Emilio Aguinaldo College

918 Gonzales Street, Ermita, Manila
Tel. No(s).:(02) 521-27-10
SCHOOL OF EDUCATION

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EXPERIMENT TITLE: "GAS BEHAVIOR IN A DIY SODA BOTTLE THERMOMETER

A draft Paper

Presented to

Michelle Carodan

EMILIO AGUINALDO COLLEGE - MANILA

Submitted by

11 STEM 8

Leader: Rabano, Jen Sofia G.
Members: Sabado, Prince Harry
Capricho, George Anthony
Corong, Mark Harold
Roque, Princes Cherilyn

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Experiment Title: "Gas Behavior in a DIY Soda Bottle Thermometer"

Introduction

Gas behavior refers to the study of how gasses behave under conditions, such as changes in temperature, pressure and volume. It is a concept in physics and chemistry that helps us understand the properties and characteristics of gasses. One important principle related to gas behavior is Charles Law, which states that at pressure the volume of a gas is directly proportional to its temperature. This means that as the temperature of a gas increases its volume also increases and vice versa. This experiment aims to investigate the relationship between temperature variations and gas behavior in a homemade soda bottle thermometer. The investigation will focus on how the gas inside the thermometer responds to temperature changes by expanding or contracting, and how this expansion or contraction can be employed as a thermometer's internal indicator of temperature changes. This simple experiment using a bottle as a thermometer illustrates the fundamentals of gas dynamics. When heated, gasses expand and when cooled, they disappear. These changes in gas volume based on temperature changes can be seen and measured by the movement of the water in the straw. This experiment not only clarifies the behavior of gasses but also demonstrates how thermometers and other devices that depend on thermal expansion and contraction can use these concepts practically. The study of gas behavior in a DIY Soda Bottle Thermometer Experiment is important because it provides a tangible, educational, and engaging way to learn fundamental scientific principles, develop scientific skills, and appreciate the practical applications of these principles in our everyday lives. The laboratory experiment "Gas Behavior in a DIY Soda Bottle Thermometer" was selected because it can offer a precise, controlled, and repeatable setting for investigating the behavior of gasses. In addition to adding to scientific knowledge, this project gives students useful educational opportunities. With a focus on the justification and significance of carrying out the experiment in a laboratory setting, this framework highlights the main topics to include in your concept paper. A connection between the chemical experiment "Gas Behavior in a DIY Soda Bottle Thermometer" and the study of gas laws, specifically the ideal gas law and ideas about temperature, pressure, and volume of gasses, is probably possible. Students could use a soda bottle filled with air as a basic thermometer for this experiment. They may examine how temperature variations affect the volume of the gas and, consequently, the pressure it exerts by altering the temperature of the air inside the container.

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Experiment Result

The Result shows that when the DIY bottled Thermometer is put in the bowl of hot water the water inside the straw significantly rises. The opposite happens when the thermometer is put in the ice cold water, after a couple of minutes the water level inside the straw starts to drop slowly.

The alcohol within the plastic bottle expands as a result of thermal expansion when the surrounding temperature rises around the homemade thermometer. The amount of alcohol in the straw rises as a result of the alcohol expanding and taking up more room in the bottle. The temperature has increased, as shown by the rise in alcohol content within the straw. In contrast, the alcohol contracts as the temperature drops. As a result, it takes up less room inside the bottle, which lowers the amount of alcohol in the straw. There has been a drop in temperature, as evidenced by the straw's alcohol content.

In general, the DIY thermometer's straw's movement in relation to the alcohol level provides a visible representation of temperature.

Data Analysis

In this experiment, Researchers aimed to create a DIY bottle thermometer. To conduct the experiment, They gathered materials that are needed for the experiment including a clear plastic soda bottle with a screw cap, a drinking straw, water, food coloring (optional), marker, modeling clay, a bowl of ice water, a bowl of warm water, and a ruler. The process involved filling the plastic bottle three quarters full with water, optionally adding food coloring for visibility. A straw was carefully inserted into the bottle without touching the sides or bottom. Researchers marked the bottle in centimeters to measure water level inside the straw. To prevent air or water leakage, the straw was sealed with modeling clay. The prepared bottle was then exposed to different temperatures, such as hot and cold water. The initial water temperature inside the straw behaved in various temperatures, including room temperature. They may use a ruler to measure how far the water rises in response to hot or cold water, looking for patterns or trends. For instance, they might notice increased movement in hot water compared to cold water. By observing these patterns, Researchers could draw conclusions about how temperature affected the straw’s movements in their DIY bottle thermometer. Finally, Researchers can compile their observations into tables for data analysis.

