

Atmosphere

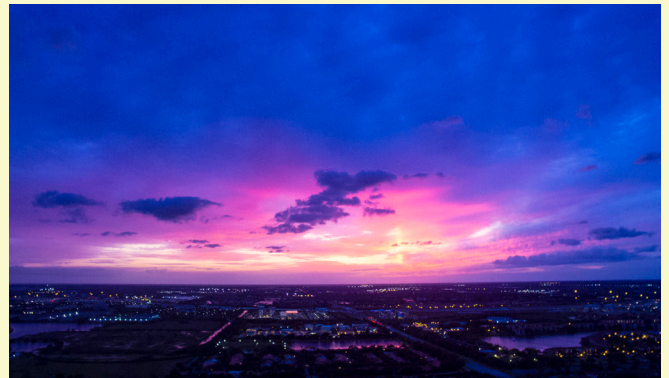


Atmosphere

**Do you need an idea for a scientific study?
Try out one of our ideas or make one of your own.**

People are bathing in a sea of gases every day and rarely take the time to notice the air that constantly surrounds them. Take the following brief quiz to see how much you already know about Earth's atmosphere. See the bottom of page 4 to check your answers.

1. During the Cambrian Period, the carbon dioxide levels in Earth's atmosphere were:
 - a. 4 times lower than Earth's current atmosphere.
 - b. 16 times lower than Earth's current atmosphere.
 - c. 4 times greater than Earth's current atmosphere.
 - d. 16 times greater than Earth's current atmosphere.
2. Since the start of the Industrial Revolution, by how much has the concentration of carbon dioxide in Earth's atmosphere increased?
 - a. by 10%
 - b. by 30%
 - c. by 60%
 - d. by 90%
3. Mount Everest is 9,000 meters tall. At what altitude above Earth's surface sea level would the body fluids of an unprotected person, such as saliva and blood inside the person begin to boil?
 - a. this would never happen at any altitude
 - b. 18,000 meters
 - c. 29,000 meters
 - d. 37,000 meters
4. About how many gallons of water are in Earth's atmosphere on a typical day?
 - a. 4,000,000
 - b. 400,000,000
 - c. 400,000,000,000
 - d. 40,000,000,000,000
5. Which substance dominated Earth's earliest atmosphere shortly after Earth was formed?
 - a. hydrogen
 - b. carbon dioxide
 - c. nitrogen
 - d. carbon monoxide



Heat It Up

People are constantly taking in oxygen gas and exhaling carbon dioxide gas. Climatologists have suggested that increased carbon dioxide in Earth's atmosphere can increase the average temperature of the atmosphere. Is it possible that your breath can increase the temperature of air? Find out now.

Materials

- 2 – empty and dry 500-mL clear water bottles/lids with the label removed
- 2 – small thermometers that fit completely inside the water bottles

Procedure

1. Place one small thermometer inside one empty water bottle and place the lid firmly on the bottle.
2. Squeeze as much air as possible out of the other empty water bottle.
3. Take in a large breath and blow into the contracted water bottle until the bottle is completely expanded back to its original size.
4. Quickly place the other small thermometer inside this bottle and place the lid on securely.
5. Place both bottles in a sunny location and allow the temperature in the bottles to stabilize for about 2 minutes.
6. After a couple of minutes, start collecting and recording in Table 1 temperature data of the two bottles.
7. Continue taking temperature measurements every 4 minutes for a total of 20 minutes.
8. Remove the thermometers and recycle the bottles.

Time	Temperature	
	Air Bottle	Breath Bottle
Start		
4 minutes		
8 minutes		
12 minutes		
16 minutes		
20 minutes		

Questions

1. Describe any differences in temperature in the gases inside the bottles at the end of the 20-minute investigation.
2. Propose a reason for any differences in temperatures of the gases inside the bottles at the end of the 20-minute investigation.

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Carbon Capture Technologies

Scientists have long warned about possible dangers to Earth's atmosphere due to dramatically increasing levels of carbon dioxide in the atmosphere. Carbon capture is a process in which atmospheric carbon is removed from or prevented from entering the atmosphere. A major goal is to reach a state of "net zero" carbon by the year 2050. Net zero means that the amount of carbon placed into the atmosphere will equal the amount removed from the atmosphere.

The most natural carbon capture called biological capture occurs when carbon is sequestered into living organisms, such as plants and stored to prevent the carbon from reaching the atmosphere. Forest, grasslands, oceans, and wetlands are all naturally sinks that store carbon. Activities that increase and preserve these environments can significantly reduce the amount of carbon entering the air.



Other human-led efforts can also store carbon are termed artificial or geological carbon capture and storage. Carbon dioxide produced via industrial process can be placed deep underground in large porous sedimentary rock formations that house salt water. This method is currently one of the largest storage methods for this type of produced carbon. Giant air filters that capture and remove carbon and ionic exchanges that absorb carbon into liquids for storage have also been implemented and shown to be effective in removing and storing carbon products.

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Answers: Page 2 Answers: (1) d, (2) c, (3) b, (4) d, (5) a. Page 3 Answers: Heat it Up (1) The Breath bottle should have heated up more than the other bottle. (2) Carbon dioxide captures and retains heat more than nitrogen and oxygen in the other bottle.

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