

BIOCHEMISTRY MODULE 2 PRACTICE TEST (SAMPLE)

STUDY GUIDE



**SAMPLE STUDY GUIDE
WITH LIMITED QUESTIONS**

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THE FULL VERSION STUDY GUIDE**

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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 does the reaction rate constant (k) represent?**
 - A. The overall rate of the entire reaction
 - B. The specific rate for a specific step in a reaction
 - C. The equilibrium constant
 - D. The activation energy barrier
- 2. What is the primary role of DNA polymerases during replication?**
 - A. Unwind the DNA double helix
 - B. Synthesize new DNA strands by adding nucleotides in the 5' to 3' direction
 - C. Lay down RNA primers
 - D. Ligate Okazaki fragments
- 3. Which statement best contrasts DNA and RNA structure and roles?**
 - A. DNA uses deoxyribose; RNA uses ribose; DNA bases A-T, G-C; RNA bases A-U, G-C; DNA stores genetic information; RNA translates to proteins.
 - B. DNA uses deoxyribose; RNA uses ribose; DNA stores genetic information; RNA does not participate in translation.
 - C. DNA replication occurs in the cytoplasm; RNA processing happens after transcription.
 - D. RNA contains thymine and DNA contains uracil.
- 4. In competitive inhibition, apparent K_m increases while V_{max} remains unchanged.**
 - A. V_{max} decreases; K_m unchanged.
 - B. V_{max} unchanged; K_m increases.
 - C. V_{max} unchanged; K_m increases.
 - D. V_{max} increases; K_m unchanged.
- 5. What are the products of pyruvate oxidation and where does it occur?**
 - A. NADH and NAD^+ , in mitochondria via LDH.
 - B. Pyruvate converted to lactate in cytosol; no CO_2 produced.
 - C. Acetyl-CoA and $FADH_2$ in cytosol via PDH.
 - D. Acetyl-CoA, CO_2 , and NADH in mitochondria via PDH complex.

- 6. In the fed versus fasting state, how does the liver regulate glucose production?**
- A. Fed: insulin suppresses gluconeogenesis and promotes glycolysis; fasting: glucagon promotes gluconeogenesis and glycogenolysis.
 - B. Fed: glucagon promotes gluconeogenesis; fasting: insulin suppresses glycolysis.
 - C. Fed: glucagon promotes glycogenolysis; fasting: insulin promotes glycolysis.
 - D. Fed: insulin promotes gluconeogenesis; fasting: glucagon suppresses glycolysis.
- 7. What does V_o represent in enzyme kinetics?**
- A. Initial velocity at very high substrate
 - B. Total product formed
 - C. Velocity of the reaction for the initial part (first 60 sec)
 - D. Maximal rate of the reaction
- 8. Beyond NADPH production, what is another function of the pentose phosphate pathway?**
- A. Primarily generates ATP through substrate-level phosphorylation.
 - B. Directly converts glucose to lactate.
 - C. Produces ribose-5-phosphate for nucleotide synthesis and can supply glycolytic intermediates via non-oxidative reactions.
 - D. Hydrogenates ribose to deoxyribose sugar for nucleotides.
- 9. Which amino acid is ketogenic?**
- A. Alanine
 - B. Leucine
 - C. Proline
 - D. Valine
- 10. What are carbs (glucose) stored as in tissue?**
- A. Glycogen
 - B. Starch
 - C. Cellulose
 - D. Glycosylated proteins

Answers

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

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Explanations

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1. What does the reaction rate constant (k) represent?

- A. The overall rate of the entire reaction
- B. The specific rate for a specific step in a reaction**
- C. The equilibrium constant
- D. The activation energy barrier

In chemical kinetics, the reaction rate constant is the proportionality factor that links the rate of a particular elementary step to the concentrations of the reactants involved in that step. It is specific to that step at a given temperature, so a multi-step mechanism will have its own rate constant for each elementary step, and the overall rate is often governed by the slowest step. The rate constant is not the overall rate itself, nor is it an equilibrium constant or the activation energy barrier. It reflects how readily the step proceeds and, via the Arrhenius relationship, how temperature changes the speed of that step. For example, a simple A → products step has rate = $k[A]$, and a bimolecular step A + B → products has rate = $k[A][B]$, illustrating how k serves as the bridge between concentration and rate for that specific transition.

