**The Air We Breathe**

**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 tube with lid

**Directions:** The goal of this activity is to fill your model with 200 air particles. The ‘air’ in your model should have the same composition as the air in our atmosphere. The air we breathe is approximately 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. Nitrogen particles: Use the chart to calculate 78% of 200. Enter this number into your chart.
2. From your container of gas particles, count out that number of nitrogen particles and add them to the tube with the blue lid.
3. Calculate 21% of 200. Enter this number into your chart.
4. Count out that number of oxygen particles and add them to the tube.
5. Calculate 1% of 200. Enter this number into your chart.
6. Count out that number of trace gas particles and add them to the tube.
7. Carefully put the lid on the tube 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!
8. Place the model on the table with the clear side facing you and observe the mixture of gas particles. Draw what you observe in your model in the rectangle on your lab paper. Don’t forget to include a key!
9. Have your teacher check your model and initial on the line by your model.
10. Answer questions 1 - 3 based on your mixture.
11. Clean up: sort out all of the particles from your model (using the plastic cups) and return them to their containers, double check your table and floor for any strays that need picked up.
12. Get teacher initials for your clean up in the bottom corner of your paper.
13. Continue with all of the questions on the back of the lab.

**Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period\_\_\_\_\_\_\_\_**

**#\_\_\_\_**

**The Air We Breathe**

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

**Observations:**

Draw a colored illustration of your model. **Provide a key.**

Teacher’s Initials\_\_\_\_\_\_\_\_

**Data:**

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

**Conclusions:**

1. Look at your model. 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 model with 500 air particles, calculate how many nitrogen particles you would need.

|  |  |  |  |
| --- | --- | --- | --- |
| Gas | Percent | Calculation  (% ÷ 100) x 500 = | Particles Needed |
| *Example: Helium* | *5%* | *(5 ÷ 100) X 500 =* | *(25)* |
| Nitrogen |  |  |  |
| Oxygen |  |  |  |
| Trace Gases |  |  |  |
| Total |  |  |  |

Teacher’s Initials\_\_\_\_\_\_\_\_

1. 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.

|  |  |  |  |
| --- | --- | --- | --- |
| Gas | Percent | Calculation  (% ÷ 100) x 1,000,000 = | Particles Needed |
| *Example: Helium* | *5%* | *(5 ÷ 100) X 1,000,000 =* | *(50,000)* |
| Nitrogen |  |  |  |
| Oxygen |  |  |  |
| Trace Gases |  |  |  |
| Total |  |  |  |

**The Air We Breathe Lab Review Questions**

1. What are the two most abundant gases in our atmosphere?
   1. Oxygen and Hydrogen
   2. Oxygen and water
   3. Oxygen and Nitrogen
   4. 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’?
   1. 78%
   2. 21%
   3. 1%
   4. 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?
   1. You would use more peas
   2. You would use less peas
   3. You would use more rice
   4. 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?
   1. We would have more oxygen
   2. We would have less carbon dioxide
   3. We would have more carbon dioxide
   4. There would not be any change in the gases
5. Which calculation is the correct way to determine how many pieces of rice you used to show 21% oxygen?
   1. 21 ÷ 100 x 200
   2. 21 x 100 x 200
   3. 0.21 ÷ 100 x 200
   4. 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?
   1. You would use more peas to increase the nitrogen
   2. You would use more rice to increase the oxygen
   3. You would use more kernels to increase the trace gases
   4. 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?
   1. Lower the amount of oxygen only
   2. Lower the amount of nitrogen only
   3. Lower the amount of trace gases only
   4. Use a new object (chocolate sprinkles) to represent ash
8. What is the purpose of building a model?
   1. Give you something to do
   2. Provide a written description of an object
   3. To make qualitative observations about an object
   4. 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?
   1. Nitrogen
   2. Oxygen
   3. Carbon dioxide
   4. Trace gases
10. Your finished model should have the particles in what order?
    1. Nitrogen, oxygen, trace gases
    2. Trace gases, oxygen, nitrogen
    3. Oxygen, nitrogen, trace gases
    4. They should be mixed and not found in layers