Biochemistry Module 6 Practice Exam (Sample)

Study Guide

BY EXAMZIFY

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

1. **What is the most noticeable difference between A-form and Z-form DNA?**
   - **A. Z-form is left-handed, A-form is right-handed.**
   - **B. Both forms are right-handed.**
   - **C. Both forms are left-handed.**
   - **D. Z-form is right-handed, A-form is left-handed.**

2. **The double helix of DNA is stabilized mainly by which type of bonds?**
   - **A. Hydrogen bonds**
   - **B. Covalent bonds**
   - **C. Ionic bonds**
   - **D. Hydrophobic interactions**

3. **Where does the amino acid attach to the tRNA?**
   - **A. 5' end**
   - **B. 3' end**
   - **C. Middle**
   - **D. Anticodon loop**

4. **In glycolysis under aerobic conditions, what is the net ATP and NADH gained per glucose?**
   - **A. Net gain of 4 ATP and 2 NADH**
   - **B. Net gain of 0 ATP and 2 NADH**
   - **C. Net gain of 2 ATP and 2 NADH**
   - **D. Net gain of 2 ATP and 0 NADH**

5. **DNA is built from which of the following?**
   - **A. Nucleosides**
   - **B. Genes**
   - **C. Purines**
   - **D. Nucleotides**

6. **The isoelectric point (pI) is the pH at which an amino acid has no net charge. For acidic residues, how is the pI determined?**
   - A. The pH at which the molecule has no net charge.
   - B. The average of the pKa values of the carboxyl group and the side-chain carboxyl group.
   - C. The average of the pKa values of the amino group and the side-chain amino group.
   - D. The pH at which the side chain is deprotonated.

7. **In RNA, cytosine always pairs with which base?**
   - A. Adenine
   - B. Guanine
   - C. Thymine
   - D. Uracil

8. **In DNA, the pentose sugar serves as the monosaccharide. What is it?**
   - A. 2-deoxyribose
   - B. Ribose
   - C. Fructose
   - D. Glucose

9. **Which component differentiates a nucleotide from a nucleoside?**
   - A. A nitrogenous base
   - B. A sugar
   - C. A phosphate group
   - D. A ring structure

10. **How does the bicarbonate buffer system maintain systemic pH?**
   - A. CO_2 dissolves in water to form carbonic acid, equilibrates to bicarbonate and H^+, maintaining blood pH near 7.4; respiratory and renal systems regulate CO_2 and bicarbonate.
   - B. Bicarbonate acts as a strong base dominating pH to 7.0.
   - C. Buffer system uses phosphate as primary buffer at pH 2.
   - D. HCl is produced to keep pH stable.

Answers

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

Explanations

1. What is the most noticeable difference between A-form and Z-form DNA?

A. Z-form is left-handed, A-form is right-handed.

B. Both forms are right-handed.

C. Both forms are left-handed.

D. Z-form is right-handed, A-form is left-handed.

Handedness of DNA helices is the key idea here. A-form DNA is right-handed, while Z-form DNA is left-handed. The A-form is a more compact, wider helix that arises under dehydrating conditions or in RNA–DNA hybrids, whereas Z-form has a zigzag backbone and tends to form in sequences with alternating purines and pyrimidines, often under higher salt. Because the twist direction differs, the most noticeable difference between these two forms is their handedness: A-form twists to the right, Z-form twists to the left. This contrasts with the common B-form, which is also right-handed, highlighting that A-form and Z-form differ specifically in how they unwind or twist in space.

2. The double helix of DNA is stabilized mainly by which type of bonds?

A. Hydrogen bonds

B. Covalent bonds

C. Ionic bonds

D. Hydrophobic interactions

Hydrogen bonding between complementary bases is what primarily holds the two DNA strands together. Adenine pairs with thymine using two hydrogen bonds, and guanine pairs with cytosine using three hydrogen bonds. This network of many relatively weak bonds provides enough stability for the double helix while still allowing strands to separate when needed for replication or transcription. The covalent phosphodiester bonds along each strand keep the backbone intact, but they don't link the two strands to each other. Ionic interactions aren't a major factor in the helix's stability, and while base stacking driven by hydrophobic effects adds overall stability, the main force that stabilizes the double helix is hydrogen bonding between bases.

3. Where does the amino acid attach to the tRNA?

A. 5' end

B. 3' end

C. Middle

D. Anticodon loop

The amino acid is attached at the 3' end of the tRNA, specifically to the 3' hydroxyl of the terminal adenosine (the A76) in the CCA tail. Aminoacyl-tRNA synthetases form an ester bond between the amino acid and this 3' OH, creating aminoacyl-tRNA ready for incorporation into protein. The anticodon loop is the site for codon recognition, not for attachment. The 5' end and the middle portion of the tRNA are not where the amino acid bonding occurs.

4. In glycolysis under aerobic conditions, what is the net ATP and NADH gained per glucose?

A. Net gain of 4 ATP and 2 NADH

B. Net gain of 0 ATP and 2 NADH

C. Net gain of 2 ATP and 2 NADH

D. Net gain of 2 ATP and 0 NADH

Energy accounting in glycolysis shows that, per glucose, two ATP are invested early to activate the molecule, and four ATP are produced later, giving a net gain of two ATP. Along with this, two NAD+ molecules are reduced to NADH during the oxidation of glyceraldehyde-3-phosphate, yielding two NADH per glucose. Under aerobic conditions, those NADH molecules can be shuttled into mitochondria and used to generate more ATP via oxidative phosphorylation, but the glycolysis step itself contributes a net of two ATP and two NADH. So the correct pairing is a net gain of two ATP and two NADH per glucose.

