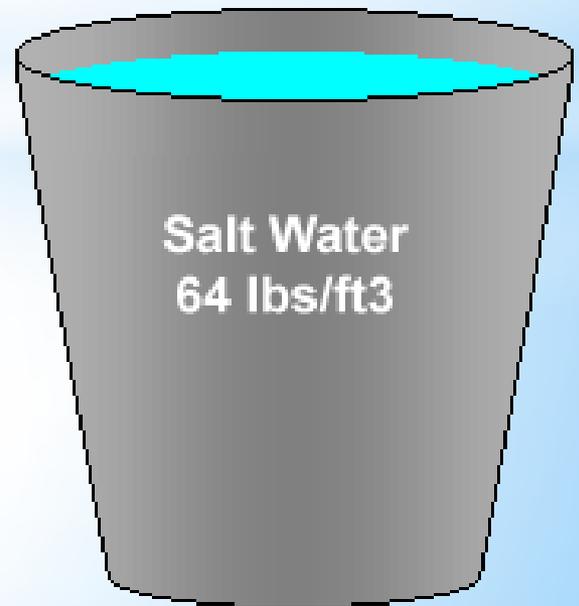
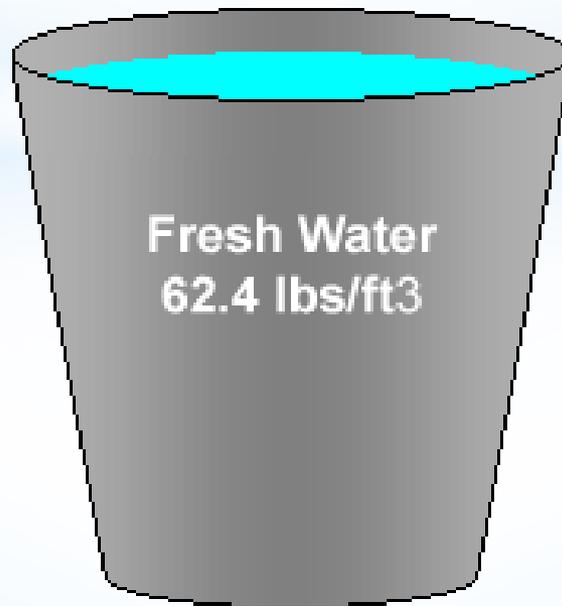


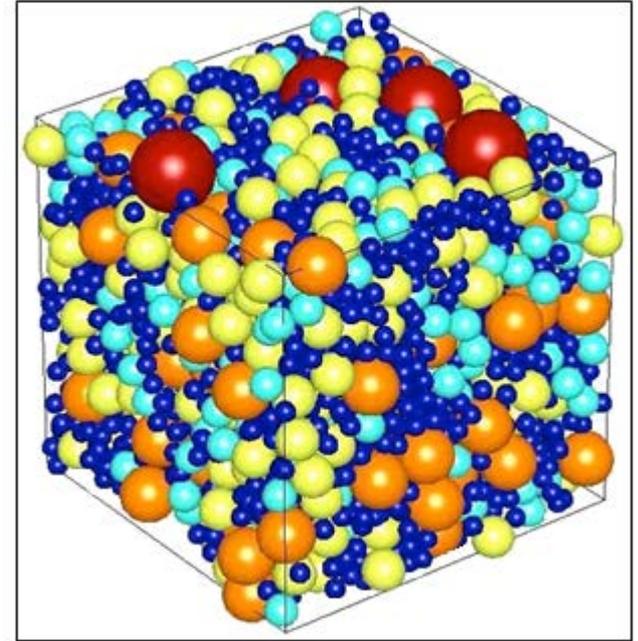
# The Impact of Temperature and Salinity on Water Density



# Activating Strategy

The diagram to the right illustrates an object that has a lot of density.

How do you think temperature affects density?  
What about salinity?



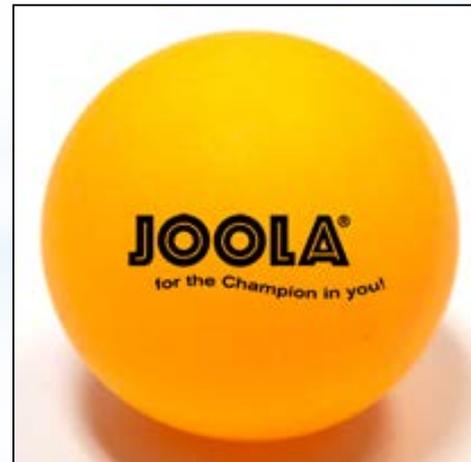
**Temperature:** the degree of hotness or coldness of an object

