# Transcript: Ocean Water Density Lab

[Transcript (Video)](#_Transcript_(Video))

[Transcript (Video with Audio Description)](#_Transcript_(Video_with)

## Transcript (Video)

### Screen 1:

#### 00:00:00.00

Pat Keeney: Hi, I am Pat Keeney, an instructional designer with K12. My assistant and I are here to work with you on a lab that explores the way ocean salt water mixes with cold fresh water.

#### 00:00:13.00

This applies to the real world when you consider melting water from winter snow, melting glaciers, or melting sea ice. The density of water depends on the temperature of the water and the amount of dissolved salts in the seawater.

#### 00:00:31.00

Salt water is more dense than fresh water because the added salts increase the mass of a given volume of water. Cold water is more dense than warm water because the molecules are moving slower and are closer together.

#### 00:00:47.00

Salinity is a measure of how salty water is. The saltier the water is the greater the salinity.

#### 00:00:55.00

In this lab, you will explore how salinity affects the way cold water from melted ice cubes mix with warm water.

#### 00:01:04.00

The important question to consider in this lab is, "How does salinity affect the way cold water from melting ice mixes with warm water?" Use your prior knowledge to write a hypothesis that describes how salinity affects the way cold water from melting ice mixes with warm water. A good hypothesis should take the form of an "if . . .then" statement, such as, "If the salinity of water is greater, then. . . " Finish this sentence with your prediction about how the cold water from melting ice will mix with water.

#### 00:01:43.00

Advance preparation is important to lab work, so we gathered these materials prior to performing the lab.

#### 00:01:51.00

Before starting the lab, we created three tables, each with the following columns: Time in minutes; Description; Temperature at the top of the water, in degrees Celsius; and Temperature at the bottom of the water, in degrees Celsius.

#### 00:02:09.00

The 3 different water solutions are saturated salt water, unsaturated salt water, and unsalted water. We prepared 1 data table for each solution.

#### 00:02:22.00

A day before the experiment, we prepared colored ice cubes. We filled trays with water and mixed 5 drops of red food coloring into each cube compartment. For valid scientific results, we were careful that the same number of drops went into each compartment. We stirred each compartment before placing the tray in the freezer.

#### 00:02:49.00

Once we had colored ice cubes, we made 3 solutions of different salinities. We filled a container with about 500 milliliters of warm water and about 500 milliliters of room-temperature water. In all trials, the initial water temperature in each of the 3 containers was the same.

#### 00:03:11.00

We used rubber bands to attach 2 thermometers together to prepare for taking temperature readings at the top and bottom of the water solutions. Doing so resulted in one bulb at the very top of the water and the other thermometer bulb close to the bottom of the water.

#### 00:03:29.00

Data from these locations allow us to see if mixing has taken place. A small temperature difference indicates that mixing has taken place, while a larger temperature difference tells us that mixing has not.

#### 00:03:44.00

We did not add salt to the first solution. We added 100 grams of salt to the second solution. Finally, we added salt to the third solution until it was saturated. Saturation occurs when, upon stirring, the salt does not dissolve. After adding the salt, we observed the temperature.

#### 00:04:07.00

Into the solution, we added one colored ice cube and recorded our observations of how the melted water moved through the solution.

#### 00:04:16.00

We also recorded the temperature at the top and bottom of each container.

We observed and recorded our observations after 5 minutes, 10 minutes, 15 minutes, and 30 minutes. We recorded the temperatures at the top and bottom of each container at each of those time intervals.

#### 00:04:38.00

Think about how the salinity of the water affected the way the cold water mixed with the warm water. This will help you solidify your understanding of how salinity affects the way melted water and water currents behave in the ocean.

## Transcript (Video with Audio Description)

### Screen 1:

#### 00:00:00.00

Pat Keeney: Hi, I am Pat Keeney, an instructional designer with K12. My assistant and I are here to work with you on a lab that explores the way ocean salt water mixes with cold fresh water.

#### 00:00:13.00

Description: An assistant removes 2 thermometers that have been banded together width-wise from a container of colored water.

#### 00:00:21.00

Pat Keeney: This applies to the real world when you consider melting water from winter snow, melting glaciers, or melting sea ice. The density of water depends on the temperature of the water and the amount of dissolved salts in the seawater.

#### 00:00:37.00

Description: There are 2 containers filled with liquid. Each container contains 2 double thermometers. The container on the right has a red ice cube in it. The assistant drops a red ice cube in the container on the left.

#### 00:00:51.00

Pat Keeney: Salt water is more dense than fresh water because the added salts increase the mass of a given volume of water. Cold water is more dense than warm water because the molecules are moving slower and are closer together.

#### 00:01:07.00

Description: There is a table with an ice tray with red ice cubes, a double thermometer, a wooden spoon, a container of salt, and a container of water. The assistant pours some of the salt into the water and stirs it.

#### 00:01:23.00

Pat Keeney: Salinity is a measure of how salty water is. The saltier the water is the greater the salinity.

#### 00:01:31.00

Description: There are 2 containers of liquid. The container on the left is labeled Salted water. The container on the right is labeled Unsalted water. Each container contains a double thermometer.

#### 00:01:44.00

Pat Keeney: In this lab, you will explore how salinity affects the way cold water from melted ice cubes mix with warm water. The important question to consider in this lab is, "How does salinity affect the way cold water from melting ice mixes with warm water?"

#### 00:02:01.00

Description: The assistant is again shown stirring salt into water.

