

ASCP Molecular Biology (MB) Technologist 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

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 Allele Specific PCR primarily used to detect?**
 - A. Chromosomal rearrangements**
 - B. Single nucleotide changes**
 - C. Whole gene amplifications**
 - D. Complex trait interactions**
- 2. Which DNA polymerase is primarily used in the process of Nick Translation?**
 - A. DNA polymerase II**
 - B. DNA polymerase I**
 - C. DNA polymerase III**
 - D. DNA polymerase alpha**
- 3. Who does Ewing Sarcoma typically affect?**
 - A. Adults aged 40 and older**
 - B. Typically affects children and young adults**
 - C. Only infants**
 - D. Individuals over 60 years of age**
- 4. Which of the following accurately describes the use of allele specific primers in PCR?**
 - A. They amplify all alleles present in the sample.**
 - B. They can detect multiple mutations at once.**
 - C. They only amplify a specific allele.**
 - D. They allow for the sequencing of alleles.**
- 5. If a probe and target are 100% identical, what is the ideal stringency condition for the wash?**
 - A. High stringent**
 - B. Low stringent**
 - C. No stringency**
 - D. Variable stringency**

- 6. What type of medium is used for Western Blot analysis?**
- A. Agarose**
 - B. Polyacrylamide.**
 - C. Cellulose Acetate**
 - D. Gelatin**
- 7. What critical information does a negative template control provide during an experiment?**
- A. It confirms the presence of target DNA**
 - B. It ensures primers are not annealing to non-target sequences**
 - C. It guarantees amplification of target sequences**
 - D. It verifies DNA extraction procedures**
- 8. What is the primary function of DNA polymerase δ (delta)?**
- A. DNA replication and transcription**
 - B. DNA replication and repair**
 - C. DNA methylation**
 - D. DNA fragmentation**
- 9. What is the impact of a mutation in UGT1A1 on drug metabolism?**
- A. It affects the metabolism of Aspirin**
 - B. It affects the metabolism of Irinotecan**
 - C. It enhances the metabolism of chemotherapy drugs**
 - D. It has no effect on drug metabolism**
- 10. Multiplex Ligation-Dependent Probe Amplification (MLPA) is used to detect what type of mutational changes?**
- A. Point mutations**
 - B. Copy number changes**
 - C. Translocations**
 - D. Sequence variations**

Answers

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

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Explanations

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1. What is Allele Specific PCR primarily used to detect?

- A. Chromosomal rearrangements**
- B. Single nucleotide changes**
- C. Whole gene amplifications**
- D. Complex trait interactions**

Allele Specific PCR is primarily utilized to detect single nucleotide changes, which are small alterations in the DNA sequence that can significantly influence gene function and potentially lead to genetic diseases. This method amplifies only the specific allele that contains the nucleotide variant of interest, allowing for a sensitive and specific detection of mutations or polymorphisms associated with various conditions. The technique is particularly valuable in clinical settings for diagnosing genetic disorders caused by single nucleotide variations. For example, it can be used to confirm the presence of mutations in genes related to specific cancers or inherited diseases. The ability to discriminate between different alleles based on a single nucleotide difference makes Allele Specific PCR a powerful tool in molecular diagnostics and personalized medicine.

2. Which DNA polymerase is primarily used in the process of Nick Translation?

- A. DNA polymerase II**
- B. DNA polymerase I**
- C. DNA polymerase III**
- D. DNA polymerase alpha**

Nick translation is a molecular biology technique used to label DNA, where a nick is introduced in the DNA strand, and the DNA polymerase replaces the nucleotides surrounding the nick with labeled nucleotides. The key enzyme in this process is DNA polymerase I. DNA polymerase I possesses both 5' to 3' polymerase activity, allowing it to synthesize new DNA, and 5' to 3' exonuclease activity, enabling it to remove nucleotides from the existing strand. This combination of activities is crucial for the nick translation procedure, as it allows for the removal of nucleotides at the nick and simultaneous incorporation of new labeled nucleotides in their place. Other DNA polymerases, while they have significant functions in DNA replication and repair, do not possess the necessary exonuclease activity alongside polymerization to effectively carry out the nick translation process. Therefore, DNA polymerase I is the definitive choice for this technique.