**Salinity:** the dissolved salt content of a body of water

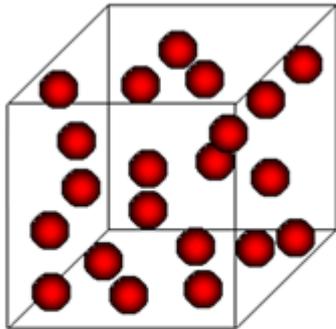
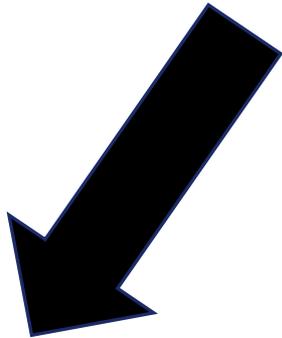
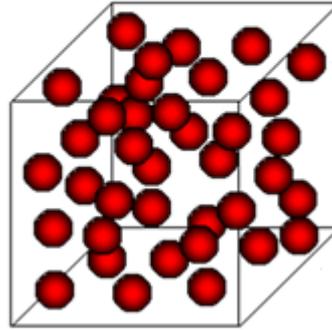
# What is Density?

Density is the amount of matter (mass) in a given space (volume)

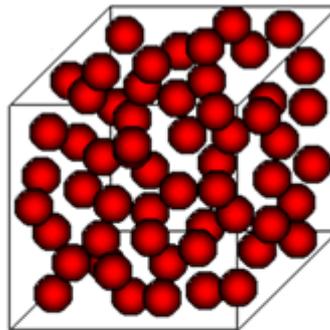
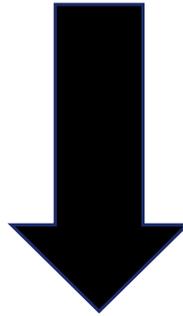
For example, a golf ball and a table-tennis ball have similar volumes. But a golf ball has more mass than a table-tennis ball does. So, the golf ball has a greater density.



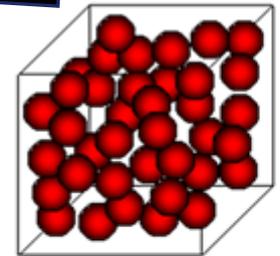
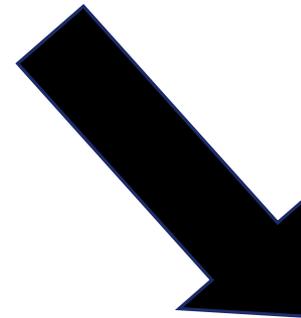
Red spots represent  
atoms with mass



A substance which occupies the  
same volume but has less  
matter is less dense.

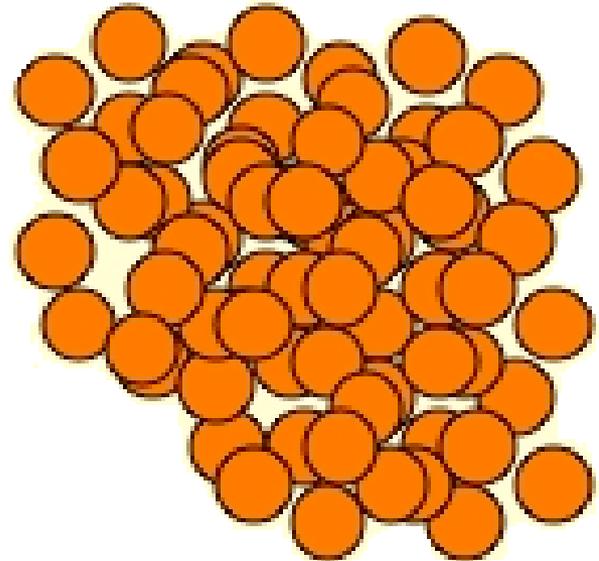
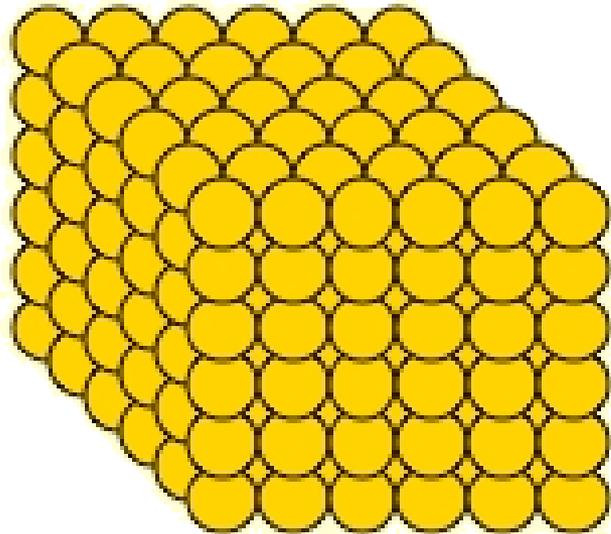


A substance which occupies the  
same volume and has more  
matter is more dense.



A substance with the same  
amount of matter but with  
a smaller volume is more  
dense

Which one has  
greater density?



