

Student Arguments: Bath Bomb Unit

Lesson 2: Where is the gas coming from?

We measured the mass in a closed and open system before and after crushing the bath bombs and before and after adding them to water. We argue about where the gas is coming from.



Prompt in Electronic Notebook:

Write an answer to the lesson question "Where is the gas coming from?" in the form of a well-supported scientific argument. Remember, in a scientific argument you make a claim, support your claim with evidence, and provide reasoning to connect your claim to any relevant key model ideas to show why their evidence supports their claim.

Lesson 5: What gas(es) could be produced by a bath bomb?

We analyze the data for common gases that includes their known densities and flammabilities. We argue from evidence (density and flammability data) that the gas from the bath bomb can be narrowed down to three candidate gases.



Prompt in Electronic Notebook:

Complete a CER to make a scientific argument that answers the following question: *What gas(es) could be produced by a bath bomb?*

Lesson 6: What gases could not have been produced in this process?

We apply what we have figured out about properties to write an argument to explain a related phenomena (elephant's toothpaste).



Prompt in Electronic Assessment:

Use these three resources: a) your observations, b) your key model ideas, and c) the data table in your notebook of *Some Common Gases*, to make an argument to answer this question: What gases could not have been produced in this process?

Lesson 9: Does heating liquid water produce a new substance in the gas bubbles that appear?

We test the flammability of the gas produced by heating water. We collect data for the density of water and the substance we collected by heating water. We argue about whether the gas is made of the same particles that were in the water we started with.



Prompt in Electronic Notebook

Write an argument to support the claim: The gas inside the bubbles that was produced from heating the water was made of water particles. Describe why you decided to include the evidence and key model ideas you selected.

Student 1's Arguments

Lesson 2: Where is the gas coming from?

The gas comes from a chemical reaction when the bath bomb is put in water. My evidence is when she puts the bath bomb in water, the water becomes fizzy and makes bubbles. I can make this inference because gas makes up bubbles, my evidence is in soft drinks there is carbon dioxide in bubbles, and carbon dioxide is a gas. So the bubbles that pop up in the water are made up of gas and the gas comes from the bubbles. So this is all due because of a chemical reaction from the bath bomb touching water.

Lesson 5: What gas(es) could be produced by a bath bomb?

A gas that can be produced by a bath bomb is Carbon dioxide. The video in Investigations 4 of citric acid and baking soda mixing is evidence. When we saw the video of the citric acid and baking soda mixing together it created bubbles that we later came to find out it was carbon dioxide which is a gas.

Lesson 6: What gases could not have been produced in this process?

The gases that could not have been produced in this process are the gases that are not flammable or do not increase flames such as nitrogen, argon, etc.

Lesson 9: Does heating liquid water produce a new substance in the gas bubbles that appear?

The gas in the bubbles is made of water particles. When new substances are made from old substances, the particles from the original substances break apart and/or join to make new types of particles. If some of the particles break apart and make new particles then it would explain how water particles are included into the gas from the bubbles. Another piece of evidence is The density from the unknown substance has the same density as water. If the density from the unknown substance is the same as the water, there is a chance that the unknown substance could be water or have water particles. The last piece of evidence is The density does not change which means that even if the matter changes, the density will always stay the same. If the matter changes (liquid to gas) the density will still be the same no matter what (Water is 1g/mL). In conclusion, these pieces of evidence prove that the gas in the bubbles is made of water particles.

Student 2's Arguments

Lesson 2: Where is the gas coming from?

The gas is from a chemical reaction. I think the matter is already there but it is changing into another form/material. Some evidence is that my teacher said in a closed space no matter can leave or enter so the mass will always stay the same in a closed space. That evidence is why I think my claim is correct.

Lesson 5: What gas(es) could be produced by a bath bomb?

I think the gas that could be produced by the bath bomb is carbon dioxide because of these reasons and evidence.

My evidence is the Video that had the flask and bath bomb in it. My reasoning is the carbon dioxide and the bath bomb gas act the same when we check the density by flipping the flask. And that is one thing that supports that the gas could be carbon dioxide.

My evidence is the other video with the bath bomb gas and the flask. My reasoning for this is carbon dioxide is not flammable and the gas produced by the bath bomb is also not. And that is another thing that supports that the gas could be carbon dioxide.

My evidence is the section that has the properties of gasses. My reasoning is the table says that carbon dioxide is denser than air and so is the bath bomb gas. And that is one more thing that supports that the gas could be carbon dioxide.

In conclusion it makes sense that it is carbon dioxide because the density and the flammability all line up with carbon dioxide and so does my evidence. And that is what gas I think that the bath bomb could be making.

Lesson 6: What gases could not have been produced in this process?

The gasses that could not have been produced in this process are nitrogen, argon, carbon dioxide, neon, helium, and carbon monoxide. I know this because they are all non flammable and the gas in the video was flammable.

Lesson 9: Does heating liquid water produce a new substance in the gas bubbles that appear?

I think that the gas produced by heating up water is water vapor or just water in a gas form.

A piece of evidence that supports my claim is boiling water makes the same looking gas and I think it is water vapor because when it recondenses it is water. My reasoning for choosing this evidence is because it supports that it is water vapor because it shows that it turns into water from water so that must be water in a different state of matter. And that is one reason why I think the gas that is produced is water vapor.

Another piece of evidence is that the gas is not flammable and water vapor also puts out flames and so does liquid water. We tested it in investigation 9. I chose this evidence because it helps us narrow down what the gas could be because if they have the same properties then they are the same substance. That is another reason why I think the gas that is produced is water vapor.

One more piece of evidence is that they smell the same so they must have the same chemicals and particles in them. Why I chose this evidence is because it supports that they are made the same which means they must be the same. And finally that is another reason why I think the gas that is produced is water vapor.

In conclusion, the gas must be made out of water because when water boils it produces this gas and when it recondenses it is water so it must be the same. Another reason is that the gas and water are not flammable so they have the same property. And last they smell the same so they must have the same chemicals and particles in them.