Dr. Muslim Al-Eidani

Metabolism (Practical)

Second Stage

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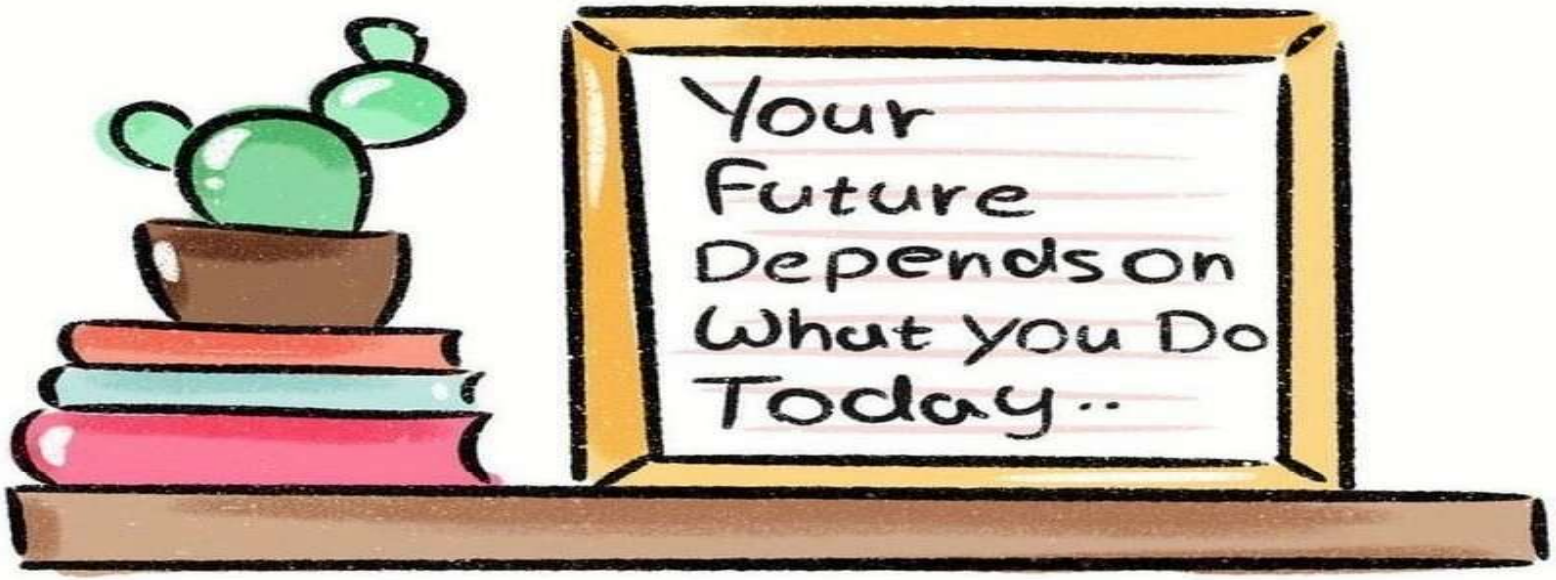

خديجة بدر
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مستقبلك يعتمد
على ما تفعله اليوم

What is Clinical Biochemistry?

It studies the chemical processes in the human body and examines biological fluids to help in diagnosis and treatment. It connects chemistry with medicine to understand metabolism and how organs work.

Importance of Clinical Biochemistry

- - Detects diseases at early stages
- Evaluates liver, kidney, and heart function
- Monitors enzymatic and metabolic activity
- Supports clinical decision-making

Laboratory Safety

- Always wear a lab coat, gloves, and goggles
- Never eat or drink in the lab
- Dispose of waste properly
- Handle glassware and chemicals carefully

Common Instruments

- Spectrophotometer
- Calorimeter
- Centrifuge
- Micropipette

Micropipette

Spectrophotometer

Calorimeter

Centrifuge

Calorimetry

Calorimetry measures the heat released or absorbed during physical or chemical processes. It determines the energy content and reaction enthalpy.

Principle of Calorimetry

- When a reaction occurs, heat is either absorbed (endothermic) or released (exothermic).

  $q = m \times c \times \Delta T$

  (q = heat, m = mass, c = specific heat, ΔT = temperature change)

Types of Calorimeters

1. Simple Water Calorimeter
2. Bomb Calorimeter
3. Differential Scanning Calorimeter (DSC)

Components of a Bomb Calorimeter

- Reaction vessel (bomb)
- Water bath

Stirrer and thermometer
- Ignition system
Calibration ensures accuracy.

