in a beaker, what is the next step in preparing a standard solution?
  - A. Mix the solution with a magnetic stirrer
  - B. Transfer to a volumetric flask with rinsings
  - C. Allow the solution to sit for an hour
  - D. Add more solid to increase concentration
3. What is a key property of strong reducing agents?
  - A. They have a high ionization energy
  - B. They readily lose electrons
  - C. They are highly acidic
  - D. They do not react with water
4. What effect does increased electronic shielding have on ionisation energy?
  - A. It increases ionisation energy
  - B. It decreases ionisation energy
  - C. It has no effect
  - D. It stabilizes the nucleus
5. What gas is commonly recognized as a reducing agent?
  - A. Oxygen
  - B. Hydrogen
  - C. Nitrogen
  - D. Carbon monoxide

6. What does a longer R group indicate about an alcohol?
- A. The alcohol is more polar
  - B. The alcohol is less polar
  - C. The alcohol has a higher boiling point
  - D. The alcohol is more soluble in water
7. What effect does increasing pressure have on the rate of reaction?
- A. It decreases the rate of reaction
  - B. It has no effect
  - C. It increases the rate of reaction
  - D. It alters the equilibrium position
8. What do the vertical columns in the periodic table represent?
- A. Periods
  - B. Groups
  - C. Rows
  - D. Metalloids
9. What is the outcome of heating proteins?
- A. They increase in molecular weight
  - B. They maintain their original structure
  - C. They undergo a change in shape due to broken bonds
  - D. They become more complex
10. What is the function of an emulsifier?
- A. To enhance the taste of food
  - B. To prevent non-polar and polar liquids from separating
  - C. To stabilize temperature in mixtures
  - D. To add color to food products

## Answers

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

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## Explanations

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1. What functional group is involved in the structure of carboxylic acids?

- A. Hydroxyl group
- B. Amino group
- C. Carboxyl group
- D. Carbonyl group

A carboxylic acid is characterized by the presence of a carboxyl group in its structure. This functional group is composed of a carbon atom that is double-bonded to an oxygen atom (the carbonyl part) and also single-bonded to a hydroxyl group (the alcohol part). The general formula for a carboxylic acid is  $\text{RCOOH}$ , where R represents a hydrocarbon chain or hydrogen. The carboxyl group ( $-\text{COOH}$ ) not only defines the chemical properties of carboxylic acids, making them acidic due to the ability to donate a proton ( $\text{H}^+$ ), but also contributes to their reactivity and role in various biological and chemical processes. This acidity is a key distinguishing feature of carboxylic acids compared to other organic compounds. In contrast, while hydroxyl groups are present in alcohols, amino groups are characteristic of amines, and carbonyl groups are found in aldehydes and ketones, they do not define the structure of carboxylic acids. The presence of the carboxyl group is what sets carboxylic acids apart and is fundamental in identifying them within various organic compounds.

2. After the solid is dissolved in a beaker, what is the next step in preparing a standard solution?

- A. Mix the solution with a magnetic stirrer
- B. Transfer to a volumetric flask with rinsings
- C. Allow the solution to sit for an hour
- D. Add more solid to increase concentration

To prepare a standard solution accurately, the correct next step after dissolving the solid in a beaker is to transfer the solution to a volumetric flask and include the rinsings from the beaker. This step ensures that the entire amount of the solute is accounted for when making the standard solution. When the solution is transferred to a volumetric flask, it is essential to rinse the beaker with distilled water and add those rinsings to the flask as well. This process guarantees that any solute that may adhere to the sides of the beaker is included in the final solution, which is critical for achieving the desired molarity of the standard solution. The volumetric flask is designed to allow for precise volume measurements, enabling the accurate dilution of the solute to a specific final volume. Using a magnetic stirrer to mix the solution is important for homogeneous mixing, but it is not the immediate next step after dissolving the solid. Allowing the solution to sit for an hour is unnecessary for the preparation process, and adding more solid would potentially change the concentration instead of accurately preparing the standard solution.