3. Who does Ewing Sarcoma typically affect?

- A. Adults aged 40 and older
- B. Typically affects children and young adults**
- C. Only infants
- D. Individuals over 60 years of age

Ewing Sarcoma is a type of bone tumor that primarily occurs in children and young adults, typically between the ages of 10 and 20. This malignant neoplasm arises from the bone or soft tissue, with a significant prevalence in those within this age range, reflecting the rapid growth and development during adolescence that may contribute to the conditions under which this tumor develops. The distinction in age groups is crucial because it highlights the specific demographic that is most at risk for Ewing Sarcoma. It's important for healthcare providers and researchers to understand this targeted population when it comes to screening, diagnosis, and treatment options. The other age groups mentioned do not align with the epidemiological data associated with Ewing Sarcoma. For instance, adults aged 40 and older, individuals over 60, and infants do not typically present with this type of tumor, making the understanding of Ewing Sarcoma's impact on children and young adults essential for effective medical insights and interventions.

4. Which of the following accurately describes the use of allele specific primers in PCR?

- A. They amplify all alleles present in the sample.
- B. They can detect multiple mutations at once.
- C. They only amplify a specific allele.**
- D. They allow for the sequencing of alleles.

The use of allele-specific primers in PCR is designed to enhance the specificity of the amplification process by targeting only a particular allele within a given genetic locus. This means that when allele-specific primers are used, they bind to and amplify only the DNA sequence that corresponds to the specific allele for which the primer was designed. This is particularly useful in applications such as genotyping, where distinguishing between different alleles can provide critical information about genetic variations associated with certain diseases or traits. By amplifying only a specific allele, these primers contribute to the precision and sensitivity of the PCR technique, allowing for accurate detection of genetic variations. This is especially important in cases where certain mutations are of interest and need to be identified without interference from other alleles in the sample. As a result, using allele-specific primers enables a focused approach to genetic analysis, with the ability to study variations that may have significant biological implications.

5. If a probe and target are 100% identical, what is the ideal stringency condition for the wash?

- A. High stringent**
- B. Low stringent**
- C. No stringency**
- D. Variable stringency**

When a probe and its target are 100% identical, a high stringency wash condition is ideal. High stringency washing conditions typically involve higher temperatures and potentially higher salt concentrations, which help to ensure that only perfectly matched probe-target hybrids remain bound. This minimizes the likelihood of non-specific binding and increases the accuracy of detecting the target of interest. In this scenario of perfect complementarity, high stringency conditions ensure that any weak or partially matched sequences are effectively washed away, providing clearer and more reliable results. This is particularly important in molecular biology applications such as hybridization assays, where the specificity and sensitivity of the probe can greatly influence the outcomes. In contrast, low stringency conditions, which involve lower temperatures and salt concentrations, allow for some mismatched pairs to remain bound. This scenario would not be appropriate when you know the probe and target are perfectly identical, as it could lead to false positives or ambiguous results. The terms "no stringency" and "variable stringency" further dilute the specificity of the binding interactions, making them less suitable as well. Thus, high stringency is the most appropriate choice in this context.

6. What type of medium is used for Western Blot analysis?

- A. Agarose**
- B. Polyacrylamide.**
- C. Cellulose Acetate**
- D. Gelatin**

Polyacrylamide is the medium of choice for Western Blot analysis due to its ability to create a gel matrix that effectively separates proteins based on their size during electrophoresis. This separation occurs because polyacrylamide gels can be cast with varying concentrations to allow for the resolution of proteins with different molecular weights, making them highly suitable for distinguishing between proteins that are close in size. The use of polyacrylamide allows for high resolution in the separation process, enabling researchers to identify specific proteins within a complex mixture. Furthermore, after proteins are separated, they can be transferred to a membrane for antibody detection, which is a key step in the Western Blot procedure. This sensitivity and specificity in detecting proteins are essential for analyzing proteins in various applications such as diagnostics and research. Other options, while they may have their applications in different types of electrophoresis or biochemical assays, do not provide the same level of resolution and specificity required for Western Blotting as polyacrylamide does. For instance, agarose is typically used for separating larger nucleic acids rather than proteins, cellulose acetate is often associated with electrophoretic applications for smaller molecules or nucleic acids, and gelatin is not used as a separation medium in this

7. What critical information does a negative template control provide during an experiment?

- A. It confirms the presence of target DNA**
- B. It ensures primers are not annealing to non-target sequences**
- C. It guarantees amplification of target sequences**
- D. It verifies DNA extraction procedures**

A negative template control is crucial in an experiment, particularly in the context of molecular biology techniques such as PCR. This control contains all the necessary components of the reaction—primers, nucleotides, and polymerase—but it lacks the target DNA. The primary role of the negative template control is to assess whether the primers are nonspecifically binding or annealing to non-target sequences. When running an experiment, a negative template control should yield no amplification product. If there is amplification in this control, it indicates that the primers might be annealing to unintended sequences in the template, or there may be contamination in the reagents, leading to false-positive results. Thus, the negative template control serves as an important benchmark to ensure the specificity of the primers used in the experiment, confirming that any observed results in the experimental samples are indeed due to the target sequences and not other factors.

