Home lab 5 · Unit 5 · 20 minutes of setup, then 2 days of waiting, 15 minutes to measure

What fraction of the air is used up when iron rusts?

Name _____ Date _____

MATERIALS

You supply everything. Tick each item as you gather it.

- ☐ Plain steel wool with no soap added (hardware store), a small ball about the size of a golf ball
- ☐ 2 identical clear jars or drinking glasses, and 2 shallow dishes
- ☐ Vinegar and water, a ruler in millimeters, a pencil and tape
- ☐ A marker for the water level

SAFETY

Steel wool can cut your fingers: handle it gently or wear gloves. Do not use soap-filled pads. Wash your hands after touching vinegar-soaked steel wool. Rust stains clothing and surfaces, so work over a tray.

PROCEDURE

1. Soak the ball of steel wool in vinegar for 2 minutes to remove its protective coating, then squeeze out the extra liquid.
2. Push the damp steel wool to the bottom of jar A (the closed end) so it stays when the jar is turned upside down. Leave jar B empty as a control.
3. Pour about 2 cm of water into each dish. Turn each jar upside down into a dish, so that the open end is under water. Tape a ruler to each jar.
4. Raise or lower each jar until the water level inside matches the water level outside, then record the length of the air column inside from the closed end to the water surface (start length).
5. Wait 48 hours without moving the jars. Match the inside and outside water levels again and measure the air column (final length).
6. Compute the change for each jar, correct jar A with the control, and calculate the percent of the air that was used up.

RECORD YOUR DATA

Jar	Start length (cm)	Final length (cm)	Decrease (cm)
A, steel wool			
B, control			

Also write the corrected decrease, the percent of the air used up, and your percent error against 20.9 percent.

LAB REPORT

Write a report that gives your table, shows the percent calculation and the percent error against the accepted value for oxygen in dry air (20.9 percent by volume), and explains what happened to the iron. Include a balanced equation for the reaction, and name its type.

Report the numbers you actually got, even when they disagree with the lesson. Write on the lines, or type your report on the website and send it to a teacher there.

Question and hypothesis *State the question in your own words, what you expect to happen, and why you expect it.*

Method *What you changed, what you measured, what you kept the same, and how many trials you ran.*

Observations *Describe what you saw, including anything unexpected. Your data tables are added to the report automatically.*

Calculations *Show each calculation step by step, with units.*

Claim and reasoning *Answer the question using your numbers, then explain why, using the science from the unit.*

Limits and next step *What could have affected your results, and one change you would make next time.*