2. What is the primary role of DNA polymerases during replication?

- A. Unwind the DNA double helix
- B. Synthesize new DNA strands by adding nucleotides in the 5' to 3' direction**
- C. Lay down RNA primers
- D. Ligate Okazaki fragments

DNA polymerases are responsible for building the new DNA strands by adding nucleotides to the growing 3' end, using the existing strand as a template, and they work in the 5' to 3' direction. This directionality matters because the enzyme can only add nucleotides to a pre-existing 3' hydroxyl group, so synthesis proceeds from 5' to 3'. Primers are needed to provide that starting 3' end, after which the polymerase extends the DNA strand by matching each nucleotide to its partner on the template. Other enzymes handle opening the double helix, laying down the RNA primer, and sealing together fragments, but the primary role of DNA polymerases is the actual synthesis of new DNA through nucleotide addition in the 5' to 3' direction.

3. Which statement best contrasts DNA and RNA structure and roles?

- A. DNA uses deoxyribose; RNA uses ribose; DNA bases A-T, G-C; RNA bases A-U, G-C; DNA stores genetic information; RNA translates to proteins.**
- B. DNA uses deoxyribose; RNA uses ribose; DNA stores genetic information; RNA does not participate in translation.
- C. DNA replication occurs in the cytoplasm; RNA processing happens after transcription.
- D. RNA contains thymine and DNA contains uracil.

Understanding how DNA and RNA differ in their sugar, bases, and roles clarifies why one statement best contrasts them. DNA uses deoxyribose as its sugar, while RNA uses ribose. In the bases, DNA has adenine paired with thymine and guanine with cytosine, whereas RNA replaces thymine with uracil, so adenine pairs with uracil and guanine with cytosine. Functionally, DNA is the stable storage of genetic information, the long-term repository of the genome. RNA, on the other hand, acts as the intermediary and executor of the genetic message—mRNA carries the code from DNA to ribosomes, where translation builds proteins, with tRNA and rRNA supporting that process. Other statements fail because they misstate these relationships: DNA replication is not generally described as happening in the cytoplasm for most organisms, and RNA does participate in translation, not just in other roles. Also, thymine is characteristic of DNA, while RNA contains uracil, not the other way around. The combination of the sugar difference, the base replacement, and the distinct roles—genetic information storage versus protein synthesis—makes this option the best contrast.

4. In competitive inhibition, apparent K_m increases while V_{max} remains unchanged.

- A. V_{max} decreases; K_m unchanged.
- B. V_{max} unchanged; K_m increases.
- C. V_{max} unchanged; K_m increases.**
- D. V_{max} increases; K_m unchanged.

In competitive inhibition, the inhibitor resembles the substrate and binds to the enzyme's active site, blocking substrate binding. Because the inhibitor and substrate compete for the same site, you need more substrate to achieve the same reaction rate, so the apparent K_m increases. However, V_{max} stays the same because at high substrate concentrations the substrate can outcompete the inhibitor, and the enzyme can reach its maximum velocity as if no inhibitor were present. This pattern—higher apparent K_m with unchanged V_{max} —distinguishes competitive inhibition from noncompetitive (V_{max} decreases, K_m unchanged) and uncompetitive (both K_m and V_{max} decrease) inhibition.

5. What are the products of pyruvate oxidation and where does it occur?

- A. NADH and NAD^+ , in mitochondria via LDH.
- B. Pyruvate converted to lactate in cytosol; no CO_2 produced.
- C. Acetyl-CoA and FADH₂ in cytosol via PDH.
- D. Acetyl-CoA, CO_2 , and NADH in mitochondria via PDH complex.**

Pyruvate oxidation, carried out by the pyruvate dehydrogenase complex in the mitochondrial matrix, converts pyruvate into acetyl-CoA while releasing carbon dioxide and generating NADH. Each pyruvate that enters this step yields one acetyl-CoA, one CO_2 , and one NADH, bridging glycolysis to the citric acid cycle and feeding electrons into the respiratory chain. This is why the correct description lists acetyl-CoA, CO_2 , and NADH, produced by the PDH complex in mitochondria. The other scenarios describe lactate formation in the cytosol or misstate the location and cofactors (such as producing FADH₂ or occurring outside the mitochondria).

6. In the fed versus fasting state, how does the liver regulate glucose production?

- A. Fed: insulin suppresses gluconeogenesis and promotes glycolysis; fasting: glucagon promotes gluconeogenesis and glycogenolysis.**
- B. Fed: glucagon promotes gluconeogenesis; fasting: insulin suppresses glycolysis.
- C. Fed: glucagon promotes glycogenolysis; fasting: insulin promotes glycolysis.
- D. Fed: insulin promotes gluconeogenesis; fasting: glucagon suppresses glycolysis.

