Testing Oil with Different Liquids

Introduction

This project came to my mind me when I observed a lava lamp. Watching the oil and water separate reminded me that oil and water do not mix because they have different properties. This made me curious about how oil behaves when combined with water and other liquids. I chose this project to investigate how oil interacts with different liquids and to understand why some liquids mix while others do not.

Problem & Prediction

The purpose of this experiment is to answer the following question: Which liquids do not mix with oil, just as oil does not mix with water? My hypothesis is that liquids that contain mostly water, such as milk and apple juice, will not mix with oil. However, I think that soda and soap will mix because they can have special molecules that can interact with both oil and water. I think this will happen because oil and water have different molecular properties, which prevents them from mixing easily.

Investigative Method or Procedure

Material:

- 6 glass cups
- A spoon
- Measuring cup
- Oil
- Water
- Milk
- Apple juice
- Energy drink
- Soap
- Soda.

Procedure:

Step 1: First pour 200 ml of each liquid in each glass cup.

Step 2: Then pour 50 ml of oil in each cup.

Step 3: Then use a spoon and mix for 10 seconds.

Step 4: Finally wait for the results and do your observations.

Investigative Method or Procedure

Variables:

- **Independent**:
  Type of liquid being tested (milk, soda, coffee, hot tea, energy drink, lemonade, etc.).
- **Dependent**:
  Whether the liquid mixes with the oil or not (amount of mixing observed).
- **Controlled**:
  Amount of oil used
  Amount of each liquid used
  Type of container
  Mixing method (same stirring time or no stirring)

Results

My results were that the milk, soda, apple juice, energy drink, and water didn't mix with the oil, but the soap mixed a little bit with the oil and took longer to separate.

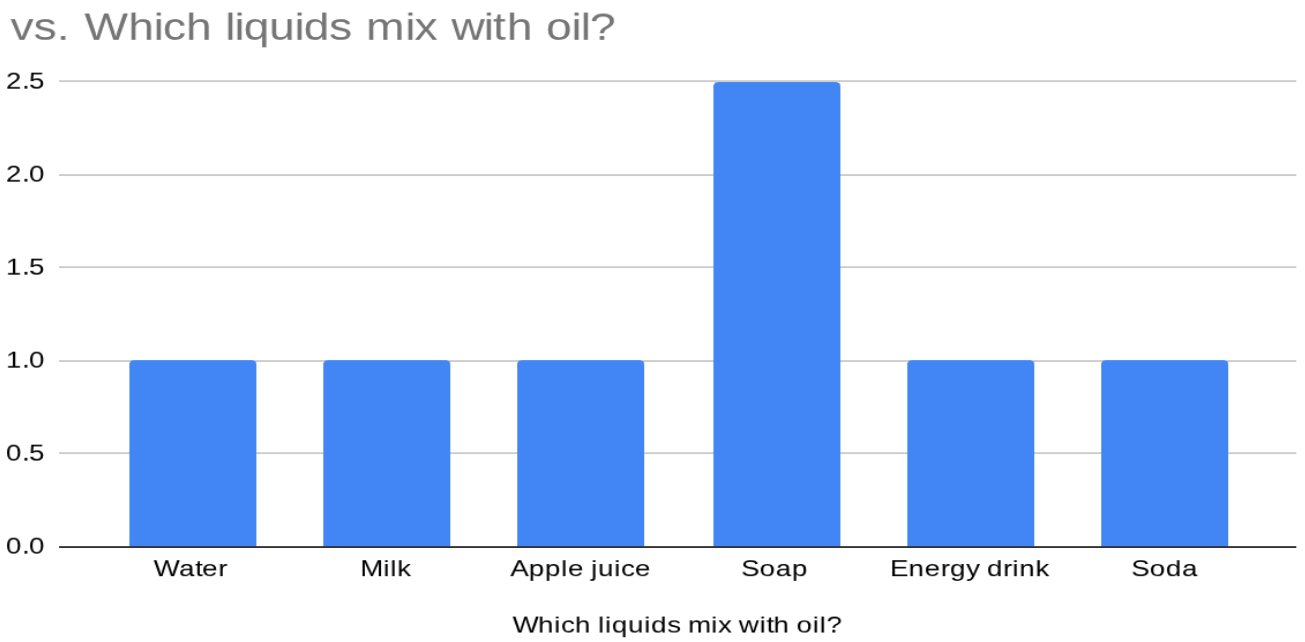
My hypothesis was partially correct because I predicted that the soda would mix with the oil, but it didn't. I also predicted that the soap would mix with the oil, and it did.

Finally, I decided to mix all the liquids together, so I was able to observe how the oil, the soap, and the rest of the liquids separated and created three different layers.

Photos

Graph

The numbers means if the liquid mix or not. The number 1 (the result for most of the drinks) means that did not mix and the 2.5 (the number of the soap) means that the liquid mix, but not completely.



Discussion and Interpretation

I investigated the amount of water in the liquids that I used, and I noticed that some of the liquids that didn't mix have between 80% and 95% water. On the other hand, the soap has about 40% water and about 60% other chemical substances. So, my final response to what happened is that the chemicals helped the oil mix.

Future Research

If I repeat this experiment in the future, I would use more liquids that aren't drinks because they affected my experiment. Another thing I would do differently is use the same amount of oil and liquid for each test.

References

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https://yeserchem.com/mastering-laundry-detergent-liquid-formulation-a-comprehensive-guide-for-industry-insiders/

https://www.scientificamerican.com/article/mix-it-up-with-oil-and-water/

Thank you!

Any Questions?