# Density of Liquids

- \* Like all substances, liquids have different densities
- \* It is easy to see the differences in the density of liquids because more dense liquids will sink and less dense liquids will rise. The same is true for objects in liquids.
- \* If you pour together liquids that don't mix and have different densities, they will form liquid layers.

# Density of Liquids

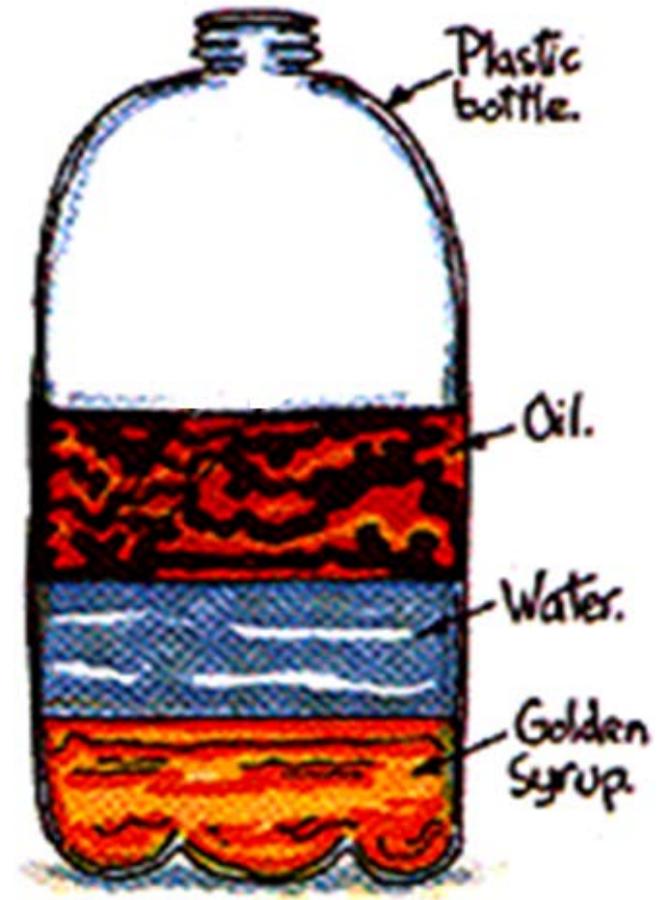
- \* Check out this picture. Which layer has the highest density?
- \* Which layer has the lowest density?



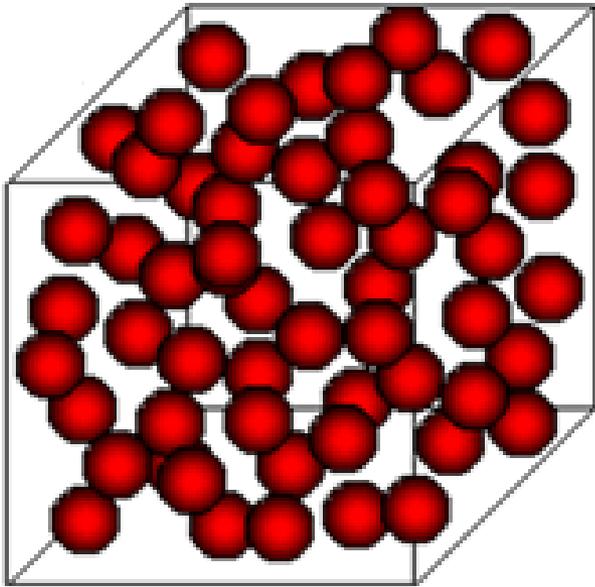
# Density of Liquids

Try with your neighbor!

- \* Which liquid has the highest density?
- \* Which liquid has the lowest density?
- \* Which liquid has the middle density?



# Relationship between Density & Temperature



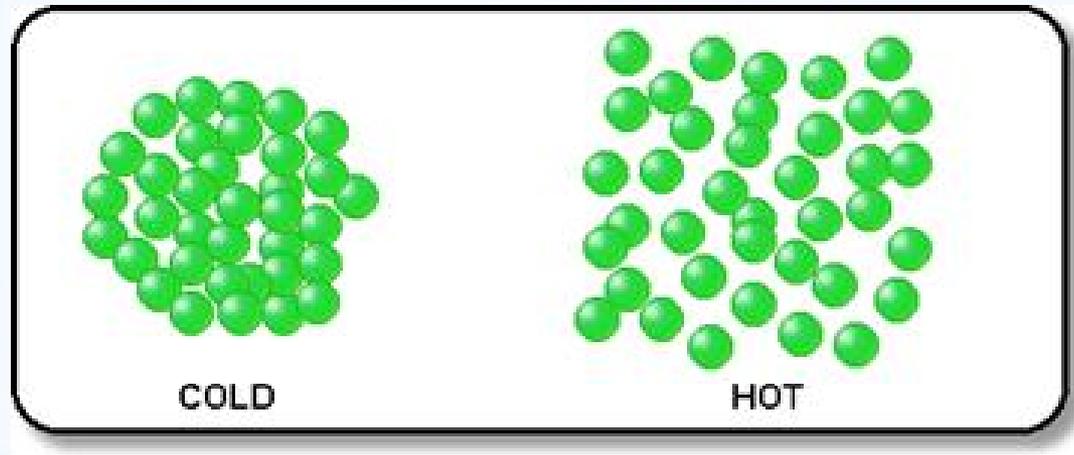
# What is temperature?