#### 00:02:06.00

Pat Keeney: Use your prior knowledge to write a hypothesis that describes how salinity affects the way cold water from melting ice mixes with warm water. A good hypothesis should take the form of an "if . . .then" statement, such as, "If the salinity of water is greater, then. . . " Finish this sentence with your prediction about how the cold water from melting ice will mix with water.

#### 00:02:33.00

Description: The assistant pours water into a container and places the double thermometer into the water. There is a close-up of the container with the double thermometer.

#### 00:02:44.00

Pat Keeney: Advance preparation is important to lab work, so we gathered these materials prior to performing the lab.

#### 00:02:51.00

Description: The materials are a container of salt, 3 sets of 2 thermometers banded together width-wise, 3 plastic containers, each with a wooden spoon, 2 graduated cylinders, and an ice tray with red ice cubes.

#### 00:03:09.00

Pat Keeney: Before starting the lab, we created 3 tables, each with the following columns: Time in minutes; Description; Temperature at the top of the water, in degrees Celsius; and Temperature at the bottom of the water, in degrees Celsius.

#### 00:03:26.00

Description: The title of the table is Data for Saturated Water Trial.

#### 00:03:32.00

Pat Keeney: The 3 different water solutions are saturated salt water, unsaturated salt water, and unsalted water.

#### 00:03:41.00

Description: There are 3 containers filled with liquid. The container on the left is labeled Saturated salt-water. The container in the middle is labeled Unsaturated salt-water. The container on the right is labeled Unsalted water. Each container contains a double thermometer.

#### 00:04:00.00

Pat Keeney: We prepared 1 data table for each solution. A day before the experiment, we prepared colored ice cubes. We filled trays with water and mixed 5 drops of red food coloring into each cube compartment. For valid scientific results, we were careful that the same number of drops went into each compartment. We stirred each compartment before placing the tray in the freezer. Once we had colored ice cubes, we made 3 solutions of different salinities. We filled a container with about 500 milliliters of warm water and about 500 milliliters of room-temperature water. In all trials, the initial water temperature in each of the three containers was the same.

#### 00:04:51.00

Description: The assistant pours water from 2 different containers into a third container.

#### 00:04:58.00

Pat Keeney: We used rubber bands to attach 2 thermometers together to prepare for taking temperature readings at the top and bottom of the water solutions. Doing so resulted in 1 bulb at the very top of the water and the other thermometer bulb close to the bottom of the water.

#### 00:05:15.00

Description: There are 3 modified thermometers. Each modified thermometer consists of 2 thermometers banded together width-wise. The double thermometer is in a container filled with water. The top thermometer's bulb is near the water line. The bottom thermometer's bulb is at the bottom of the container.

#### 00:05:35.00

Pat Keeney: Data from these locations allow us to see if mixing has taken place. A small temperature difference indicates that mixing has taken place, while a larger temperature difference tells us that mixing has not.

#### 00:05:49.00

Description: There are 3 containers filled with liquid. The container on the left is labeled Saturated salt-water. The container in the middle is labeled Unsaturated salt-water. The container on the right is labeled Unsalted water. Each container contains a double thermometer.

#### 00:06:08.00

Pat Keeney: We did not add salt to the first solution. We added 100 grams of salt to the second solution. Finally, we added salt to the third solution until it was saturated. Saturation occurs when, upon stirring, the salt does not dissolve. After adding the salt, we observed the temperature.

#### 00:06:31.00

Description: The assistant adds the double thermometer to a container of water. In the next scene, the assistant pours salt into a container of water and stirs. In the next scene, the assistant pours salt into a container of water and stirs. In the last scene there are 3 containers filled with liquid. The container on the left is labeled Saturated salt-water. The container in the middle is labeled Unsaturated salt-water. The container on the right is labeled Unsalted water. Each container contains a double thermometer.

#### 00:07:06.00

Pat Keeney: Into the solution, we added 1 colored ice cube and recorded our observations of how the melted water moved through the solution.

#### 00:07:14.00

Description: There are 2 containers filled with liquid. The container on the left contains cloudy liquid. Each container contains a double thermometer. The container on the right has a red ice cube in it. The assistant places a red ice cube in the container on the left.

#### 00:07:32.00

Pat Keeney: We also recorded the temperature at the top and bottom of each container. We observed and recorded our observations after 5 minutes, 10 minutes, 15 minutes, and 30 minutes. We recorded the temperatures at the top and bottom of each container at each of those time intervals.

#### 00:07:53.00

Description: There is the data table. Then, there is a split screen of 2 containers. Both contain liquid and a double thermometer. The container on the left is labeled Unsalted water. The container on the right is labeled Unsaturated salt-water. The Unsalted water is uniformly colored red. In the Unsaturated salt-water container, the red coloring is only located at the top of the container and it is darker near the ice cube. In the last scene, the red coloring has spread evenly across the top of the container labeled Unsaturated salt-water.

#### 00:08:32.00

Pat Keeney: Think about how the salinity of the water affected the way the cold water mixed with the warm water. This will help you solidify your understanding of how salinity affects the way melted water and water currents behave in the ocean.

#### 00:08:47.00

Description: The assistant drops a red ice cube into a container containing water and a double thermometer. Then, there are three containers of liquid. The container on the left is labeled Saturated salt-water. The container in the middle is labeled Unsaturated salt-water. The container on the right is labeled Unsalted water. The Saturated salt-water container has more red coloring at the top of the container than the bottom. In the Unsaturated salt-water container and the Unsalted water container, the red color is uniformly mixed.