

Why Can I See My Breath When it is Cold?

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A couple of weeks ago, while our group was in our school teepee, Lincoln asked a great question: “Why does our breath make a cloud when it is cold?”. We decided to base our science fair project on this question and explore the topic.

Research question:

Why does our breath make condensation when it is cold outside?

Background Research:

When you breathe air in, it goes into your warm and moist lungs. When you exhale the air, your breath contains a lot of moisture from your lungs. The breath contains tiny little water droplets in the form of water vapor. Water vapor is the gas form of water. You cannot see these tiny drops of water with your bare eyes. When you are indoors, or in a warm environment, the water in your breath will remain in an invisible gas form. When you exhale and it is cold outside, the water molecules in the water vapor of your breath begin to pack themselves closely together. When this happens, they change into liquid or solid forms of water that we can see. This process is called condensation. When you exhale when it's cold outside, the water vapor in your breath condenses into many tiny droplets of liquid water and ice (solid water) that you can see in the air as a cloud, similar to fog.

Objective:

To test to see if it is true that when warm, moist air mixes with cold outdoor air, it creates condensation.

Materials:

Pencil, Data recording sheet, markers, labels, 2 equally sized glass jars, 500ml warm water, 500ml cold water

Plan:

Step 1: Label two equally sized glass jars. One with the label “cold”, the other with the label “warm”.

Step 2: Place mason jars on a flat surface indoors.

Step 3: Fill the glass jar with the “cold” label with 500ml of cold water.

Step 4: Fill the glass jar with the “warm” label with 500 ml of warm water.

Step 5: Observe the glass jars. Look for condensation.

Step 6: Take notes on data recording sheet (annex A and B)

Step 7: Repeat process (steps 1-6) outdoors.

Data:

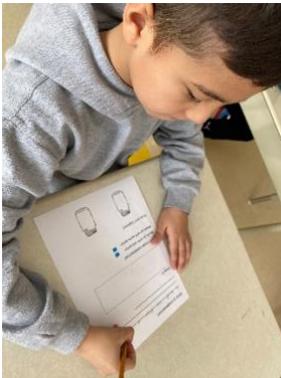
Glass jar type	Condensation	No condensation
Cold water, indoors		X
Warm water, indoors		X
Cold water, outdoors		X
Warm water, outdoors	X	



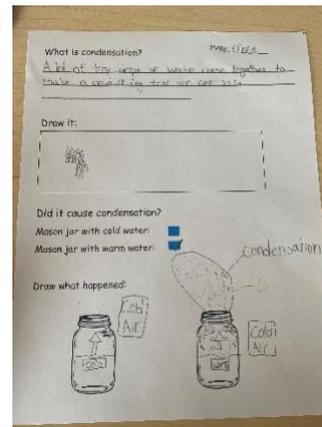
Indoors



Outdoors (please ignore coffee stained water)



Lincoln recording data



Sample data sheet

Conclusion:

Condensation happens when warm water is brought into the cold outdoor air. When warm, moist air comes out of the glass jar and mixes with the cold outdoor air, we were able to see condensation on the glass jar and in the air above it. It created a little cloud, in the same way our breath does, in cold outdoor air. Just like our breath, the glass jar with warm air did not create condensation in warm indoor air. The cold water jar did not create any condensation indoors or outdoors.

What is condensation?

Draw it:



Did it cause condensation?

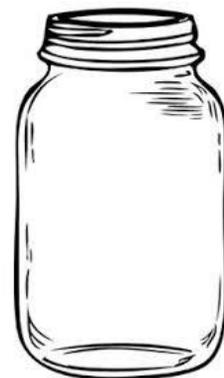
Mason jar with cold water:



Mason jar with warm water:



Draw what happened:



Annex B

Glass jar type	Condensation	No condensation
Cold water, indoors		
Warm water, indoors		
Cold water, outdoors		
Warm water, outdoors		