Ocean Properties

Introduction:

Saltwater makes up most of a ***marine*** habitat. The water in the ocean creates a lot of challenges for organisms that live in the ocean. Below are some properties of the ocean that make it difficult to live in.

Marine – (adj.) Relating to the sea.

Density:

Density is a measure of how much matter fits into a specific space. The density of water changes as temperature changes and as salt content changes.

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Temperature:

Organisms in the ocean are constantly surrounded by water. Water takes a lot of energy to change its temperature. ***Exothermic*** animals are more common in the ocean than ***endothermic*** animals.

Exothermic – an organism that their body temperature changes based on their environment.

Endothermic – An organisms that generates heat in their cells.

Pressure:

All organisms are surrounded by their environment and have pressure pushing in on them. We can measure pressure in Atmospheres (***atm***). Ocean organisms deal with pressure changes more than organisms in the air.

1 atm is the pressure change of going from sea level to outer space.

Experiment 1: Temperature Effects on Density

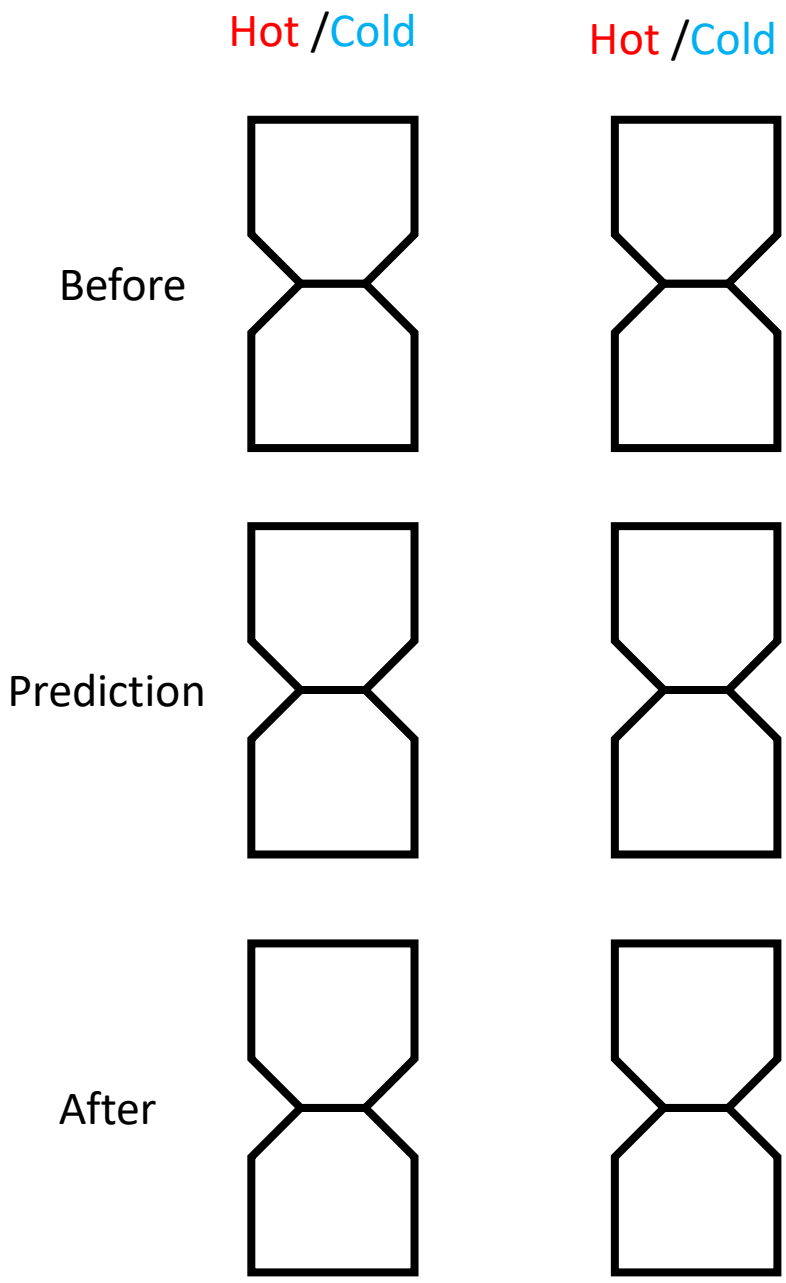
Draw what you observe. Use colored pencils to record what you see.

Predict what will happen when the card separating the jars is removed.

