**“To Float or Not to Float”**

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**1. Abstract** McBob 3

 The purpose of this project was to find out whether or not a can of regular soda and diet soda would sink or float when placed in a tub of water at room temperature. The hypothesis was if a can of regular soda is placed in a tub of water, then it will sink while its diet counterpart will float. The experiment involved placing 4 cans of regular soda and their counterpartys into a bin of tap water. The water was left at room temperature and did not contain any solutes. Three trials were conducted. Data was recorded on a table based upon whether the can of soda sank or floated. Various types of soda were used, but final results were matched against similar sodas. For example, the Mountain Dew and Diet Mountain Dew data were compared for a more accurate depiction of cause of floating or sinking. Once the data was recorded, it was revealed that regular soda does indeed sink while its diet counterpart floated. The ingredients were compared and contrasted to attempt to find the cause for the different results. Research was also conducted to find the answer to why the diet soda floated while the regular soda sank. After much research and data analysis, a proper conclusion was made to explain the phenomena. The diet soda has a lower density than regular soda because of its sugar content. A solution with more solutes will be denser than water alone which explains why regular soda sank in water.

**2. Introduction** McBob 4

The purpose of this experiment is to determine whether regular soda or diet soda will sink or float when placed in a tub of water. Based on the research conducted, the hypothesis for this project is that if a can of regular soda is placed in a tub of water at room temperature, then it will sink while its diet counterpart will float.

 In the following experiment four different types of 12 ounce aluminum cans of regular soda and their diet counterparts will be tested. The cans of soda will be placed in a tub of room temperature water. Observations will be made as to whether the cans sink or float. The data will be recorded. Three trials of this experiment will be conducted to assure accuracy of results. After the results are recorded, the ingredients of each type of soda will be compared.

Density is the amount of mass contained within a specific volume (“Density”, pg. 1). When an object has a higher density than water, it will sink, whereas an object that has a lower density than water will float (Ophardt, Pg. 3). Research has shown that when placing cans of soda into a tub of water, the cans of diet soda were usually less dense than water, so they float (Shakhashiri, pg. 1). Sweetener is much sweeter than sugar, but has less mass (Lewis, pg. 1). Due to the lower mass, the overall density of diet soda is less than that of regular soda as well as water (Spangler, pg. 3). In 12 ounces of regular soda, there are over 40 grams of sugar which contributes to the higher mass and makes the can sink in water (Lewis, pg. 2).

This topic is of interest because the amount of soda and diet soda consumed in the United States are very high. It is interesting that people will consume such large quantities of soda even though some sodas will float and some will sink. Experimenting

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why objects float or sink in water is a way to learn more about density and to further explore this topic. Even though some materials look heavier than water, its density may actually be less causing it to float in water.

**3. Experiments and Data**

*Purpose*

To determine if regular and diet soda floats or sinks when placed in water and what causes them to sink or float.

*Materials*

4 can of diet soda

4 can of regular soda

Medium to large bin

Water

*Procedure*

1. Fill a bin with room-temperature water almost to the top.
2. Gently place the can of soda into the water.
3. Record if the soda floats or sinks.
4. Test various diet and regular sodas.
5. Record data on table.

*Data Table:* **Sink or Float Trials 1-3**

|  |  |  |
| --- | --- | --- |
| Soda | Float: T1 T2 T3 | Sink: T1 T2 T3 |
| Mountain Dew |   |  X X X |
| Diet Mountain Dew |  X X X |  |
| Coke |  |  X X X |
| Diet Coke |  X X X |  |
| Root Beer |  |  X X X |
| Diet Root Beer |  X X X |  |
| Fanta Orange |  X X X |  |
| Diet Fanta Orange |  X X X |  |

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|  |
| --- |
| *Bar Graph***: Average of Cans of Soda: Sink or Float** |

**4. Conclusion**

 As stated in the hypothesis, if cans of regular soda are placed in a tub of water, then they will sink while their diet counterparts will float. The results of this experiment indicated that 3 out of the 4 regular cans of soda sank when placed in water and 4 out of 4 of the diet cans of soda floated when placed in water. The regular can of Orange Fanta floated. The ingredients of the cans of soda were then compared. All regular cans of soda except the Orange Fanta had 40mgs of sugar. Orange Fanta had 5mgs of sugar making its density less than that of water. All diet sodas contained 0mgs of sugar therefore making their density less than water and allowing them to float. Overall, the hypothesis was supported. Although an object may feel or look heavier than water, its density actually determines its ability to float or sink. Another aspect of this experiment that could be tested is changing the temperature of the water in the tub

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to hot or cold and then seeing if the cans of regular and diet soda will show the same results as when the water was at room temperature. If this experiment was to be conducted again, the cans of soda would be placed into the bin of water with the same force to ensure accurate results.

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