YEAR 9 CHEMICAL REACTIONS: PROPERTIES, EQUATIONS, AND ENERGY CHANGES 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 is an everyday endothermic reaction?

A. Burning fuels

B. Hand warmers

C. Instant cold packs

D. Condensing steam

2. Litmus test: how can you distinguish acids and bases using litmus paper? What colors indicate each?

A. Acids turn blue litmus red; bases turn red litmus blue.

B. Acids turn red litmus blue; bases turn blue litmus red.

C. Acids and bases both turn blue litmus red.

D. Bases both turn red litmus blue.

3. Which scientist is known for standardizing chemical symbols and formulas?

A. Jöns Jakob Berzelius

B. Dmitri Mendeleev

C. Antoine Lavoisier

D. Marie Curie

4. When an ionic compound dissolves in water, the ions that form are called

A. Dissolved ions

B. Free radicals

C. Gas ions

D. Aqueous ions

5. What is a balanced chemical equation?

A. An equation where total mass changes.

B. An equation with only products on one side.

C. An equation where the same number of each type of atom is present on both sides.

D. An equation that cannot be solved.

6. What is a word equation?

A. A chemical equation written with symbols only.

B. An equation that lists only the products.

C. A representation of a chemical reaction using words to show the relationship between reactants and products.

D. An equation that shows energy changes.

7. Which statement about displacement reactions is true?

A. Displacement reactions occur only in gases.

B. A metal can replace another metal in a compound if it is more reactive.

C. Displacement reactions always produce a precipitate.

D. Displacement reactions require chlorides.

8. What is the full ionic equation for $Pb(NO_3)_2 + 2\ KI \rightarrow PbI_2(s) + 2\ KNO_3$?

A. $Pb(NO_3)_2 + 2\ KI \rightarrow PbI_2(s) + 2\ KNO_3$

B. $Pb^{2+} + 2\ NO_3^- + 2\ K^+ + 2\ I^- \rightarrow PbI_2(s) + 2\ K^+ + 2\ NO_3^-$

C. $Pb^{2+} + 2\ I^- \rightarrow PbI_2(s)$

D. $Pb^{2+} + 2\ NO_3^- + 2\ K^+ + 2\ I^- \rightarrow PbI_2(s) + 2\ NO_3^- + 2\ K^+$

9. Provide a balanced equation for the complete combustion of ethene (C_2H_4).

A. $C_2H_4 + 2\ O_2 \rightarrow CO_2 + 2\ H_2O$

B. $C_2H_4 + O_2 \rightarrow CO_2 + H_2O$

C. $C_2H_4 + 3\ O_2 \rightarrow 2\ CO_2 + 2\ H_2O$

D. $2\ C_2H_4 + O_2 \rightarrow 4\ CO + 4\ H_2O$

10. In a precipitation reaction, which species are removed to form the net ionic equation?

A. All species in the solution.

B. The full molecular equation.

C. Only the ions involved in forming the product, with spectator ions removed.

D. Only the solid precipitate.

Answers

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

Explanations

1. Which is an everyday endothermic reaction?

A. Burning fuels

B. Hand warmers

C. Instant cold packs

D. Condensing steam

Endothermic reactions absorb energy from their surroundings. An everyday example is an instant cold pack: when activated, the contents dissolve, and the dissolution pulls heat from the surrounding pack and your skin, making it feel cold. The other options involve releasing heat: burning fuels and hand warmers mainly produce warmth through exothermic reactions, and condensing steam releases heat as it changes from gas to liquid. So the cold-pack is the everyday endothermic example.

2. Litmus test: how can you distinguish acids and bases using litmus paper? What colors indicate each?

A. Acids turn blue litmus red; bases turn red litmus blue.

B. Acids turn red litmus blue; bases turn blue litmus red.

C. Acids and bases both turn blue litmus red.

D. Bases both turn red litmus blue.

Litmus paper is a simple pH indicator that changes color depending on how acidic or basic a solution is. In acidic solutions, blue litmus turns red. In basic (alkaline) solutions, red litmus turns blue. Neutral solutions don't cause dramatic color changes for either paper, so blue stays blue and red stays red. So, when you're distinguishing acids and bases, acids make blue litmus red, and bases make red litmus blue. Using both papers helps you confirm: a blue paper turning red indicates acidity, while a red paper turning blue indicates basicity.