Record the results of what happened.

Is hot water more dense or less dense than cold water?

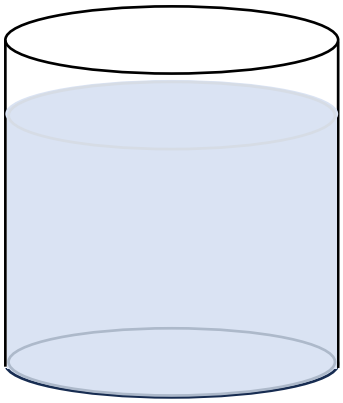
How can you tell? Use specifics from what you observed happen.



Experiment 2: ***Salinity*** Effects on Density and Freezing

An extremely salty ice cube has been prepared.

Record what happens when it is added to a container of room temperature tap water.



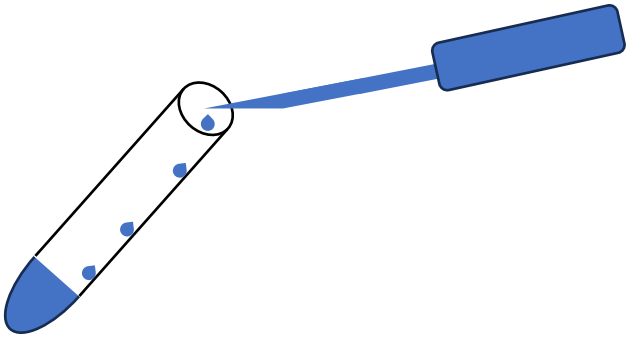
Experiment 3: Salinity Effects on Density

Four solutions of water have been prepared.

Using the pipette take one of the sample solutions and slowly add drops to the test tube.

Ensure that you are holding the test tube at an angle and the solution is being added slowly by dripping drops down the side of the test tube.

Repeat the process with each of the four solutions.



Salinity is the measure of how much salt is in a sample. In most cases it is measured in grams per liter (g/l)

What impact does salinity have on density?

What impact does salinity have on the freezing point?

Disposable pipette

Wikimedia commons

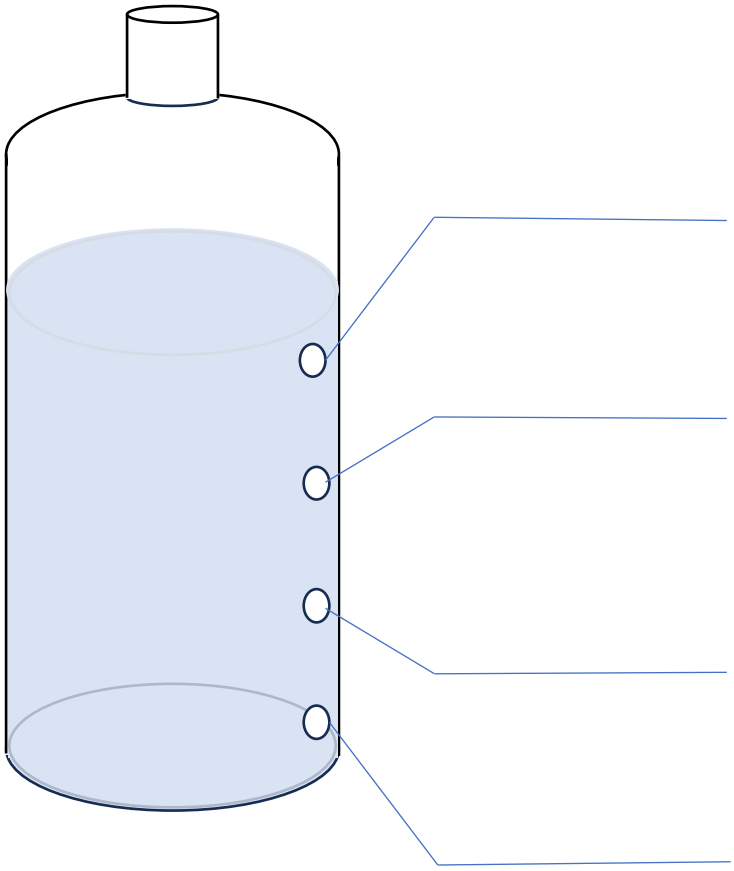
Draw a diagram of what your test tube looked like?

Are the layers in the same order that you added them? Why or why not?

Experiment 4: Water Pressure

A bottle has four holes covered in tape.

