**Lab: Is 1 + 1 always 2?**

**Objectives:**

* Make observations and Inferences.
* Predict outcomes in terms of volume and mass when combining solids and liquids.
* Demonstrate properties of matter (volume and mass).

**Demonstration and Observations:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Demo # | Starting Mass and Volume | Predictions for Mixing | Observations | Result |
| Demo #1  (H2O + H2O) | Water- 25 ml  Water- 25 ml  Total Mass- | Volume:  Mass: |  | Volume:  Mass: |
| Demo #2  (C3H8O + C3H8O) | Alcohol- 25 ml  Alcohol- 25 ml  Total Mass- | Volume:  Mass: |  | Volume:  Mass: |
| Demo #3  (C3H8O + H2O) | Alcohol- 25 ml  Water- 25 ml  Total Mass- | Volume:  Mass: |  | Volume:  Mass: |
| Demo #4  (H2O + C3H8O) | Water- 25 ml  Alcohol- 25ml  Total Mass- | Volume:  Mass: |  | Volume:  Mass: |

**Analysis of Demonstrations:**

1. How did the volume of the originals compare to the volume of the mixtures?

1. How did the mass of the originals compare to the mass of the mixtures?

1. Why do you think we got these results?

1. Predict what would happen if we used a solid and a liquid instead of two liquids?

**Step 2: Solids and Liquids Procedure:**

1. Place 10 ml of water into a graduated cylinder. Find the Mass of the water.
2. In another graduated cylinder find the mass of 10 ml of sugar. Record the total mass of sugar and water before mixing in the data table.
3. Predict the mass and volume after pouring the water into the sugar.
4. Pour the water into the graduated cylinder with the sugar. Record mass and resulting volume. Record observations immediately and after several minutes.
5. In the empty graduated cylinder repeat the steps in **reverse order**. That is pouring the water in first and then add the sugar.
6. Rinse and dry all the graduated cylinders.

**Data:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Demo # | Starting Mass and Volume | Predictions for Mixing | Observations | Result |
| Water + Sugar | Water- 10 ml  Sugar- 10 ml  Total Mass- | Volume:  Mass: |  | Volume:  Mass: |
| Sugar + Water | Water- 10 ml  Sugar- 10ml  Total Mass- | Volume:  Mass: |  | Volume:  Mass: |

**Analysis and Conclusion:**

1. How did the total volume compare to the original volumes in your lab when the solid was in the cylinder first? Why?
2. How did the total volume compare to the original volumes in your lab when the liquid was in the cylinder first? Why?
3. How did the total mass compare to the original masses in your lab?
4. Predict: Would you get the same results with other solid/liquid combinations?