

A decorative graphic on the left side of the slide. It features a brown arrow pointing right at the top, and several thin, curved lines in shades of green and brown extending downwards from the arrow's base.

# Colorimeter

- **A colorimeter is a light-sensitive device used for measuring the transmittance and absorbance of light passing through a liquid sample. The device measures the intensity or concentration of the color that develops upon introducing a specific reagent into a solution.**
- **There are two types of colorimeters --- color densitometers, which measure the density of primary colors, and color photometers, which measure the color reflection and transmission.**

# ➤ Design of Colorimeter

The three main components of a colorimeter are a light source, a cuvette containing the sample solution and a photocell for detecting the light passed through the solution.

- The instrument is also equipped with either colored filters or specific LEDs to generate color. The output from a colorimeter may be displayed by an analog or digital meter in terms of transmittance or absorbance.
- In addition, a colorimeter may contain a voltage regulator for protecting the instrument from fluctuations in mains voltage. Some colorimeters are portable and useful for on-site tests, while others are larger, bench-top instruments, which are useful for laboratory testing.

# Colorimeter



# On-site tests colorimeter



# Bench-top instruments colorimeter



# Working principle of colorimeter

## Working Principle

- ▶ The colorimeter is based on Beer-Lambert's law, according to which the absorption of light transmitted through the medium is directly proportional to the medium concentration.
- ▶ In a colorimeter, a beam of light with a specific wavelength is passed through a solution via a series of lenses, which navigate the colored light to the measuring device. This analyzes the color compared to an existing standard. A microprocessor then calculates the absorbance or percent transmittance. If the concentration of the solution is greater, more light will be absorbed, which can be identified by measuring the difference between the amount of light at its origin and that after passing the solution.
- ▶ To determine the concentration of an unknown sample, several sample solutions of a known concentration are first prepared and tested. The concentrations are then plotted on a graph against absorbance, thereby generating a calibration curve. The results of unknown sample are compared to that of the known sample on the curve to measure the concentration.

# Application of colorimeter

## Applications

Colorimeters are widely used to monitor the growth of a bacterial or yeast culture. They provide reliable and highly accurate results when used for the assessment of color in bird plumage. They are used to measure and monitor the color in various foods and beverages, including hesh vegetable products and sugar. Certain colorimeters can measure the colors that are used in copy machines, fax machines and printers.

Besides being used for basic research in chemistry laboratories, colorimeters have many practical applications such as testing water quality by screening chemicals such as chlorine, fluoride, cyanide, dissolved oxygen, iron, molybdenum, zinc and hydrazine. They are also used to determine the concentrations of plant nutrients such as ammonia, nitrate and phosphorus in soil or hemoglobin in blood.

Colorimetry is also used in color printing, textile manufacturing and paint manufacturing for precise quality inspection.





THANK YOU