8. What is the primary function of DNA polymerase δ (delta)?

- A. DNA replication and transcription**
- B. DNA replication and repair**
- C. DNA methylation**
- D. DNA fragmentation**

The primary function of DNA polymerase δ (delta) is associated with DNA replication and repair. This enzyme plays a critical role during DNA synthesis, specifically in the synthesis of the lagging strand during DNA replication. It carries out this process by adding nucleotides to the growing DNA strand, thus facilitating the duplication of the genetic material. In addition to its role in replication, DNA polymerase δ is also involved in the repair of damaged DNA. It participates in various DNA repair pathways, ensuring the integrity of the genome by correcting errors that may occur during replication or as a result of DNA damage. The enzyme's proofreading ability enhances its fidelity, allowing for the correction of misincorporated nucleotides, which is vital for maintaining genetic stability. The other options mention functions that are either not associated with DNA polymerase δ or are functions of other types of enzymes. While DNA replication is indeed one of the primary roles of this enzyme, combining it with the function of repair provides a comprehensive picture of its importance in cellular processes.

9. What is the impact of a mutation in UGT1A1 on drug metabolism?

- A. It affects the metabolism of Aspirin**
- B. It affects the metabolism of Irinotecan**
- C. It enhances the metabolism of chemotherapy drugs**
- D. It has no effect on drug metabolism**

A mutation in the UGT1A1 gene primarily affects the metabolism of certain drugs, particularly those that require glucuronidation for elimination. UGT1A1 encodes a key enzyme that facilitates the conjugation of bilirubin and various drugs to glucuronic acid, thus making them more water-soluble and easier to excrete. Irinotecan, a chemotherapy drug used primarily to treat colorectal cancer, is one of the substances that is significantly affected by UGT1A1 activity. In individuals with mutations in UGT1A1, there can be reduced activity of the enzyme, leading to decreased metabolism and elimination of irinotecan. This can cause increased exposure to the active metabolite of irinotecan, SN-38, which can result in heightened toxicity and increased side effects in patients with UGT1A1 polymorphisms, particularly in those with the *28/*28 genotype that results in Gilbert's syndrome. Understanding the role of UGT1A1 in drug metabolism is crucial for personalized medicine, as it can help determine appropriate dosing strategies and improve patient outcomes by reducing adverse effects associated with chemotherapy. This clear association highlights why the mutation significantly impacts the metabolism of irinotecan.

10. Multiplex Ligation-Dependent Probe Amplification (MLPA) is used to detect what type of mutational changes?

- A. Point mutations**
- B. Copy number changes**
- C. Translocations**
- D. Sequence variations**

Multiplex Ligation-Dependent Probe Amplification (MLPA) is specifically designed to detect and quantify copy number changes in DNA, which includes deletions and duplications of genomic regions. This technique utilizes specific probes that bind to target sequences in the DNA, followed by a ligation step that joins adjacent probes. Once ligated, these products are amplified through PCR, allowing for the identification and quantification of specific DNA segments. The strength of MLPA lies in its ability to simultaneously analyze multiple target sequences, making it an efficient tool for assessing copy number variations across several genes or genomic loci in a single reaction. This is crucial in various clinical applications, such as diagnosing genetic disorders, detecting chromosomal abnormalities, and identifying potential cancer-related mutations. In contrast, point mutations are typically analyzed using sequencing techniques or specific mutation detection methods, translocations are generally evaluated using methods such as fluorescence in situ hybridization (FISH) or karyotyping, and sequence variations encompass changes in nucleotide sequences that might not result in copy number alterations. Therefore, the use of MLPA is particularly relevant to understanding and addressing copy number changes, confirming that this choice is the most accurate representation of what MLPA is intended to detect.

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://ascpmolecularbiology.examzify.com>

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