### 3. What is a key property of strong reducing agents?

- A. They have a high ionization energy
- B. They readily lose electrons**
- C. They are highly acidic
- D. They do not react with water

A key property of strong reducing agents is their ability to readily lose electrons. Strong reducing agents are substances that easily donate their electrons to other species during a chemical reaction, facilitating the reduction of those species. This characteristic is essential for their function in redox reactions, where the reducing agent is oxidized in the process. By losing electrons, strong reducing agents help to lower the oxidation state of another substance, which is a fundamental aspect of their role in chemical reactions. This tendency to lose electrons is typically linked to a lower electronegativity compared to the species they are oxidizing, as well as the stability of the resulting ion or molecule after donation. Other properties such as high ionization energy would actually indicate that a substance is less likely to lose electrons, and thus would not function effectively as a reducing agent. Similarly, being highly acidic does not correlate with the reducing capability of a substance, and the ability to react with water does not affect a substance's strength as a reducing agent. Therefore, the ability to readily lose electrons is what defines a strong reducing agent effectively.

### 4. What effect does increased electronic shielding have on ionisation energy?

- A. It increases ionisation energy
- B. It decreases ionisation energy**
- C. It has no effect
- D. It stabilizes the nucleus

Increased electronic shielding occurs when the inner electrons within an atom effectively block the outer electrons from the full positive charge of the nucleus. This shielding effect reduces the effective nuclear charge experienced by the outermost electrons. As a result, these outer electrons feel less attraction to the nucleus, making it easier to remove them from the atom. When it comes to ionisation energy, which is the energy required to remove an electron from an atom, decreased attraction due to increased shielding means that less energy is needed to remove the outer electron. Therefore, as electronic shielding increases, ionisation energy decreases. This principle is important for understanding trends in the periodic table, particularly as you move down a group, where increased numbers of electron shells contribute to enhanced shielding.

5. What gas is commonly recognized as a reducing agent?

- A. Oxygen
- B. Hydrogen
- C. Nitrogen
- D. Carbon monoxide

The gas that is commonly recognized as a reducing agent is carbon monoxide. Carbon monoxide has the ability to donate electrons in chemical reactions, which is a hallmark of a reducing agent. When carbon monoxide reacts with metal oxides, it helps to reduce the metal ions back to their elemental forms by removing oxygen. This process is essential in metallurgy, particularly in the extraction of metals from their ores. In general, a reducing agent is a substance that loses electrons and causes another substance to be reduced. Carbon monoxide's ability to effectively donate electrons makes it a useful reducing agent in various chemical processes, particularly in the production of iron and other metals in blast furnaces. In contrast, oxygen is typically an oxidizing agent, as it tends to gain electrons and facilitate oxidation reactions. Hydrogen can also act as a reducing agent under certain conditions, but it is less commonly recognized for this role compared to carbon monoxide in industrial processes. Nitrogen, on the other hand, is generally inert and does not participate in redox reactions as a reducing agent in the same way as carbon monoxide does.

6. What does a longer R group indicate about an alcohol?

- A. The alcohol is more polar
- B. The alcohol is less polar
- C. The alcohol has a higher boiling point
- D. The alcohol is more soluble in water

In the context of alcohols, the length of the R group, which represents the carbon chain of the molecule, plays a significant role in determining the properties of the alcohol. A longer R group primarily contributes to an overall increase in the hydrophobic character of the molecule. As the R group lengthens, the non-polar carbon and hydrogen portion of the molecule becomes much greater relative to the polar hydroxyl (-OH) group. This means that the hydrophilic (water-attracting) nature of the alcohol, due to the presence of the hydroxyl group, is increasingly overshadowed by the hydrophobic (water-repelling) nature of the longer carbon chain. Consequently, this results in the alcohol being less polar overall. Additionally, while polarity is related to solubility and boiling points, a longer R group typically leads to decreased solubility in water and potentially a higher boiling point due to increased van der Waals forces, but this must be balanced against the polar nature of the hydroxyl group. The correct interpretation focuses on the impact of the R group's length on the overall polarity of the molecule.