Discussion

The goal of the proposed experiment, "Gas Behavior in a DIY Soda Bottle Thermometer," is to examine how gasses behave and react to temperature changes inside a sealed soda bottle thermometer. Investigating the relationship between temperature and gas pressure within a sealed soda bottle thermometer is one of the main goals. According to Charles's Law, which states that gas pressure should increase as temperature rises and drop as temperature falls, this study should produce results that are inline with this law. If this relationship is found, Charles's Law would be substantially justified.

An additional significant goal is the actual application of knowledge related to gas behavior. By creating a homemade soda bottle thermometer, students may have first-hand experience with how gasses expand and contract in response to temperature changes. By bridging the theoretical and real-world application gaps, this interactive presentation aids students in better understanding gas behavior and its relevance to their everyday lives.In the context of the grade 11 chemistry curriculum, this experiment connects perfectly with the fundamental concepts of gas laws and thermodynamics. It provides a realistic demonstration of how these concepts function, supporting the theoretical knowledge acquired in the classroom. Furthermore, it encourages active learning and critical thinking, two crucial components of a good scientific education.It is expected that as the experiment goes on, significant information will be produced and given in the final experiment report. Students will have the chance to evaluate their experimental methods and potential causes of error by critically analyzing any variations from the anticipated results. This analysis adds to a thorough knowledge of gas behavior and is a crucial component of the scientific process.Experiment to Clearly Illustrate Gas Expansion and Contraction: The experiment will clearly demonstrate how gasses expand and contract in response to temperature changes. This tangible experience supports the basic idea of gas behavior.Students are expected to see how the gas laws are directly applicable to daily life, notably through the operation of the soda bottle thermometer. This helps to better understand scientific ideas by bridging the gap between theory and application.

This discussion represents the experiment's desired aims, relevance to the grade 11 chemistry curriculum, emphasis on critical thinking, and practical application while acting as a general strategy for the experiment. As the experiment proceeds, empirical data will be provided, and the final report will contain a more in-depth discussion, an analysis of the results, and conclusions drawn from the experiment's findings.

Conclusion

Experimenting on "Gas Behavior in a DIY Soda Bottle Thermometer," it is clear that the potential significance and influence of such an experiment cannot be emphasized. This experiment provides a hands-on opportunity to apply scientific ideas in a real-world setting and opens the door to learning the basic principles of gas behavior and its link to temperature. One can strengthen their fundamental understanding of thermodynamics by conducting this experiment and gaining insightful knowledge about the behavior of gasses. Also, as understanding gas behavior is vital in disciplines like meteorology, engineering, and environmental research, the knowledge gathered from such studies can have broad applications in these areas as well. The experiment's significance and prospective impact on scientific knowledge and real-world applications are thus undeniable even though it is not carried out in this instance.

Application and Real Life Connection

The experiment, "Gas Behavior in a DIY Soda Bottle Thermometer," is highly applicable and pertinent to everyday life. This experiment investigates how gasses respond to temperature changes in order to bridge the gap between theoretical knowledge and its practical applications. The ideas presented in this experiment can be readily applied to a variety of real-world scenarios. For instance, it works in a similar way as house thermostats and enables us to keep cozy inside temperatures. By connecting the results to the behavior of gasses in weather balloons, the findings also shed insight on the techniques employed by meteorologists to gather crucial information for weather forecasting. It also illustrates the essential ideas of engine temperature control, which have an impact on how well and efficiently cars operate. Through the DIY Soda Bottle Thermometer project, students get a firsthand look at how understanding gas behavior affects our capacity to forecast weather trends, organize outside activities, and respond to extreme weather occurrences.The automobile sector is a factor in how gas behavior relates to actual world circumstances. Gas combustion engines, which are the backbone of automobiles, prioritize precise temperature control. It is essential to have a good grasp of gas behavior at various temperatures in order to maximize engine efficiency and performance. Charles's Law-related concepts are used by engine coolant systems, which regulate engine temperature, to guarantee that the engine operates at the proper temperature. By comprehending the fundamental concepts presented in the DIY soda bottle thermometer experiment, students may get an understanding of how these principles enable the design and operation of vehicles, developing automotive technology.

The "Gas Behavior in a DIY Soda Bottle Thermometer" experiment not only discusses Charles' Law and the fundamentals of gas behavior, but it also has an important impact on the everyday aspects of our life. It provides an actual connection between classroom learning and the outside world by exposing the uses of gas behavior in temperature control, meteorology, and the

automobile industry. Additionally, it develops students' capacity for critical thought as well as their interest and enthusiasm for scientific investigation, enabling them to understand the significant influence that chemistry has on the world in which they live. The ultimate goal of this experiment is to inspire the subsequent generation of scientists and engineers to push the boundaries of knowledge and creativity by opening a door to a greater understanding of the natural sciences and its application to our daily lives.

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