Rusty Balloon

Student Worksheet

Name_____

Overview Nooooo! You left your bike out in the rain and now it's covered with rust. Why? What is rust? And why does it form where we least want it?

What to Learn You should understand that rust is the result of a chemical reaction: iron + oxygen = Rust.

Materials

- Four empty water bottles
- Four balloons
- Water
- Steel wool
- Vinegar (MSDS)
- Water
- Salt

Lab Time

1. Line up four empty water bottles on the table.
2. Label your bottles so you know which is which: Water, Water + Salt, Vinegar, Vinegar + Salt
3. Fill two bottles part way with water.
4. Fill two bottles part way with vinegar.
5. Add a tablespoon of salt to the "Water + Salt" bottle.
6. Add a tablespoon of salt to the "Vinegar + Salt" bottle.
7. Stuff a piece of steel wool into each bottle so it comes in contact with the liquid. Cap the bottle and shake. The steel wool should be completely saturated with liquid.
8. Open the bottle and pour out the liquid, leaving the soaked steel wool inside.
9. Stretch a balloon across the mouth of each bottle.
10. Let your experiment sit (overnight is best, but you can shorten this a bit if you're in a hurry).
11. Fill in the data table.

Rusty Balloon Data Table

Item/Object	Detailed Observations **What happened to the balloon? The water bottle? How does the steel wool look?**
Water	
Water + Salt	
Vinegar	
Vinegar + Salt	

Exercises Answer the questions below:

1. When iron rusts, it goes through a chemical reaction: Steel (iron) + Water (oxygen) + Air (oxygen) = Rust. Keeping this reaction in mind, explain what happened to the balloon in the bottle with water and steel wool.

2. Why did the balloon inflate with the vinegar sample?

3. What can you conclude about salt used in this experiment?

4. There are two metal bridges, both several hundred years old and located in a very dry area. One is over water, and one over dry ground. Which one is most likely to be safer? Why?

Exercises

1. When iron rusts, it goes through a chemical reaction: Steel (iron) + Water (oxygen) + Air (oxygen) = Rust. Keeping this reaction in mind, explain what happened to the balloon in the bottle with water and steel wool. (The iron and oxygen produced rust. The oxygen was used up so there was less pressure inside the bottle, causing the balloon to be sucked inside.)
2. Why did the balloon inflate with the vinegar sample? (The vinegar produced gas, which caused a higher pressure inside the bottle. This caused the balloon to inflate slightly.)
3. What can you conclude about salt used in this experiment? (The salt acts like a catalyst, speeding up the rusting reaction).
4. There are two metal bridges, both several hundred years old and located in a very dry area. One is over water, and one over dry ground. Which one is most likely to be safer? Why? (The bridge over dry ground. The bridge over a river is constantly exposed to oxygen, which can cause the structures to rust.)

Closure Before moving on, ask your students if they have any recommendations or unanswered questions that they can work out on their own. Brainstorming extension ideas is a great way to add more science studies to your class time.