

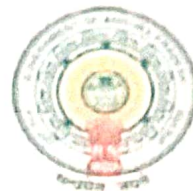


GOVERNMENT DEGREE COLLEGE (MEN)

ACCREDITED BY NAAC WITH B++ (CGPA 2.90)

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ICT BASED LESSON PLAN

Date and Time (duration)	31.10.2023 11.40 am to 12.30 pm
Class:	III B.SC MPCS
No. of students attended	21
Name of the Class Teacher	R.Ravi Kumar, Lecturer in Physics,GDC(M),Srikakulam
Title:	Constant gas volume thermometer
Objectives	<ol style="list-style-type: none">1.Understanding Temperature Measurement2.Appreciating the Ideal Gas Law3.Exploring Gas Behaviour at Constant Volume4.Learning Thermodynamic Principles5.Enhancing Experimental and Analytical Skills6.Applying in Scientific Research7.Exploring Practical Applications8.Analyzing Advantages and Limitations
Materials used	<ol style="list-style-type: none">1.Computer with projector2.Internet access3. Access videos from YouTube4.Whiteboard and markers
Introduction (5 minutes) Begin with a captivating video or images.	<ol style="list-style-type: none">1. What is the fundamental purpose of a thermometer?2. Can you name different types of thermometers that you're familiar with?3. How do gases respond to changes in temperature and pressure, based on what you know about gas laws?4. Why is it important to maintain a constant volume in certain thermometers?5. Can you think of situations where high sensitivity in temperature measurement is Crucial?6. How might a constant gas volume thermometer be useful in scientific experiments or industrial processes?7. What are some challenges or potential sources of error associated with using a constant gas volume thermometer?

**Virtual Insect Exploration
(10 minutes)**

Students were visualized the YouTube video and analyze constant gas volume thermometer.

<https://www.youtube.com/watch?v=AB57wg8qkIE>
<https://www.youtube.com/watch?v=n0xΛQXL905c>
<https://www.youtube.com/shorts/LXvytΛK09f0>

**Presentation and Discussion
(20 minutes)**

A constant gas volume thermometer is a specific type of thermometer used to measure temperature by keeping the volume of a gas constant. This type of thermometer operates on the principle that the pressure of a gas is directly proportional to its temperature at constant volume.

Gas Laws and Thermometry

- Boyle's Law: States that at constant temperature, the pressure and volume of a gas are inversely proportional.
- Charles's Law: At constant pressure, the volume and temperature of a gas are directly proportional.

Concept of Constant Volume Thermometry

- Definition: A constant gas volume thermometer maintains the volume of a gas at a constant value throughout the temperature measurement process.
- Working Principle: Relies on the pressure-temperature relationship of a gas under constant volume conditions.

The Ideal Gas Equation

- Equation: $PV = nRT$ (where P is pressure, V is volume, n is the number of moles, R is the gas constant, and T is temperature in Kelvin).
- Application: Utilized in constant gas volume thermometry to establish the relationship between pressure and temperature.

Construction of a Constant Gas Volume Thermometer

- Components:
 - A fixed volume container (to maintain constant volume).
 - A pressure-measuring device (e.g., pressure gauge).
 - Gas (typically an ideal gas, like nitrogen or helium).

Temperature Measurement Process

- Step 1: The gas is enclosed in the fixed volume container.
- Step 2: The pressure of the gas is measured using the pressure gauge.
- Step 3: The pressure reading is related to temperature using the ideal gas equation.

Advantages of Constant Gas Volume Thermometers

- High Sensitivity: Small temperature changes result in significant pressure changes due to constant volume.
- Wide Range: Can measure a wide range of temperatures accurately.

Applications

- Scientific Research: Particularly useful in precise experimental conditions where accurate temperature measurement is crucial.
- Industrial Applications: In settings where accurate and sensitive temperature measurements are required.

Limitations and Challenges

- Sensitivity to Volume Changes: Changes in volume due to leaks or other factors can affect measurements.
- Maintenance and Calibration: Requires regular maintenance and calibration to ensure accuracy.

Conclusion (5 minutes)

- Constant gas volume thermometers offer high sensitivity and accuracy by maintaining gas volume constant during temperature measurements.
- Significance: Valuable tools in scientific research and various industrial applications.

This presentation provides an overview of a constant gas volume thermometer, including its working principle, construction, applications, and limitations. Feel free to tailor the content based on your audience and specific requirements.

Activity photos