The question tests how the liver changes glucose output depending on hormonal signals when fed versus fasting. When you've just eaten, insulin is high and your body is in a storage mode. Insulin tells the liver to stop making new glucose and to use incoming glucose for energy production and storage—so gluconeogenesis is suppressed and glycolysis is promoted. This means the liver converts glucose into pyruvate and then into fatty acids or glycogen rather than releasing more glucose into the blood. During fasting, glucagon is higher. It signals that energy is needed from stored sources, so the liver ramps up glucose production. Glucagon stimulates pathways that break down glycogen (glycogenolysis) and activate gluconeogenesis to generate glucose from noncarbohydrate precursors, ensuring blood glucose stays adequate for tissues that depend on it, like the brain. So the correct statement reflects insulin driving glycolysis and suppression of glucose production in the fed state, and glucagon driving gluconeogenesis and glycogenolysis in the fasting state. The other options swap or assign the wrong hormone roles to these pathways, which doesn't fit how insulin and glucagon regulate hepatic glucose output.

7. What does V_o represent in enzyme kinetics?

- A. Initial velocity at very high substrate
- B. Total product formed
- C. Velocity of the reaction for the initial part (first 60 sec)**
- D. Maximal rate of the reaction

V_o is the initial velocity of an enzyme-catalyzed reaction—the rate measured at the very start of the reaction when substrate concentration is effectively constant and little product has formed. This early-time slope reflects the true catalytic rate before substrate depletion or product inhibition alters the rate, so scientists often determine V_o from the initial portion of the progress curve, typically the first seconds up to about a minute. It is not the total amount of product formed, which is a cumulative quantity, nor the maximal rate reached at saturating substrate—that maximal rate (V_{max}) is the rate at which the enzyme runs when substrate is abundant.

8. Beyond NADPH production, what is another function of the pentose phosphate pathway?

- A. Primarily generates ATP through substrate-level phosphorylation.
- B. Directly converts glucose to lactate.
- C. Produces ribose-5-phosphate for nucleotide synthesis and can supply glycolytic intermediates via non-oxidative reactions.**
- D. Hydrogenates ribose to deoxyribose sugar for nucleotides.

Beyond making NADPH, the pentose phosphate pathway provides the ribose-5-phosphate needed to build nucleotides. The oxidative part makes ribose-5-phosphate, while the non-oxidative portion can rearrange carbon units to feed either nucleotide synthesis or glycolysis. Through enzymes like transketolase and transaldolase, the pathway can convert sugars back into glycolytic intermediates such as glyceraldehyde-3-phosphate and fructose-6-phosphate, allowing the cell to adapt to whether it needs ribose for nucleotides or more energy/metabolic intermediates from glycolysis. This pathway does not primarily generate ATP, nor does it directly convert glucose to lactate. It also doesn't hydrogenate ribose to deoxyribose in the pathway; deoxyribose is produced later from ribose-containing nucleotides in separate steps using reducing equivalents supplied by NADPH.

9. Which amino acid is ketogenic?

- A. Alanine
- B. Leucine**
- C. Proline
- D. Valine

Ketogenic amino acids break down to acetyl-CoA or acetoacetate, which can form ketone bodies but cannot be turned into glucose. Leucine falls into this category: its degradation produces acetyl-CoA and acetoacetate, so it contributes to ketone body formation rather than gluconeogenesis, making it strictly ketogenic. The other amino acids listed are glucogenic (or partly glucogenic): alanine is converted to pyruvate and feeds gluconeogenesis; valine is converted to succinyl-CoA, a TCA intermediate that can be used for glucose production; proline is converted to glutamate and then to α -ketoglutarate, which also feeds into gluconeogenesis. Thus leucine is the ketogenic amino acid here.

10. What are carbs (glucose) stored as in tissue?

- A. Glycogen
- B. Starch
- C. Cellulose
- D. Glycosylated proteins

Glucose is stored in tissue as glycogen. In animals, glycogen is a large, highly branched polysaccharide made of glucose units linked mainly by alpha-1,4 bonds with alpha-1,6 branches. This branching increases the number of terminal glucose ends, allowing rapid addition or removal of glucose when energy is needed. The liver stores glycogen to help maintain blood glucose between meals, while muscle glycogen provides a quick local glucose supply for muscle contraction during activity. Starch is the plant storage form of glucose, composed of amylose and amylopectin. Cellulose is a structural carbohydrate in plants with beta-1,4 linkages and is not digestible by humans. Glycosylated proteins are proteins with carbohydrate groups attached, not storage forms of glucose.

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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://biochemmod2.examzify.com>

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

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