From gas to rust

Environment, Nature

Attach a vertical strip of masking tape to the side of each of your test tubes for marking the water level)and using the permanent marker, make a mark on the tape about 1 CM down from the mom the of the test tube. This will be the outside water level. 4. Tear off enough steel wool to make a ball about 2. 5 CM in diameter. Use a p encircle to push the steel wool down to the bottom of a test tube. Repeat for a total of three test tubes with steel wool. 5. Rinse all of the test tubes (three with steel wool and three without) by filling the test tubes with water, allowing the water to sit there for 1 minute, and then pouring the water out.

This step will dampen the tell wool in the three tubes that have it thus making sure there is enough water present for the oxidation reaction. Treating the the ere test tubes without steel wool the same way ensures that all variables are controlled. 6. Turn all six of the test tubes (three with steel wool and three without) upside e down and mount them over the jars so that the water level is at the starting mark you made in step 3 on each test tube. 7. You may want to cover your entire setup with a big plastic bag to minimize evaporation. Be careful not to knock the test tubes when covering and uncovering. Check at least daily, and write your observations down in your lab notebook k. Carefully mark the water level on the tape on each test tube. 9. When the water level is no longer changing in the test tubes, you're ready t o analyze your results. 10. Measure the difference in water level between the open end of the test TU be and the water height inside the test tube at the end of the experiment. For how many tubes did the water level change? For t hose that did: Calculate the volume that corresponds 2 to this difference the total starting volume of air in each test tube.

Volume of a cylinder: V= nor h Remember, for tubes containing steel wool, the wool will displace most of the air. Make sure your measure ants and calculations take this into account. 1 1 . Calculate the proportion of oxygen in each test tube. Average the proportion on of oxygen from all the test tubes with steel wool. How does this compare with the value for percentage of oxygen in the air that you found in your background research? Background Information The goal of this experiment is to measure the percentage of oxygen in air Sam peels and this reject will show an interesting way of doing that.

The method depends on at mesospheric pressure and a chemical reaction that removes oxygen from the air. I will find out what kind 0 f chemical reaction can remove oxygen from the air. Oxidation of iron, also known as rusting, will do t he trick. Exposed iron will rust in the presence of oxygen and water. I will study this chemical reaction a ND I'll see that oxygen becomes combined with the iron atoms and water to create iron oxides. I thin k this meets middle school grade level expectations because it enables me to understand the term s and concepts: atmospheric pressure, oxidation of iron and the layers of the atmosphere.

The question I am asking is why does the water level eventually stop rising? I wanted to know how much oxygen is in the air and how much of it we consume when we bread the every day. Well this project shows an interesting way of finding out. The atmosphere contains the oxygen we need to breathe to support cellular respiration, the metabolic process that provides the e chemical energy necessary for life. This makes my project

possible and yet at the same time ca vitiating. I'm going to SE test tubes to measure the percentage of oxygen in my air sample.

This is what gave me the idea to do thisscienceexperiment. Variables The independent variable was the varying types of metal: steel, copper, and iron. The dependent variable was the amount on rust on each sample. The control fifths experiment is the surrounding air. The constants in this experiment are the type of test tubes used, the time each metal spent submerged in water, the water in each bottle/jar, and the temperature of the surrounding air. Graph Data Table Types of Metal Trial 1 Trial 2 Trial 3 Average Copper ml ml mm 21. Ml ml gorgon ml 28. Ml Steel Wool ml mm mm L 34. Ml Hypothesis If the metal rusts, then the level of the water in the measuring beaker will decrease. Conclusion My hypothesis was if the metal rusts, then the amount of water in the measuring beaker will decrease and it was correct. My data supported my hypothesis because as the metals developed rust, the amount of water in the measuring beakers decreased. The average for the copper was 21. 3. The average for the iron was 28. 7 and the average for the steel wool was 33. 7. The copped water level decreased the most and the steel wool decreased the least.

My question, why does the water eventually stop rising was answered. I found out that the water level decreased because of evaporation. Reflection loved working on the project but what I enjoyed the most about it was making g the test tubes. My data made sense because its shows the water level decreasing for each metal like I said it would in my hypothesis. Now that I have finished my experiment have new questions such h as what

would happen if collected air samples at high altitude, and then tested them at low altitude or vice versa).

If I ever took a vacation in the mountains, I can use this method to compare oxygen el veils in the air at high and low altitude. I could try doing this experiment at high altitude and comparing t he results with same experiment done at a lower altitude. Can use this procedure to detect decree seed oxygen content in exhaled air. Then I could do background information and find out how much oxygen we consume when we breathe. I think this method is sensitive enough to detect the difference an d would provide me with more accurate data.