

Alternate: Explaining another phenomenon

You watched the video of the elephant's toothpaste, which was the result of combining three different ingredients together: potassium iodide (a substance), a mixture of hydrogen peroxide and water, and soap (a mixture).

To help us figure out what is going on, here are the results from tests of different combinations of the three ingredients.

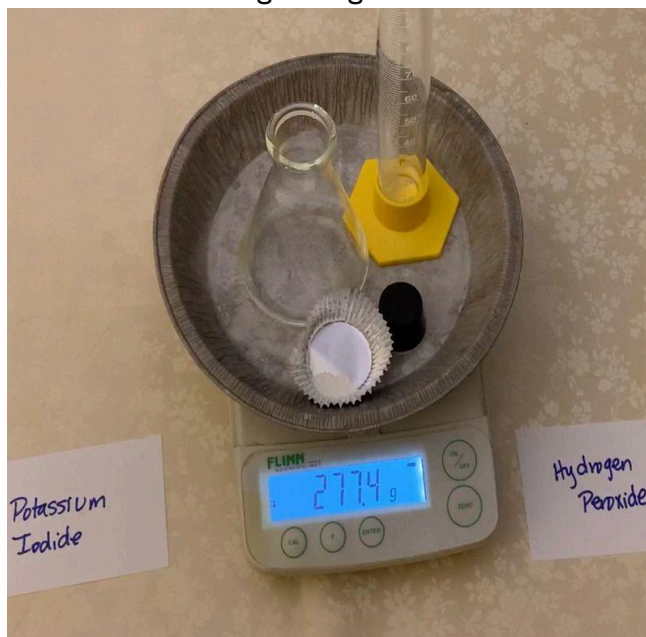
Combination	Ingredients combined	Bubbles?
A	hydrogen peroxide + soap	No
B	potassium iodide + soap	No
C	hydrogen peroxide + potassium iodide	Yes, lots!

Since combination C was the only one that produced bubbles, we will analyze a video showing what else happens when those two ingredients are combined.

1. Watch this second video and record your observations below.

Observations:

Mass of the system before
mixing the ingredients:



Mass of the system after
mixing the ingredients:



Use these resources in your answer to the next question:

Key Model Ideas:

- Gas is a type of matter and has mass and takes up space.
- In an open system matter can get in and out of the system and when this happens the mass may change.

2. Use the resources above to make an argument to answer this question:

- After combining these ingredients what could have caused the mass of the system to change?

When _____ and _____ were combined together there were a lot of bubbles that were produced and the mass went _____. This means a _____ was made.

I know this because (use one or more of the key model ideas listed above):

Use these resources in your answer to the next question:

Key Model Ideas:

- Gas is a type of matter and has mass and takes up space.
- In an open system matter can get in and out of the system and when this happens the mass may change.
- A substance has properties that can help to identify it. Some properties are more useful than others.
- Flammability is a property.

Some Common Gases Data:

Gas	Flammability
Nitrogen	Will extinguish a flame
Oxygen	Will increase a flame or cause a glowing ember to burst into flame.
Argon	Will extinguish a flame.
Carbon dioxide	Will extinguish a flame.
Neon	Will extinguish a flame.
Helium	Will extinguish a flame.
Methane (natural gas)	Will increase a flame. Can create an explosion.
Hydrogen	Will increase a flame. Can create an explosion.
Propane	Will increase a flame. Can create an explosion.
Air with 5% humidity	Can maintain an open flame.

3. Use the resources above to make an argument to answer this question:

- What gases could *not* have been produced in this process?

The gas from the elephant's toothpaste could *not* have been nitrogen, oxygen, argon, carbon dioxide, neon, helium, methane, hydrogen, propane, air. (circle all that apply) When the gas was tested with a flame it went out/glowed brighter (circle one). We can use _____ to help identify substances. When the gas was tested with a flame, we were testing its _____. Since the flame went out / glowed brighter (circle one), we know the gas is flammable/not flammable (circle one) and therefore it can't be nitrogen, oxygen, argon, carbon dioxide, neon, helium, methane, hydrogen, propane, air. (circle all that apply).

Use these resources in your answer to the next question:

Key Model Ideas:

- Gas is a type of matter and has mass and takes up space.
- In an open system matter can get in and out of the system and when this happens the mass may change.
- A substance has properties that can help to identify it. Some properties are more useful than others.
- Flammability is a property.
- Density is a property.

This is how we tested density of a gas before:

Holding a flame above a flask filled with helium:



Holding a flame below a flask filled with helium:



Some Common Gases Data:

Gas	Density ((g/L) measured at 0°C)
Nitrogen	1.250
Oxygen	1.430
Argon	1.780
Carbon dioxide	1.960
Neon	0.900
Helium	0.179
Methane (natural gas)	0.714
Hydrogen	0.090
Propane	2.000
Air with 5% humidity	1.160

4. Another student claims that the gas that was produced was methane. The class discussed ways to collect evidence to support or refute this claim. They decided that testing the density of the gas could provide them helpful evidence for this argument. -

- What test could you do on the gas from the elephant's toothpaste?
- How would the results of that test help you either support or refute the student's claim?
