

Tishk International University
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Nutrition and Dietetics Department



Nutritional Biochemistry I

Pre-Lab (1): Qualitative Measurements

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Outline

- Qualitative and Quantitative measurements
- Visual Indicators
- Qualitative test in nutritional assessment
- Error sources

Qualitative and Quantitative measurements



- Qualitative measurements describe **the presence or absence** of a substance or the **type of reaction** that occurs, without determining the exact amount.
- These tests rely on **observable characteristics**, such as color change, precipitate formation, or odor, to indicate a result.
- **Quantitative measurements** determine **how much** of a substance is present, usually through numerical data (e.g., concentration in mg/mL or g/L) obtained by analytical methods such as spectrophotometry or titration.

Quantitative = How much is present?

Qualitative = What is present?

Importance of indicators in biochemical tests



Color changes serve as **visual indicators** of specific chemical reactions between biological molecules and reagents. Each reagent reacts with certain functional groups, producing a distinct color that signifies the **presence of a particular biomolecule** (e.g., sugars, proteins, lipids).

For example:

- Benedict's reagent turns **orange-red** in the presence of reducing sugars.
- Biuret reagent becomes **violet** when reacting with peptide bonds in proteins. These visible changes make biochemical tests simple, rapid, and effective for identifying nutrients without the need for advanced instruments.

Role of qualitative tests in nutritional assessment?



Qualitative tests help identify **the types of nutrients** present in food samples, which is useful in evaluating **nutritional quality and composition**. For example, detecting carbohydrates, proteins, and fats in foods allows students and researchers to determine whether a sample provides a **balanced nutrient profile**. Such tests are beneficial for:

- Comparing different food sources.
- Evaluating nutrient content in dietary studies.
- Understanding metabolic and biochemical functions of nutrients.

While qualitative tests do not give exact quantities, they provide essential **preliminary data** that guide further **quantitative or nutritional analyses**.



Sources of error might affect the results of qualitative analysis.

Several factors can introduce **errors** in qualitative biochemical tests, including:

- 1. Improper sample preparation** – impurities or incorrect dilutions may alter results.
- 2. Contaminated glassware or reagents** – can cause false positive or negative reactions.
- 3. Incorrect reagent volume or concentration** – affects color intensity and accuracy.
- 4. Inadequate heating or mixing** – may prevent reactions from completing.
- 5. Subjective color interpretation** – different observers may perceive color intensity differently.

To minimize these errors, all equipment should be clean, reagent volumes measured accurately, and tests repeated for consistency.



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