Applications of Calorimetry

- Determining energy content of food
- Measuring metabolic rates
- Studying thermodynamics
- Pharmaceutical quality control

Spectrophotometry

- Spectrophotometry measures light absorbance by a solution. Essential in biochemical and clinical assays

Beer–Lambert Law

$A = \varepsilon \times c \times l$

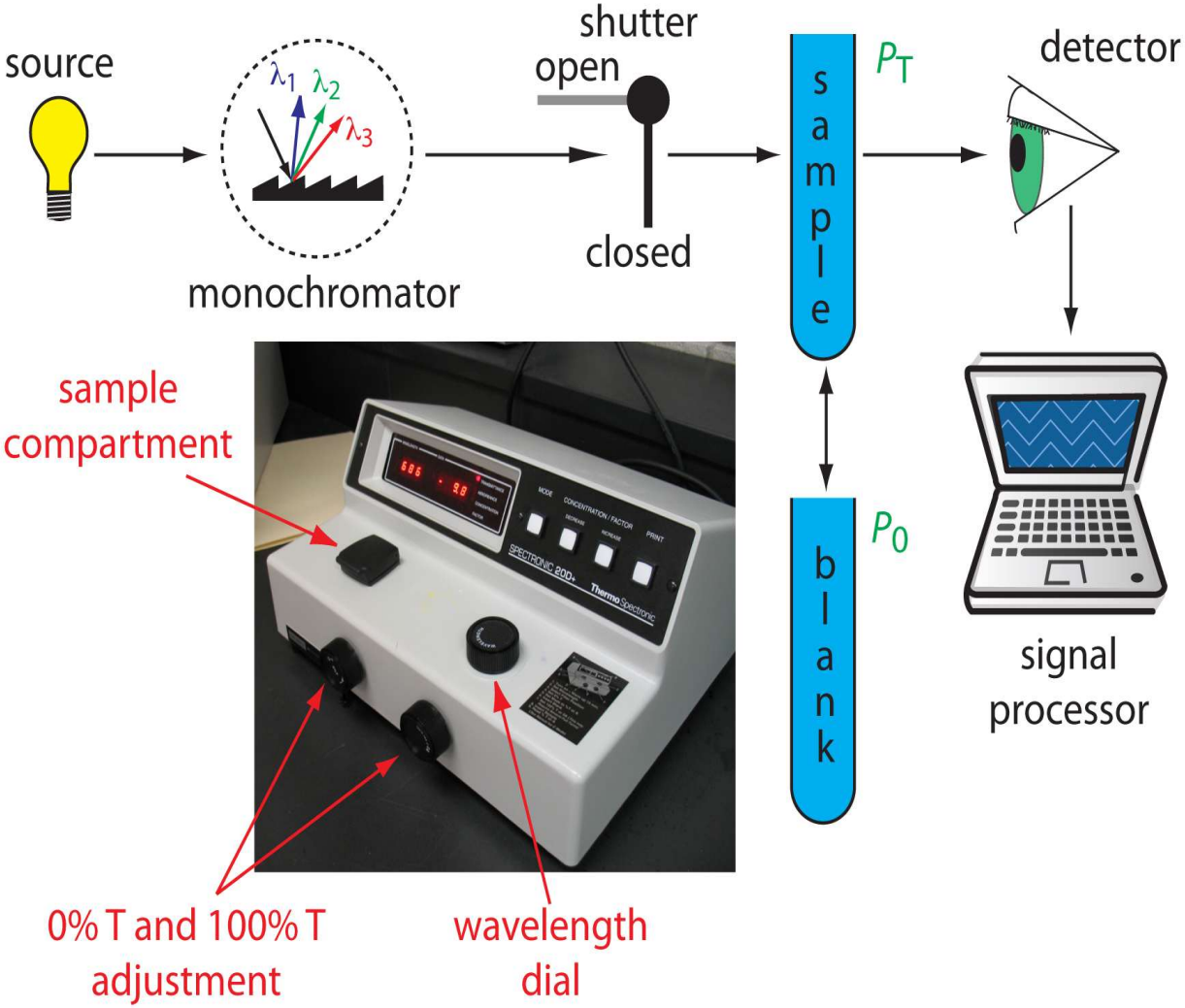
A = absorbance,

ε = molar absorptivity,

c = concentration,

l = path length. Absorbance is directly proportional to concentration.