5. DNA is built from which of the following?

A. Nucleosides

B. Genes

C. Purines

D. Nucleotides

DNA is built from nucleotides, the basic monomers that carry a deoxyribose sugar, a nitrogenous base, and one to three phosphate groups. These nucleotides link together through phosphodiester bonds, connecting the phosphate of one nucleotide to the sugar of the next, which forms the DNA sugar–phosphate backbone. The energy for this linking comes from the high-energy phosphate groups of the nucleotides that are used during polymerization, typically as deoxyribonucleotide triphosphates. The bases then pair between strands to create the double helix. Nucleosides lack the phosphate groups needed to form the backbone, so they're not the units used to build DNA. Genes are sequences of DNA, not the individual building blocks. Purines are one type of base found in DNA (A and G), but DNA also contains pyrimidines (C and T), so purines alone do not constitute the building blocks.

6. The isoelectric point (pI) is the pH at which an amino acid has no net charge. For acidic residues, how is the pI determined?

   A. The pH at which the molecule has no net charge.

   B. The average of the pKa values of the carboxyl group and the side-chain carboxyl group.

   C. The average of the pKa values of the amino group and the side-chain amino group.

   D. The pH at which the side chain is deprotonated.

The key idea is that the isoelectric point is defined by the pH at which the molecule carries no net charge. For acidic residues, there are two acidic sites that can lose protons—the α-carboxyl group and the side-chain carboxyl group. As pH rises, the molecule transitions from positively charged to negatively charged, and there is a pH between those two deprotonation steps where the overall charge sums to zero. That zero-charge point is what the pI represents. In practice, you can estimate its value by averaging the pKa values of those two acidic groups, but the fundamental criterion remains the pH at which the molecule has no net charge.

7. In RNA, cytosine always pairs with which base?

   A. Adenine

   B. Guanine

   C. Thymine

   D. Uracil

In RNA, bases pair in a complementary way that provides stability to the structure. Cytosine pairs with guanine because their chemical groups align to form hydrogen bonds, typically three of them, creating a strong C–G pairing. In RNA, thymine is replaced by uracil, which pairs with adenine instead. So cytosine's partner is guanine.

8. In DNA, the pentose sugar serves as the monosaccharide. What is it?

   A. 2-deoxyribose

   B. Ribose

   C. Fructose

   D. Glucose

In DNA, the sugar is a five-carbon sugar called 2-deoxyribose. It's called deoxyribose because it lacks an oxygen atom at the 2′ position compared with ribose. This absence makes the DNA backbone more chemically stable, helping preserve genetic information over time. In contrast, RNA uses ribose, which has a hydroxyl group at the 2′ position, making RNA more reactive and less chemically stable. Fructose and glucose are six-carbon sugars (hexoses), not the pentose used in nucleic acids, so they aren't the sugars that form the DNA backbone.

9. Which component differentiates a nucleotide from a nucleoside?

A. A nitrogenous base

B. A sugar

C. A phosphate group

D. A ring structure

The key difference is the phosphate group. A nucleoside is just a sugar (ribose or deoxyribose) bound to a nitrogenous base. When a phosphate group is added to the sugar, forming one or more phosphate units, you obtain a nucleotide. Those phosphate groups enable the nucleotides to link together via phosphodiester bonds, creating the backbone of DNA or RNA and enabling energy transfer in molecules like ATP. The sugar and the ring structure, and the nitrogenous base, are present in both nucleosides and nucleotides, so they don't differentiate them.

10. How does the bicarbonate buffer system maintain systemic pH?

A. CO2 dissolves in water to form carbonic acid, equilibrates to bicarbonate and H+, maintaining blood pH near 7.4; respiratory and renal systems regulate CO2 and bicarbonate.

B. Bicarbonate acts as a strong base dominating pH to 7.0.

C. Buffer system uses phosphate as primary buffer at pH 2.

D. HCl is produced to keep pH stable.

The main idea is that blood pH is held steady by the bicarbonate buffer pair, which links carbon dioxide metabolism to proton buffering and is finely tuned by the lungs and kidneys. In the plasma, carbon dioxide from tissues combines with water to form carbonic acid, which quickly dissociates into bicarbonate and a proton. Bicarbonate acts as a base by neutralizing added H+, while the proton is buffered by the carbonic acid part of the system. This balance keeps pH near 7.4. The lungs regulate the amount of CO2, effectively controlling the driving force for the carbonic acid/bicarbonate pair. When acidity rises, more CO2 is expelled, shifting the equilibrium toward CO2 and H2O and removing H+ in the process, which buffers the drop in pH. When alkalinity rises, CO2 is retained to push the reaction toward producing more H+ and HCO3-, counteracting the pH rise. The kidneys contribute by reabsorbing or generating bicarbonate and by secreting hydrogen ions, adjusting the [HCO3−] to maintain the proper ratio with CO2. This balance is often summarized by the Henderson–Hasselbalch relationship for the bicarbonate buffering system, pH ≈ 6.1 + log([HCO3−]/[CO2]), with CO2 levels reflecting respiratory control and bicarbonate levels reflecting renal control. Together, these mechanisms keep systemic pH around 7.35–7.45. Other options misstate the system: bicarbonate is not a strong base that fixes pH at 7.0, the phosphate buffer is not the primary extracellular buffer at physiological pH, and HCl production is not how systemic pH is stabilized.

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://biochemmodule6.examzify.com

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