Name _____ **Date** _____ **Page** _____

The Air We Breathe

Lab Etiquette:	**Infractions:**
1. You will only converse with your lab partners. 2. You will only discuss topics concerning the lab activity. 3. You will treat your lab partners with respect. 4. You will follow all lab directions. 5. You will participate equally. 6. Use equipment properly.	___ Reminder ___ Serve Lunch Detention ___ Removal from Lab
Initial: I understand the rules and consequences _____	**Safety:**  

Purpose: To construct a model and understand the composition (make-up) of Earth's atmosphere.

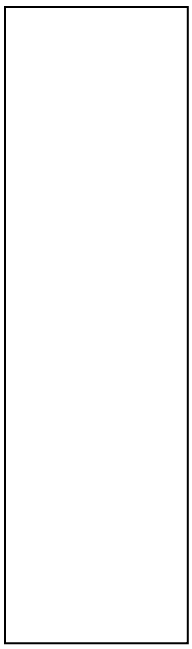
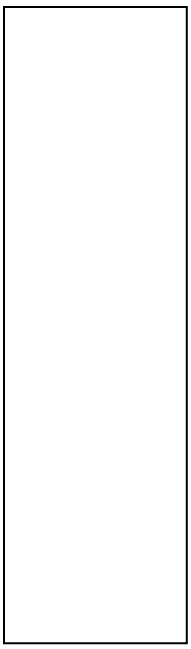
Materials: split peas (nitrogen gas particles)
rice (oxygen gas particles)
popcorn kernels (trace gases particles)
small graduated cylinder

Directions: The goal of this activity is to fill your graduated cylinder with 200 air particles. The 'air' in your graduated cylinder should have the same composition as the air in our atmosphere. The air we breathe typically is 78% nitrogen, 21% oxygen, and the remaining 1% is a mixture of trace gases (a variety of gases that appear in very small amounts).

Procedure:

1. Use your math skills to calculate the number of nitrogen particles to add to the graduated cylinder. Using the chart below to help you, calculate 78% of 200.
2. From your Ziploc baggie of gas particles, count out that many nitrogen particles and add them to the graduated cylinder.
3. Calculate 21% of 200. Enter this number into your chart.
4. Count out that many oxygen particles and add them to the graduated cylinder.
5. Calculate 1% of 200. Enter this number into your chart.
6. Count out that many trace gas particles and add them to the graduated cylinder.
7. Seal up the extra particles in your Ziploc baggie and set them aside.
8. Draw a colored illustration of your graduated cylinder in the observations section.
9. Carefully cover the graduated cylinder with your hand and shake the gas particles to mix them thoroughly. Any spillage will constitute a gas leak and your group will have to be quarantined, i.e. separated!
10. Have your teacher check your model and initial _____.
11. Place the graduated cylinder on the table and observe the mixture of gas particles.
12. Draw a second colored illustration of your graduated cylinder now that you have mixed up the gases.
13. Answer the questions below based on your mixture.

Observations:

Draw a colored illustration of your graduated cylinder before shaking. Provide a key.	Draw a colored illustration of your graduated cylinder after shaking. Provide a key.
	

Data:

Gas	Percent	Calculation (% ÷ 100) x 200 =	Particles Needed
Example: Helium	*5%*	*(5 ÷ 100) X 200 =*	*10*
Nitrogen			
Oxygen			
Trace Gases			
Total		xxxxxxxxxxxxxx	

Conclusions:

1. Look at your jar. What type of gas makes up most of the air?

2. In your opinion, which gas in our atmosphere do you think is most important to sustaining life? Why?

3. If you had to fill your graduated cylinder with 500 air particles, calculate how many nitrogen particles you would need. Show your work!

4. Challenge (+2 points): When scientists study gases, they often measure concentration of particles in PPM (parts per million). Calculate the number of *oxygen*, *nitrogen*, and *trace gas* particles in a column of air with 1,000,000 gas particles. Show your work!

The Air We Breathe Lab Review Questions

1. What are the two most abundant gases in our atmosphere?
   a. Oxygen and hydrogen
   b. Oxygen and water
   c. Oxygen and nitrogen
   d. Oxygen and trace gases

2. What percent of our atmosphere is made up of a mixture of gases that appear in small amounts and are called 'trace gases'?
   a. 78%
   b. 21%
   c. 1%
   d. 0%

3. Nitrogen is necessary for plant growth and function. If we saw a large decrease of nitrogen in our atmosphere, how might your model change?
   a. You would use more peas
   b. You would use fewer peas
   c. You would use more rice
   d. You wouldn't have to change the model

4. Plants absorb carbon dioxide gas and produce oxygen. If we saw a decrease in plant growth, how might the gases in our atmosphere change?
   a. We would have more oxygen
   b. We would have less carbon dioxide
   c. We would have more carbon dioxide
   d. There would not be any change in the gases

5. Which calculation is the correct way to determine how many rice pieces to use that shows 21% oxygen?
   a. 21 ÷ 100 x 200
   b. 21 x 100 x 200
   c. 0.21 ÷ 100 x 200
   d. 0.21 x 100 x 200

6. Forest fires produce a large amount of carbon dioxide. How might the model change to represent the atmosphere in an area right after a forest fire?
   a. You would use more peas to increase the nitrogen
   b. You would use more rice to increase the oxygen
   c. You would use more kernels to increase the trace gases
   d. You would not need to change the model

7. Volcanoes produce a large amount of ash (pulverized rock and glass) that gets carried into the atmosphere. How should we change the model to represent the atmosphere near an eruption?
   a. Lower the amount of oxygen only
   b. Lower the amount of nitrogen only
   c. Lower the amount of trace gases only
   d. Use a new object (chocolate sprinkles) to represent ash

8. What is the purpose of building a model?
   a. Give you something to do
   b. Provide a written description of an object
   c. To make qualitative observations about an object
   d. To give you a visual of an object that is too small or large to see normally

9. Which gas in the model is needed by animals for breathing?
   a. Nitrogen
   b. Oxygen
   c. Carbon dioxide
   d. Trace gases

10. Your finished model should have the particles in what order?
    a. Nitrogen, oxygen, trace gases
    b. Trace gases, oxygen, nitrogen
    c. Oxygen, nitrogen, trace gases
    d. They should be mixed and not found in layers

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