mystery science

Grades K-5
Mini-Lesson: “Why can we see our breath in the cold?”

VIDEO TRANSCRIPT

VIDEO 1

Hi, it's Jay! When it gets cold outside, and I mean really cold, a lot can happen. Soap bubbles can freeze, and boiling water can instantly turn into snow. Someone named Avaree is curious about another thing that can happen when it's cold. Let's give Avaree a call now.

[Video Call]

- Hi, Avaree.
- Hi, Jay. I got a question for you.
- Why do we see our breath in the cold?
- That's a great question.

Have you ever stepped outside in the cold, taken a deep breath, and noticed this? It almost looks like smoke is coming out of your mouth. Like, you're a fire breathing dragon or something! Okay. I know you're not really a dragon, but why does your breath look like that? Believe it or not, the answer to this question has nothing to do with smoke and everything to do with this. Yep. That breath you're seeing in the air has everything to do with water. See, there's water everywhere, but you may not always notice it. That's because when people think of water, They usually think of the liquid form of water. That's the kind of water you drink or swim in, but you may have seen that liquid water can change. Before I go on, I'm curious. What are some of the different forms of water you've seen?

VIDEO 2

Some of you may have said that water can change into something that looks like this. When it gets really cold, liquid water can turn into a solid form of water called ice. In the winter, entire lakes, parts of the ocean, and even waterfalls can turn into solid ice. And when it gets warmer, watch what happens. The solid ice turns back into a liquid and you can go swimming again. Those changes we see in water mostly depend on the temperature. Like water can change from a liquid to a solid when it gets cold, and then it can change back into a liquid when it gets warm. Like ice when it melts. But when liquid water is warm enough, another change can happen. Watch what happens when this puddle is warmed up by the Sun. It almost looks like the puddle is disappearing, doesn't it? That water isn't gone. It just changed into another form of water called a gas. Though you can't see it, this invisible gas form of water is in the air all around us. Whenever water is warm enough, It can turn from a liquid we can touch and feel into a gas that floats out into the air. This change can happen anywhere. Even in our bodies. I'm serious. There's a lot of water in our bodies, and our bodies are pretty warm. So just like how warmer temperatures can make the water from a puddle turn from a liquid into a gas, the warmth of our bodies heats the water inside us up, and you can breathe some of it out as a gas. Now, usually, we can't see the water in our breath because it's a gas so it's invisible. But what if you're standing outside on a cold day and the temperature is much colder out there. See that air coming out of this person's mouth, it almost looks like smoke, but it isn't. To figure out what it is, you can try breathing onto a cold window or a glass of ice water. See that fog on the glass? It's water. When the water in our breath goes on to something cold, it turns from an invisible gas back to a liquid. The same thing happens in cold air. When the water in our breath goes out into the cold air, the cold makes the water turned from an invisible gas back into teeny tiny drops of

liquid that we can see. The water droplets are so small that they just float around in the air, and that's why we see our breath in the cold. It's water turning from a gas back into a liquid. Pretty cool. So in summary, there are three common forms or states of water, solid, liquid, and gas, and temperature can change water into those different states. Like water can change from a liquid to solid ice when it's cold. It can change from solid ice back into a liquid when it gets warm and melts. And it can even change into an invisible gas when it gets warmer, like the invisible water in our breath when we breathe. But when it's cold enough outside, that invisible gas in our breath turns back into tiny drops of liquid that we can see floating in the air. And that's why we can see our breath when it's cold. That's all for this week's question. Thanks for asking it, Avaree.