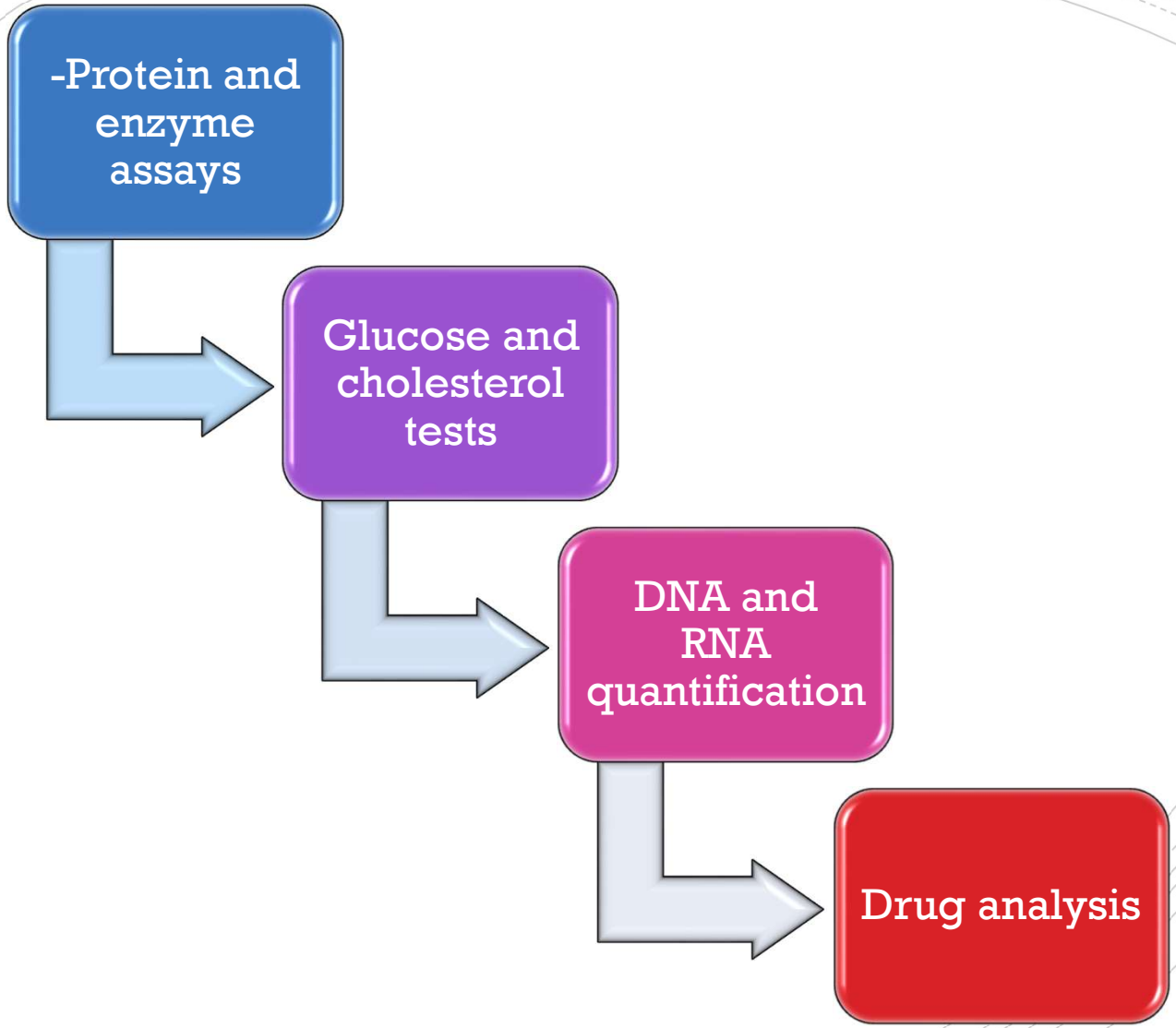
Components of a Spectrophotometer



Procedure

1. Turn on and warm up instrument
2. Select wavelength
3. Calibrate using a blank
4. Measure absorbance

Applications of Spectrophotometry



Comparison Between Calorimetry and Spectrophotometry

PARAMETER	Calorimetry	Spectrophotometry
Measured	Heat energy	Light absorbance
Output	Temperature change	Absorbance value
Application	Energy analysis	Concentration measurement


THANK
YOU
FOR
YOUR
ATTENTION