3. Which scientist is known for standardizing chemical symbols and formulas?

A. Jöns Jakob Berzelius

B. Dmitri Mendeleev

C. Antoine Lavoisier

D. Marie Curie

Standardizing chemical symbols and formulas means creating a clear, universal way to write elements and compounds so scientists can share and compare results. That system was developed by Jöns Jakob Berzelius. He introduced the modern chemical symbol system—one or two letters for each element—and used subscripts to show how many atoms of each element are present in a compound. This laid the foundation for the notation we still use today. Dmitri Mendeleev is famous for organizing the periodic table and predicting properties of undiscovered elements. Antoine Lavoisier helped shape chemical naming conventions and promoted the law of conservation of mass. Marie Curie made pivotal discoveries in radioactivity.

4. When an ionic compound dissolves in water, the ions that form are called

A. Dissolved ions

B. Free radicals

C. Gas ions

D. Aqueous ions

When an ionic compound dissolves in water, it splits into charged particles and those particles become surrounded by water molecules, forming hydrated ions in the solution. The standard way to name them in chemistry is aqueous ions, meaning they are ions present in water (often written with the (aq) notation). This term highlights both their charged nature and their state in a dissolved, water-based solution. Free radicals are unrelated here because they're species with unpaired electrons, not simply ions in solution. Gas ions refer to ions in the gas phase, which isn't what happens when a salt dissolves in water. So the best description for the ions formed in an aqueous solution is aqueous ions.

5. What is a balanced chemical equation?

A. An equation where total mass changes.

B. An equation with only products on one side.

C. An equation where the same number of each type of atom is present on both sides.

D. An equation that cannot be solved.

Balanced chemical equations follow the law of conservation of mass: the same number of atoms of each element must appear on both sides of the equation. That is why this option is the best description—the counts of each type of atom match on the reactant and product sides, so mass and matter are preserved. To balance, you adjust the coefficients in front of formulas (not the subscripts inside a molecule), so you're just showing more or fewer molecules involved in the reaction. For example, H2 + O2 -> H2O isn't balanced because there are four hydrogen atoms and two oxygen atoms on the left, but only two hydrogen and one oxygen on the right. Balancing gives 2 H2 + O2 -> 2 H2O, which has the same number of each atom on both sides (four hydrogen and two oxygen). If total mass changed, that would contradict the conservation law, which is why that choice isn't correct. An equation with only products on one side wouldn't represent a real balanced reaction, and the idea that an equation cannot be solved isn't accurate—most reactions can be balanced by adjusting coefficients.

6. What is a word equation?

A. A chemical equation written with symbols only.

B. An equation that lists only the products.

C. A representation of a chemical reaction using words to show the relationship between reactants and products.

D. An equation that shows energy changes.

A word equation represents a chemical reaction using the names of the substances, not their chemical symbols, to show the relationship between reactants and products. It shows what reacts with what and what is formed, all in words, with an arrow indicating the direction of the reaction. For example: magnesium + hydrochloric acid magnesium chloride + hydrogen. This helps you understand the idea of what is happening before you move on to balance with symbols. The other ideas don't fit as well. A uses symbols and formulas rather than names, so it's a symbol equation. One option focuses only on the products, which doesn't describe the reaction at all. The last option is about energy changes, which is a different aspect of reactions, not how the substances are named.

7. Which statement about displacement reactions is true?

A. Displacement reactions occur only in gases.

B. A metal can replace another metal in a compound if it is more reactive.

C. Displacement reactions always produce a precipitate.

D. Displacement reactions require chlorides.

In a single-displacement reaction, a more reactive metal can push a less reactive metal out of a compound. The firing rule is set by the reactivity series: if a metal sits higher in the series than the metal in the compound, it can replace it. This statement is the best because it captures that driving force—the relative reactivity. For example, when zinc metal is added to copper(II) sulfate solution, zinc, being more reactive, displaces copper from the compound, giving zinc sulfate in solution and depositing copper metal. That shows how reactivity, not state or the need for a specific salt, governs the outcome. Displacement reactions don't have to occur in gases; they happen in aqueous solutions (and often in molten salts) as ions and metal atoms interact. They also don't always produce a precipitate—depends on the solubility of the products. If the displaced metal forms a soluble salt, you won't see a solid. And these reactions don't require chlorides specifically; many different metal salts can participate, with the reaction decided by the relative reactivities of the metals involved.

