

BIO 2134 Tutorial (Accuracy and Precision)

1. Imagine you are conducting a protein quantification experiment using a spectrophotometer. If your measurements are consistently close to each other but differ significantly from the known concentration of the protein, would you say your results are more accurate or more precise? Explain why and discuss how you would improve the situation.
2. In a clinical laboratory, different technicians perform the same assay on identical samples but obtain slightly different results. Discuss whether this scenario highlights an issue of accuracy or precision and suggest possible reasons for the discrepancies.
3. You are testing a new diagnostic method that produces results which are consistently 10% higher than the known values, even though repeated measurements of the same sample yield nearly identical results.
 - (i) How would you categorize the method's accuracy and precision? Explain why.
 - (ii) What steps would you take to address the issue?

4. A biotechnology company is evaluating the performance of two different analytical methods for detecting a biomarker in blood samples.

Method A consistently produces results close to the true biomarker concentration but varies significantly between trials.

Method B gives highly consistent results but is often far from the true value.

- (i) Which method is more accurate?
 - (ii) Which is more precise?
 - (iii) Which would you recommend for clinical use? Explain why?
5. A researcher notices that their results are both highly precise and highly accurate when working in the morning but become more variable and less accurate when working in the afternoon. What does this suggest about the nature of the errors, and what potential sources of error could be causing this change?
 6. When conducting a PCR (polymerase chain reaction) experiment, the amplification results seem to vary slightly each time despite following the same protocol, while another set of results from a different machine consistently shows a lower yield. How would you diagnose the presence of random and systematic errors in these experiments?