7. What effect does increasing pressure have on the rate of reaction?

- A. It decreases the rate of reaction
- B. It has no effect
- C. It increases the rate of reaction
- D. It alters the equilibrium position

Increasing pressure primarily affects the rate of reaction for gaseous reactants by compressing the molecules, which leads to a higher concentration of the reactants in a given volume. This increased concentration translates to a greater number of collisions between reactant molecules per unit time. Since reaction rates typically depend on the frequency of these molecular collisions, a rise in pressure consequently results in an increase in the rate of reaction. In gas-phase reactions, when pressure is increased, it directly influences the system's dynamics. This is particularly significant for reactions involving gases in which the total number of moles of gas on the reactants and products side may differ, since increasing pressure could favor the reaction that produces fewer moles of gas, if considering changes to equilibrium. The connection between increased collisions and reaction rate is foundational to understanding how pressure impacts chemical kinetics in gaseous systems, confirming that rising pressure does indeed increase the reaction rate.

8. What do the vertical columns in the periodic table represent?

- A. Periods
- B. Groups
- C. Rows
- D. Metalloids

The vertical columns in the periodic table are known as groups. Each group consists of elements that share similar chemical properties due to their similar electron configurations, particularly in their outermost electron shells. For instance, elements in group 1 are all alkali metals, which are highly reactive and have one electron in their outermost shell, leading to similar reactivities across that group. By organizing elements in this way, the periodic table allows for the prediction of chemical behavior based on an element's position. The concept of groups is fundamental in understanding trends such as ionization energy, electronegativity, and atomic radius throughout the table. Each group often contains elements that can form similar types of compounds and can exhibit similar trends in reactivity, which is crucial for anyone studying chemistry.

9. What is the outcome of heating proteins?

- A. They increase in molecular weight
- B. They maintain their original structure
- C. They undergo a change in shape due to broken bonds
- D. They become more complex

Heating proteins causes them to undergo a process known as denaturation. This process involves breaking the weak bonds and interactions that maintain the protein's three-dimensional shape, such as hydrogen bonds, ionic bonds, and Van der Waals forces. As these bonds break, the protein loses its original structure and unfolds, which can change its function and properties. The correct answer articulates that heating leads to a change in the protein's shape due to these broken bonds, which is a fundamental aspect of how proteins respond to temperature changes. This change is significant because it can affect the protein's biological activity, potentially rendering it inactive or altering the way it interacts with other molecules. In contrast, other outcomes such as an increase in molecular weight, maintaining the original structure, or becoming more complex do not accurately describe the effect of heating on proteins. Heating does not increase the molecular weight of proteins but can instead lead to loss of functionality due to structural alteration.

10. What is the function of an emulsifier?

- A. To enhance the taste of food
- B. To prevent non-polar and polar liquids from separating
- C. To stabilize temperature in mixtures
- D. To add color to food products

An emulsifier serves the crucial function of stabilizing mixtures that consist of both non-polar and polar liquids, which typically do not mix well on their own. The unique molecular structure of an emulsifier contains both hydrophilic (water-attracting) and hydrophobic (water-repelling) parts. This dual nature allows the emulsifier to interact with both types of liquids, reducing the surface tension between them. In practical terms, this means that when an emulsifier is added to a mixture, such as oil and water, it allows for the creation of a stable emulsion—where tiny droplets of one liquid are dispersed throughout the other, instead of separating. Common examples of emulsifiers include lecithin, found in egg yolks, and various food additives that help maintain consistency in products like mayonnaise and salad dressings. The other options listed do not pertain directly to the primary role of an emulsifier. Taste enhancement, temperature stabilization, and color addition could involve other food ingredients or additives but are not characteristic functions of emulsifiers.

## 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://sqahigherchemistry.examzify.com>

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

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