

## Qur'an and Science Symposium

### Science Kitchen

#### Salt Water Density Experiment

*And He it is Who has caused the two seas to flow, this palatable and sweet, and that saltish and bitter; and between them He has placed a barrier and a great partition.*

(Qur'an 25:54)

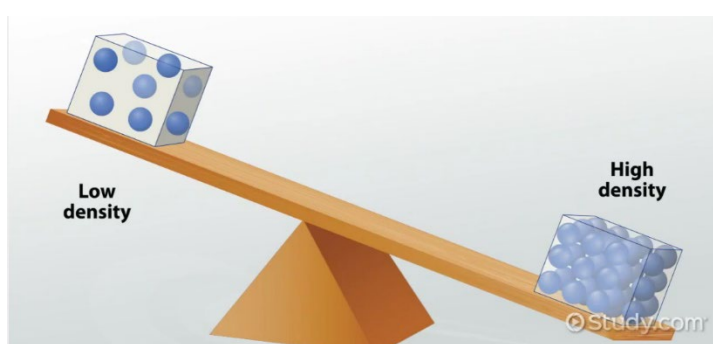
**Objective:** To observe how different amounts of salt in water affects density.

#### **Background:**

Density is a measurement that equates to the mass of an object in relation to the volume of space it occupies. In other words, how much stuff is packed into an object and how big it is.

The mass of an object refers to the amount of matter, or “stuff,” an object has. Everything in the universe is made up of matter. The stars, air, cars, the ground, plants, and animals are all made up of matter. The amount of matter makes up the mass the object has. How much space the object takes up refers to the volume of the object.

$$\text{density} = \frac{\text{mass}}{\text{volume}}$$



If an object has a higher mass in a small amount of volume means that it has high density. An object with little matter in the same amount of volume has a lower density. Density is found by dividing the mass of an object by its volume.

For example, you may have noticed that a tennis ball floats on water while a smaller golf ball will sink. The golf ball has a higher mass and takes up less space, which means it has a higher density than the tennis ball.



*Despite its smaller size, a golf ball will sink, while other balls will float.*

Density is an important measurement used by scientists in many different field. Chemists use density to identify and separate different materials. Astronomers study the density of rocks and how they behave in different gravity.

Water is used as a base measurement for mass and volume, and in turn, also for density. One cubic centimeter of water has approximately one gram of water. This means it has a density of  $1 \text{ g/cm}^3$ .

We know that some things dissolve in water, such as sugar, salt, and Kool-Aid. When we dissolve items into water, we are adding more matter to the water. This will increase the mass of the water, but the volume stays the same. If we are increasing the mass, while keeping the volume the same, the density of the water will change.

Let's explore the concept of density more.

Qur'an and Science Symposium  
Science Kitchen: Salt Density

Name: \_\_\_\_\_

Jama'at: \_\_\_\_\_

**Experiment 1: Salt Density**

Items you will use:

- Six (6) Plastic Cups
- Warm Water (from kettle)
- Marker to label cups
- Teaspoon
- Salt
- Clear plastic straw
- Food coloring or water colors

Procedure:

Always work with a parent or elder to help out with the experiment. Clean up afterwards and don't forget to have fun!

- 1) Gather the six (6) plastic cups. Label the cups #1 through #6
- 2) Add 1 tsp of salt into cup #1, 2 tsp of salt to cup #2, 3 tsp of salt to cup #3, 4 tsp of salt to cup #4, 5 tsp of salt to cup #5, and 6 tsp of salt to cup #6.
- 3) Obtain warm water from the kitchen sink. The water needs to be warm, but not hot.
- 4) Add the same amount of warm water into each cup. About 4 ounces should be good, but you can add more if you want. You will need to stir until all the salt is dissolved.
- 5) Add two drops of food coloring or water colors into each cup and mix. For example, you can make a rainbow by adding
  - a. 2 drops of red food coloring to cup #1,
  - b. 2 drops of orange to cup #2,
  - c. 2 drops of yellow to cup #3,
  - d. 2 drops of green to cup #4,
  - e. 2 drops of blue to cup #5, and

- f. 2 drops of purple to cup #6
- 6) Mix up the water to get uniform colors.
  - 7) Grab the clear plastic straw.
  - 8) Keeping both ends open, dunk the bottom end of the straw about a half an inch into the liquid of cup #1. Cap the top of the straw with your thumb and remove the straw from the solution. Keep your thumb on the top of the straw.
  - 9) Now dip the bottom end of the straw into the liquid of cup #2. Be sure to dip the straw about a half an inch deeper than you did in the first cup. Cap the top of the straw with your thumb and remove the straw from the solution. Keep your thumb on the top of the straw.
  - 10) Repeat step 7 for the remaining cups #3-6.



Questions:

- 1) Please note down your observations.

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- 2) How does the salt affect the density of the water?

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## **Experiment 2: What floats**

Items you will use:

- Plastic Cups
- Salt water cups used in the first experiment
- Small objects that can fit in a cup of water

Procedure:

1. You can use the salt water cups that you made in the first experiment.
2. Fill one empty cup with warm water only.

3. Obtain your small objects and note them down in the table below. Hypothesize in which cup you think your object will float in.
4. Place the object in the cup of water and write down your observations. Did it float or sink? If it sank, how quickly did it sink?
5. Remove the object from the cup and rinse with water in the sink.
6. If the object sank, repeat steps 4-5 for the remaining cups #1-6 and fill in the table until the object floats.
7. Try again with another small object.

Table: Does the object sink or float

<b>Object</b>	<b>Cup #1</b>	<b>Cup #2</b>	<b>Cup #3</b>	<b>Cup #4</b>	<b>Cup #5</b>	<b>Cup #6</b>

Questions:

- 1) Does more salt in the cup affect whether the object will sink or float?
- 2) What other experiments could you try?