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((Analytical Chemistry))

Stage (First Year)

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A Brief Overview of the Development of Analytical Chemistry

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Introduction

Analytical chemistry is a major branch of chemistry focused on identifying, measuring, and understanding chemical substances.

It helps scientists determine the composition of materials and investigate their chemical properties.

Analytical chemistry is essential in research, industry, medicine, environmental studies, and everyday life.

Example: Testing water for pollution, analyzing medicines, or checking food quality.



Drivers of the Development of Analytical Chemistry

1. People needed to identify substances.
2. Medicine, industry, and technology required better analysis.
3. Accurate measurements are important for safety.



Historical Development of Analytical Chemistry

Analytical chemistry developed gradually over time.

Early analytical methods were simple and limited in accuracy.

With scientific advancement, analytical techniques improved and instruments replaced human senses.

1. Ancient Times

1. Analysis was qualitative.
2. Accuracy was low.
3. Examples: Distinguishing metals by color; testing water clarity.
4. Tools: Simple balances, mortars, basic heating devices.

2. Middle Ages

1. Accuracy improved.
2. Basic chemical reactions were used.
3. Examples: Separating alcohol from water; making dyes; testing metal purity.
4. Tools: Filtration setups, simple distillation apparatus.



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3. Modern Era

1. Quantitative analysis became possible.
2. Accuracy and precision increased.
3. Examples: Measuring pollutants in water; determining drug concentration; analyzing food composition.
4. Instruments: Spectrophotometers, pH meters, chromatographs, balances.

4. Analytical Chemistry Today

1. Widely used in medicine, industry, environmental studies, and research.
2. Important for quality control, safety, and innovation.
3. Examples: Testing food quality; monitoring factory emissions; forensic analysis; water and soil testing.
4. Instruments: Advanced spectrophotometers, HPLC, GC, pH meters, atomic absorption spectrometers.