When the tape is removed use a stopwatch to record the time I takes for the water to completely pass each hole.



When was the water pressure the highest?

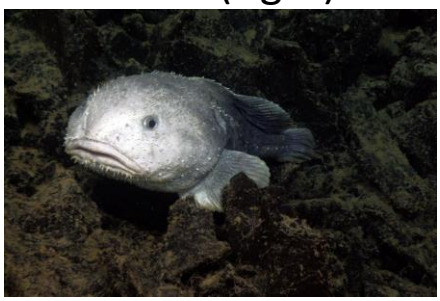
What creates water pressure in the ocean?

Where would you find the greatest water pressure in the ocean?

1. What changes the density of seawater?

2. At a depth of 660 ft and 3300 ft, there is an abrupt change in the density (both salinity and temperature) of the ocean. Why would this occur at almost the same point in all of the oceans?

3. The blobfish (Psychrolutes marcidus) is a species of fish that lives at a depth of up to 1100 m. Why would this fish look like different on the surface (right) than at depth (left)?



4. Water pressure increases at a rate of 1 atm (the pressure of the entire atmosphere) per 10 m of water. What would the pressure be if SCUBA diving at the Great Barrier Reef (35m)? What would the pressure be on the Alvin submarine at its max depth (6453 m)?

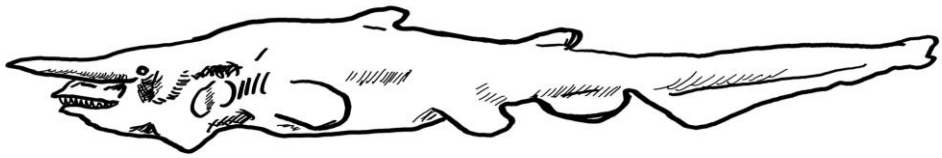
Organisms of the Deep Ocean

The deep ocean is called the Abyssal Plain. Very little light, oxygen or food makes it to the deep ocean.

Organisms here are often times extreme in their biology and behavior.

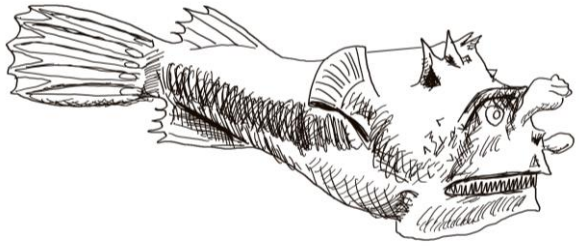
Many organisms in the deep ocean are dark in color. This is so they can blend in with the dark water around them.

Larger predatory organisms like the goblin shark will have counter shading. This means they are darker on top and lighter on the bottom. This allows them to blend with the dark water when something looks down at them and blend with the slightly lighter water when viewed from below.

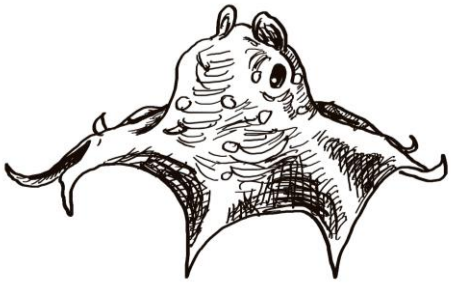


Lot of other organisms have bioluminescence, the ability to make their own light. This may seem like a bad adaptation when the environment is very dark. But these organisms pulse and flash light to distract and disorient prey or predators. It is like when you are in a dark room and someone turns on the light. Your eyes need time to adjust.

Most deep sea organisms live solitary lives. This means finding a mate can be hard. Most deep sea organisms may only have one chance to produce offspring. In extreme cases like some anglerfish, when a male find a female they will attach to the female and live connected to her for the rest of their lives to ensure that they are able to produce offspring.



But because food and oxygen are so scarce most organisms are slow and almost lazy. They do not move unless there is a reason because it could be weeks or months until their next meal. The Dumbo octopus is one of the deepest living octopodes. They lack an ink sac because encounters with predators almost never happen. Most other octopus species swim fast using jet propulsion, but this octopus swims slowly by flapping fins that look like large elephant ears.



Researchers will often times look for dead whales, called whale falls, when they want to find a lot of organisms all in one place. A whale fall provides literal tons of food to the ocean food and because of the cold low oxygen environment it will not rot. Instead whole communities of organisms will feed off of the whale fall for months until it is just bones.