Name: Date: Pd:

Unit 6: Atmosphere & Oceans

The Origin of the Atmosphere

Iron on the earth's surface did not rust until approximately 2.3 billion years ago even though iron has been present on the Earth since its formation. Now, all iron rusts if exposed to the elements. The following two activities will guide our understanding of what causes rusting, the composition of the atmosphere and how and when the earth developed its atmosphere.

Activity 1: Rust

Day 1:

Part A: Oxygen Only

1. Place one piece of the steel wool in the bag
2. Fill the bag with as much O_2 as possible
3. Seal the bag tightly and label it with your groups names and "O_2"
4. Fill in your predictions in the data table below

Part B: Oxygen and Water

1. Place one piece of steel wool in the bag
2. Add a little water (H_2O)
3. Fill the bag with a much O_2 as possible
4. Seal the bag tightly and label it with your group names and "O_2 and H_2O"
5. Fill in your predictions in the data table below

Part C: Carbon Dioxide and Water

1. Place the last bit of steel wool in the bag
2. Add your vinegar and baking soda to the bag
3. Vinegar and baking soda react with each other and release carbon dioxide (CO_2) and water
4. CO_2 is more dense than air, so as the bag fills with CO_2, where will the O_2 go?

5. Once the reaction is just about complete, seal the bag
6. Label this bag with your group names and "CO_2 and H_2O"
7. Fill in your predictions in the data table below

	O_2 Only	O_2 and H_2O	CO_2 and H_2O
Day 1: Predictions			
Day 2: Observations			

Day 2: Analysis Questions

1. In which bags did rust appear on the steel wool?
2. What causes rusting?
3. What is water's role in rust formation?
4. What does the presence of rust in the "redbeds" tell you about the earth's atmosphere?
5. Hypothesize about the origin of oxygen in the atmosphere.

Activity 2: Bromythymol Blue

Bromythymol Blue is a solution that is blue in color if O_2 is present in the solution. If no oxygen is present, the solution turns a yellow color.

Day 1:

1. What happens when air is blown into Bromythymol Blue? What gas is this?
2. What happens to the oxygen that was originally present in the solution? Explain.

We will add a rock, a piece of wood, Elodea (a water plant), sand a mushroom to five additional test tubes filled with a Bromythymol Blue solution. These five test tubes have had the oxygen removed from them by blowing carbon dioxide into the solution. We will seal and leave these test tubes overnight and make observations tomorrow. In the data table below, make predictions about which object will put oxygen back in the test tube tomorrow.

	Rock	Wood	Elodea	Sand	Mushroom
Day 1: Predictions					
Day 2: Observations					

Day 2: Analysis Questions

3. Which test tubes had oxygen in them today? What is the explanation for this?
4. Using the information we learned from the rust activity and your results above, what does this tell us about when plant life first emerged on the planet?
5. What happened to all of the CO_2 that the atmosphere was originally made up of?