8. What is the full ionic equation for $Pb(NO_3)_2 + 2\ KI \rightarrow PbI_2(s) + 2\ KNO_3$?

A. $Pb(NO_3)_2 + 2\ KI \rightarrow PbI_2(s) + 2\ KNO_3$

B. $Pb^{2+} + 2\ NO_3^- + 2\ K^+ + 2\ I^- \rightarrow PbI_2(s) + 2\ K^+ + 2\ NO_3^-$

C. $Pb^{2+} + 2\ I^- \rightarrow PbI_2(s)$

D. $Pb^{2+} + 2\ NO_3^- + 2\ K^+ + 2\ I^- \rightarrow PbI_2(s) + 2\ NO_3^- + 2\ K^+$

In a precipitation reaction in solution, the full ionic equation shows every species as ions, including spectator ions, while the solid product is written with its solid form. Here, $Pb(NO_3)_2$ dissociates into Pb^{2+} and 2 NO_3^-, and KI dissociates into 2 K^+ and 2 I^-. The new solid formed is $PbI_2(s)$, while the potassium and nitrate ions remain in solution as K^+ and NO_3^-. Putting all that together gives $Pb^{2+} + 2\ NO_3^- + 2\ K^+ + 2\ I^- \rightarrow PbI_2(s) + 2\ K^+ + 2\ NO_3^-$. This is the full ionic form because it shows all ions present in solution on both sides. The net ionic equation, which cancels the spectator ions, would be $Pb^{2+} + 2\ I^- \rightarrow PbI_2(s)$.

9. Provide a balanced equation for the complete combustion of ethene (C_2H_4).

A. $C_2H_4 + 2\ O_2 \rightarrow CO_2 + 2\ H_2O$

B. $C_2H_4 + O_2 \rightarrow CO_2 + H_2O$

C. $C_2H_4 + 3\ O_2 \rightarrow 2\ CO_2 + 2\ H_2O$

D. $2\ C_2H_4 + O_2 \rightarrow 4\ CO + 4\ H_2O$

Balancing chemical equations means making sure the same number of each type of atom is on both sides. For a hydrocarbon burning completely, the products are carbon dioxide and water, so you fix the carbon and hydrogen first, then adjust oxygen. Ethene has 2 carbons and 4 hydrogens. To match carbon, put 2 molecules of CO_2 on the product side. To match hydrogen, add 2 molecules of H_2O on the product side, which accounts for all 4 hydrogens. Now count oxygen: the right side has 2 CO_2 (4 O) plus 2 H_2O (2 O) = 6 O total. To supply 6 oxygen atoms, you need 3 O_2 molecules on the left. This gives the balanced equation: $C_2H_4 + 3\ O_2 \rightarrow 2\ CO_2 + 2\ H_2O$. The other forms fail because they either don't balance carbon, don't balance oxygen, or describe incomplete combustion that would produce CO instead of CO_2.

10. In a precipitation reaction, which species are removed to form the net ionic equation?

A. All species in the solution.

B. The full molecular equation.

C. Only the ions involved in forming the product, with spectator ions removed.

D. Only the solid precipitate.

In a precipitation reaction, the net ionic equation is built by canceling out spectator ions and keeping only the ions that actually form the solid precipitate. When soluble salts dissociate in water, the ions that pair up to make an insoluble solid are the ones that change during the reaction, so they appear in the net ionic equation. The ions that just roam around on both sides unchanged (the spectators) don't participate in forming the precipitate and are removed from the equation. For example, mixing two soluble salts might produce a solid like AgCl. The full ionic equation shows all ions, but the net ionic equation keeps only the ions that form the precipitate, such as Ag^+ and Cl^- combining to make $AgCl(s)$. The other ions, Na^+ and NO_3^- in that example, are spectators and are omitted.

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://y9chemreactions.examzify.com

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