Temperature is the degree of hotness or coldness of an object.



The temperature of a substance is related to the speed of the substance's particles.

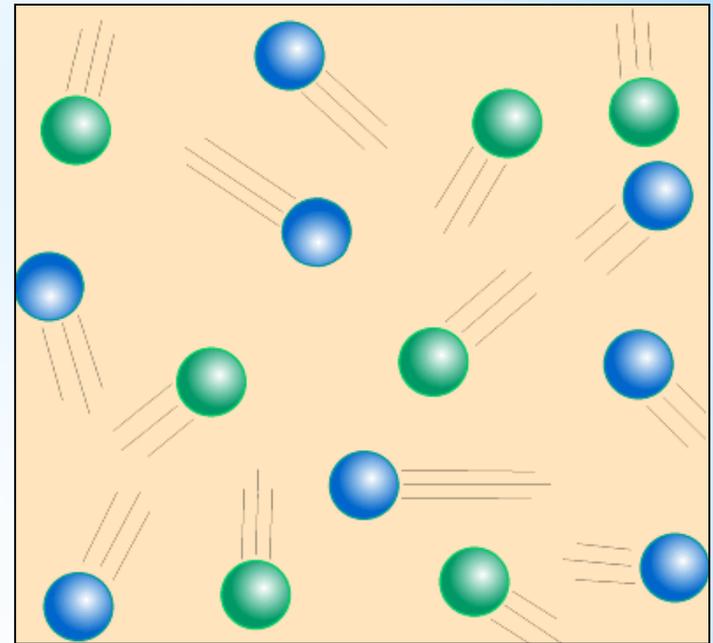
What happens to the particles in an object or substance when its temperature is increased?



As the temperature of a liquid increases, the particles in the liquid move faster.

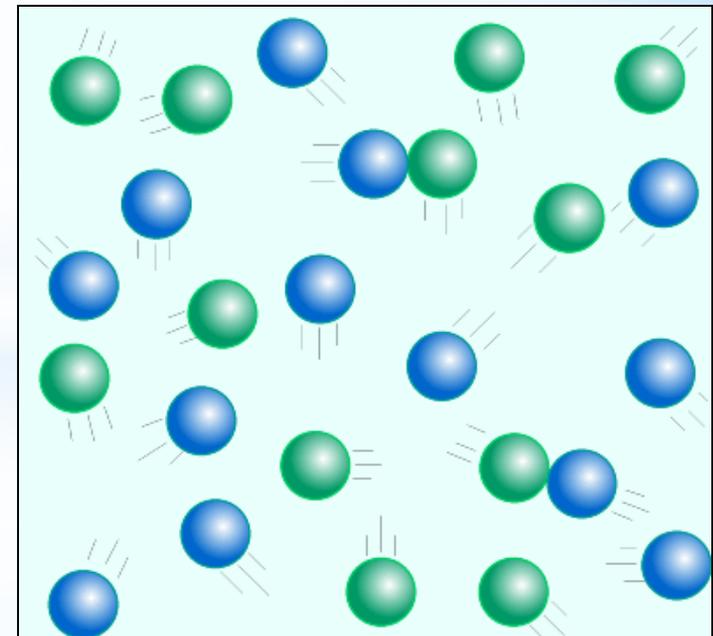
As the temperature of a liquid decreases, the particles in the liquid move slower.

When an object or substance is warmer, its particles move faster and get further apart  
(Tip for remembering: they are warmer and want to get cooler by moving away from one another)



When an object or substance is cooler, its particles move slower and are closer together

