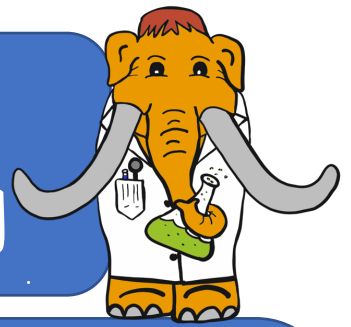


Science Saturday @ Home

Thermal Convection Color Mixing



Gathering Supplies:

- 2 Clear Bottles
(juice or Gatorade bottles work well)
- Cold Water Hot Tap Water
- Food Coloring (Yellow and Blue)
- Stiff Paper (old playing card or junk mail)
- Tray
- Paper Towels

What happens when you stack bottles filled with hot and cold water?
Let's use some colors to get a better look!

You might want an adult to help you with this one. It can get messy!

How To Steps:

1. Label one bottle "HOT" and the other "COLD"
2. Fill the bottle marked cold to the top with cold water and add a few drops of yellow food coloring. You can place the bottle in the refrigerator to keep cold.
3. Fill the other bottle to the top with hot tap water and add a few drops of blue food coloring.
4. Pick which bottle you want to go on the bottom and place it inside a tray. Take the other bottle and put a card over the top of it and slowly turn the bottle upside down, holding the card over the mouth. Doing this over the tray will help catch any water that accidentally spills.
5. Place the second bottle's mouth directly over the mouth of the other bottle with the card separating them. What do you think will happen to the two different colored waters when you remove the card? Will they mix together or stay separated?
6. Carefully remove the card while keeping the two bottles together. What happened? Try again but this time switch which bottle is on the bottom.

Bottle Stacking with Max



Did You Know?

When liquid is warmed up, the molecules inside will move around more. This causes a change in the liquid's density. Cold water will have a slightly higher density than hot water. So if the cold water is in the bottom jar and hot water is in the top, the two colors will stay separated! The colors will slowly mix together as water in the bottles reach the same temperature.

If the hot water is on the bottom and the cold water is on the top, something different happens! Hot water will want to rise and the cold water will sink, so the colors will quickly mix together. This flow of water due to different temperatures is called *convection*. Thermal convection is what causes the movement of ocean currents throughout the world.

The same thing also happens with the air around us. Hot air rises and cold air sinks. This can cause winds and other weather patterns. During colder months this can cause a problem when a layer of warm air high in the atmosphere traps a layer of cold air under it. This is called a thermal inversion and is a problem in cities that have air pollution. The pollution becomes trapped in the colder air, causing a hazy color or layer in the sky.