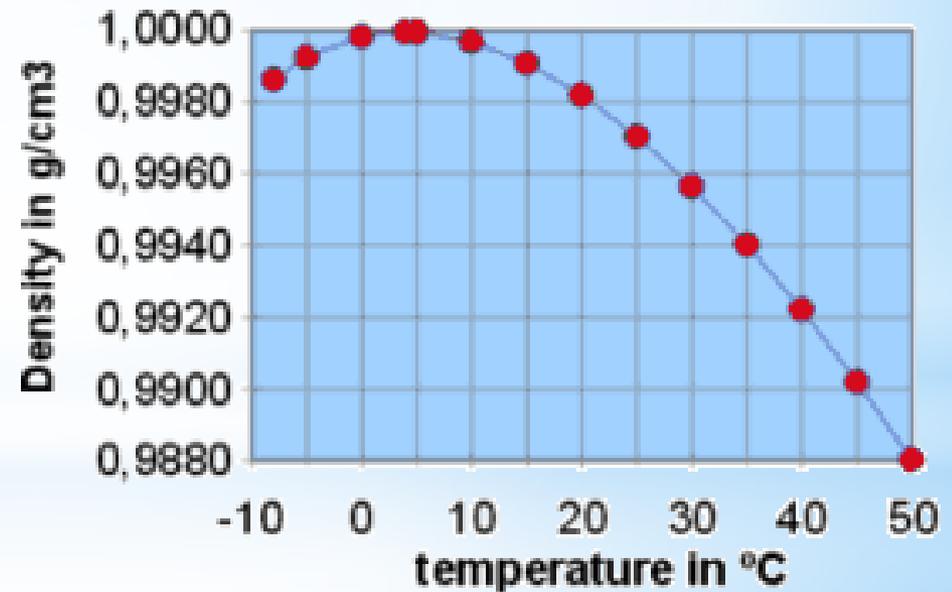
(Tip for remembering: they are cold and want to get warm by getting closer together)



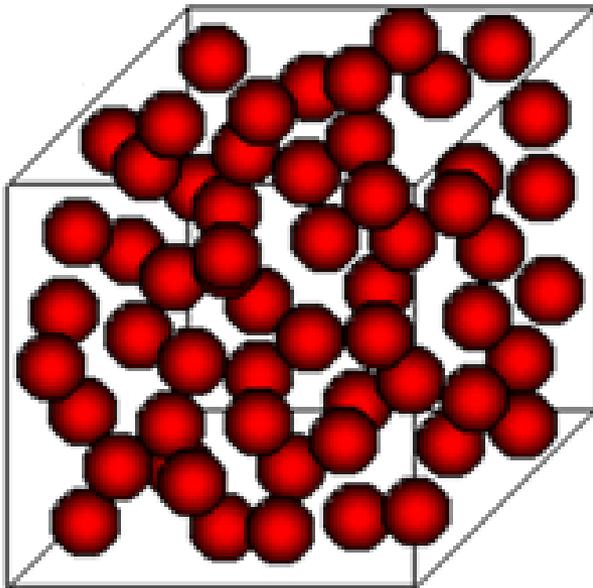
# Relationship between Temperature and Density

As  
temperature  
increases,  
density  
decreases.

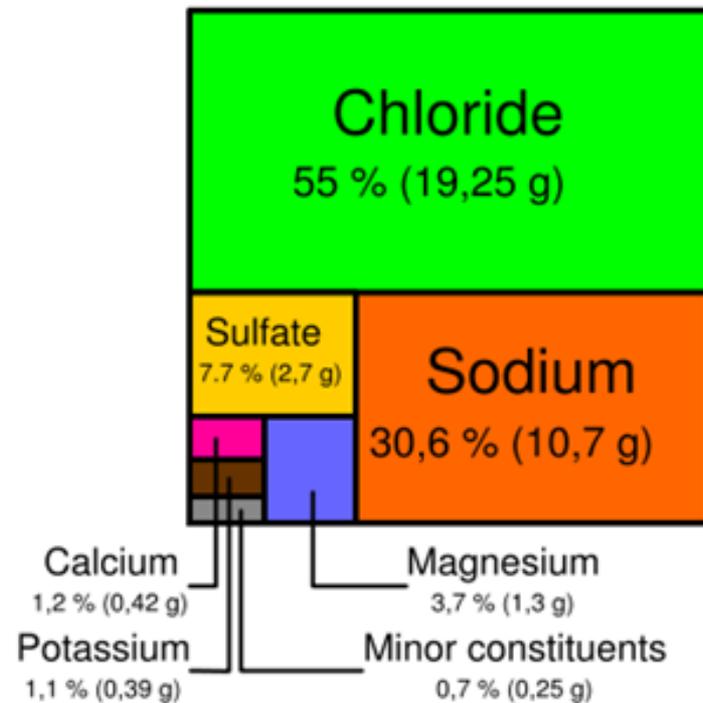
**Density of water**  
related to temperature



# Relationship between Density & Salinity

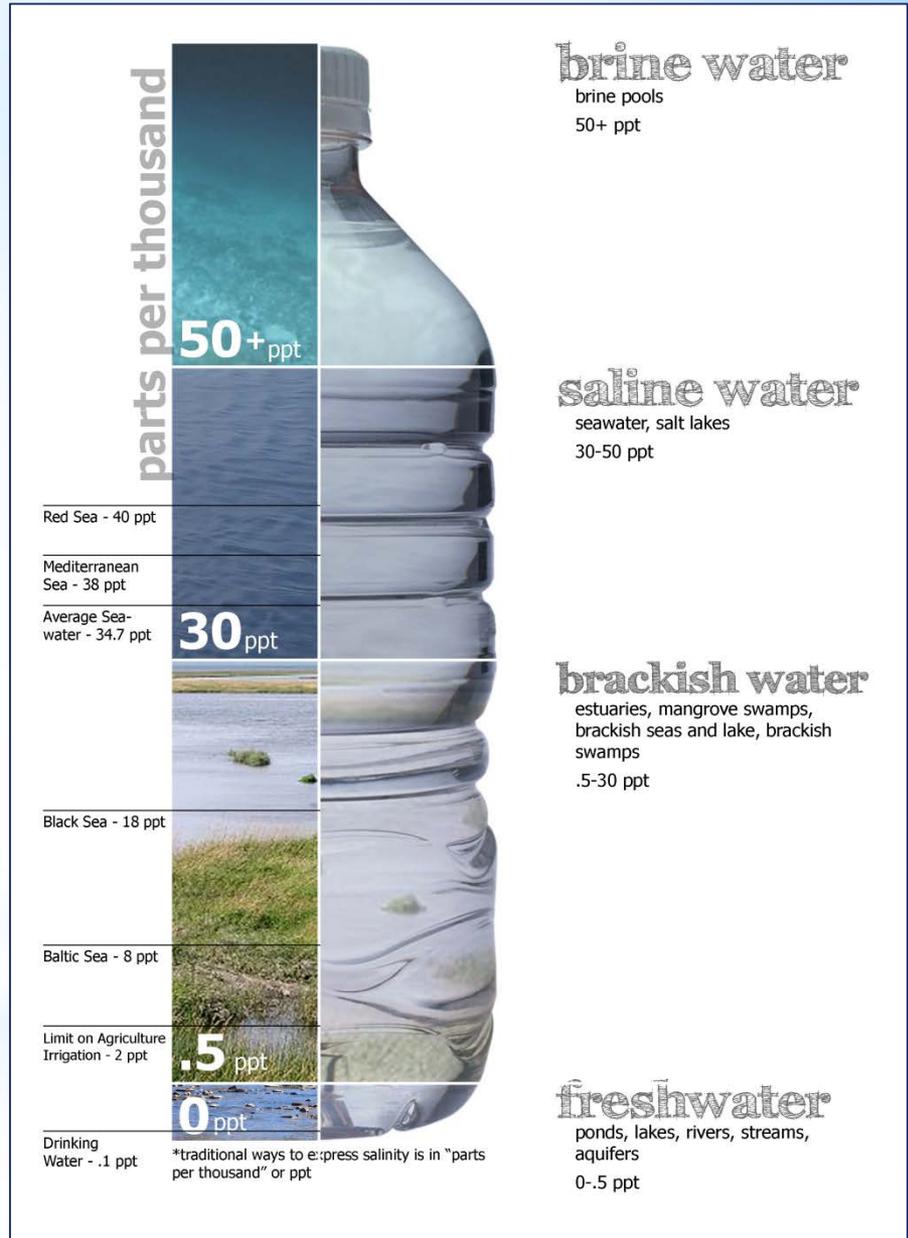


## Sea salts



# What is salinity?

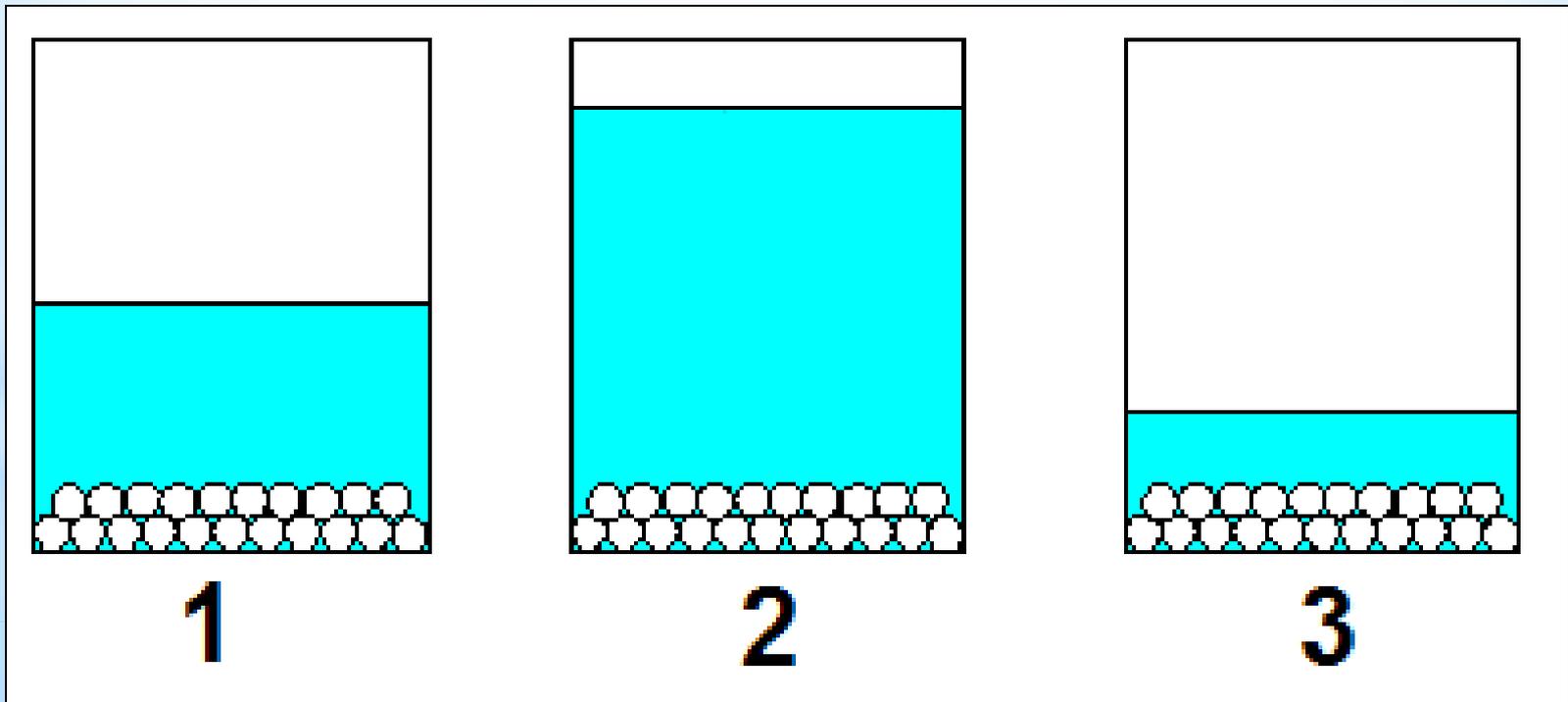
- \* Salinity is the dissolved salt content of a body of water
- \* Look at the diagram to the right showing the varying degrees of salinity in water



# Salinity

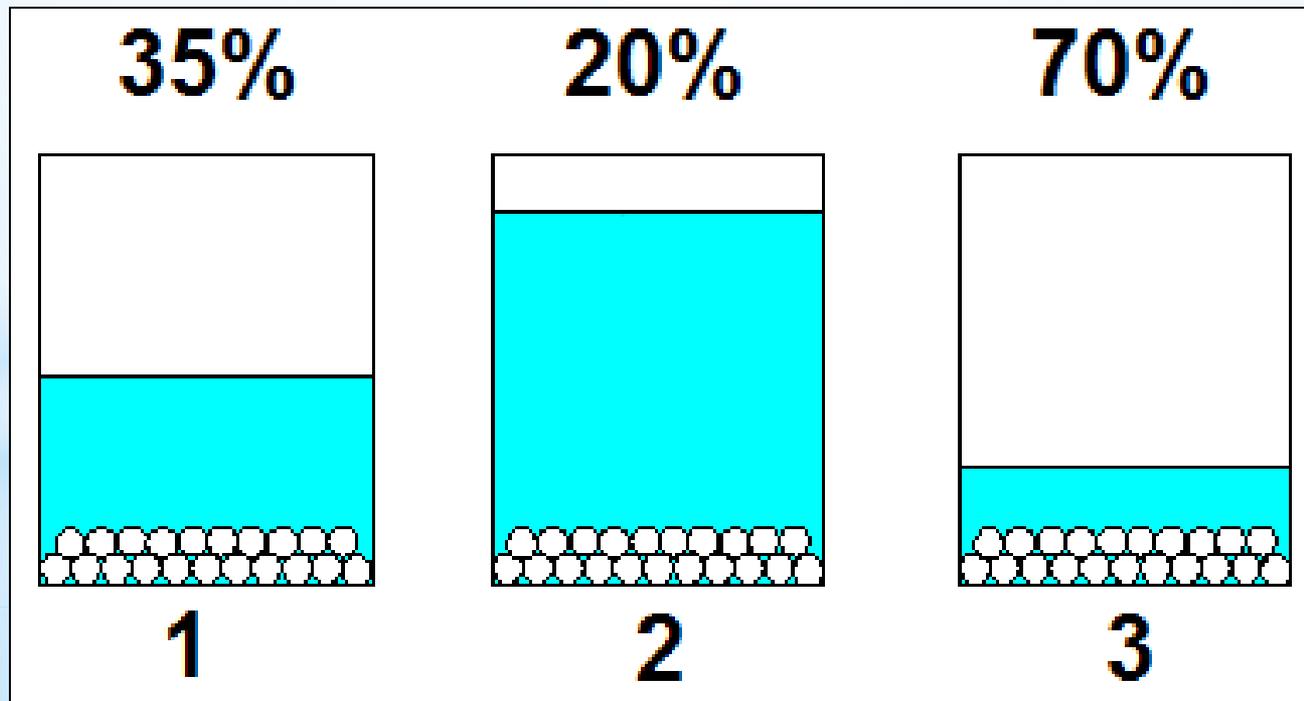
Look at the three diagrams below. Which one do you think has the highest salinity?

Why?



# Salinity

Number 3 has the highest Salinity because it has more salt particles than water particles per unit.



# Density and Salinity

\*As Salinity [the amount of salts in the water] increases, density increases.

*Discuss the following and record the questions and your responses.*

1. Salinity can increase from the freezing of polar ice and through evaporation. Why?
2. Salinity can increase from evaporation. Why?
3. Salinity can decrease from the melting of polar ice. Why?

# Density's Role in Water

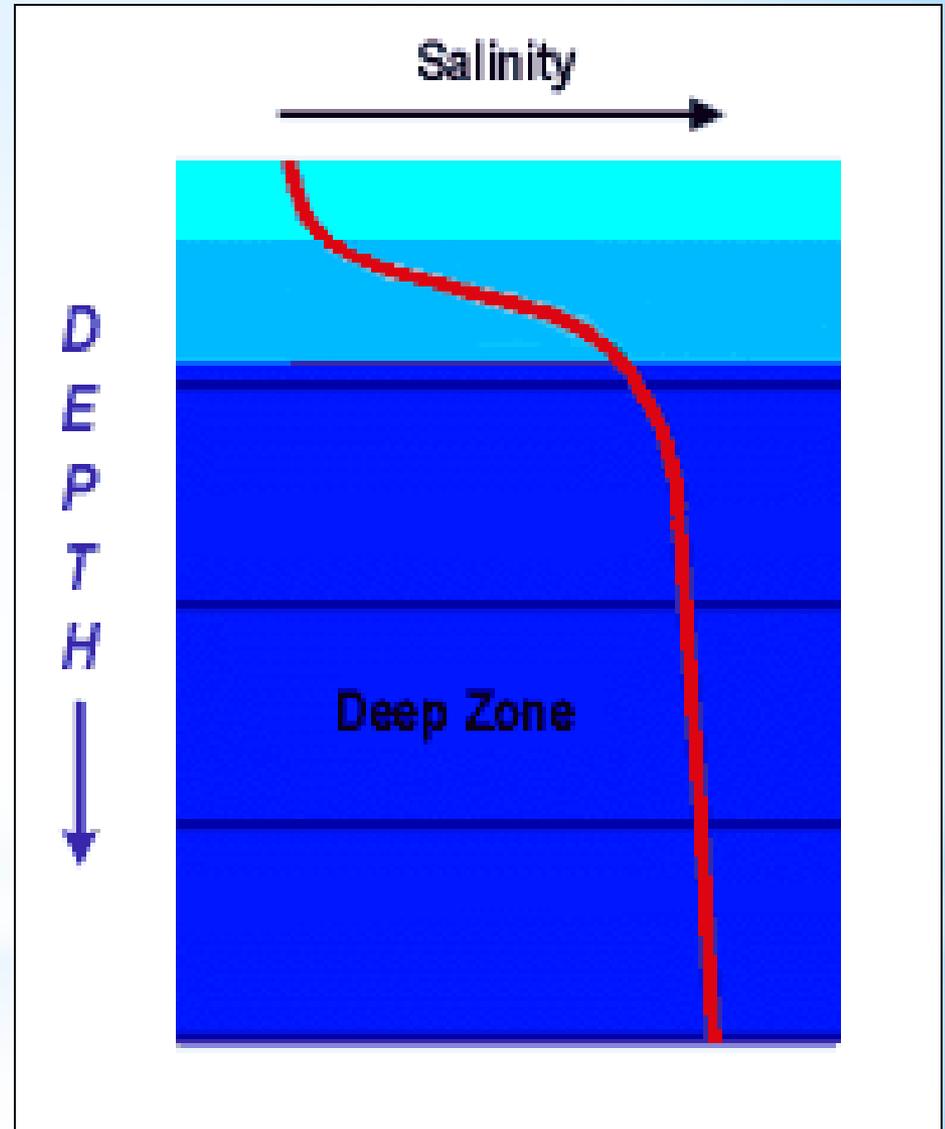
- \*The saltier the water, the more buoyant an object becomes.
- \*Changes in density affect the deep-ocean currents which in turn impact weather patterns and climate.
- \*Density affects the objects that are existing in the water, such as whales, seaweed, and submarines. A change in density would cause negative biological impacts on animals and humans.

Temperature and salinity affect the density of the water

Look at the graph to the right. What does it tell us about Salinity and depth of the ocean?

Salinity increases as ocean depth increases.

What happens to temperature as ocean depth increases? Why?



# Temperature, Salinity and Density

