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EXPLORING CORROSION

MATERIALS:

- Goggles
- Test tubes, 25 x 150 mL -6 per group
- 5 cm piece of steel wool each weighing the same & tightly rolled into a worm shape -6 per group
- Salt packets-restaurant individual packs-6 per group
- Hydrogen peroxide (50 ml per group)
- Distilled water bottle (50 ml per group)
- Test tube rack (one per group)
- 20 cm piece of zinc ribbon (one per group)
- 20 cm piece of magnesium ribbon (one piece per group)
- 20 cm piece of copper wire, 18 gauge (one piece per group)
- 20 cm X 1 cm strip of aluminum foil (one piece per group)
- Cooking Spray (one per group)
- Rustoleum Paint any color (one per group)
- Graduated cylinders 5 ml- 2 per group
- Electronic Balance
- pH sensor

PRE LAB:

Rank how well you think each of the inhibitors will work to protect steel wire from rusting. Rank them from 1 - 5 with 1 being the best at preventing the formation of rust. (2 pts)

Ranking

I think _____ inhibitor will work best, followed by _____, _____,_____and _____ will work the least.

My reasoning for this ranking is:

_____

_____.

SAFETY:







PROCEDURE:

1. Record the masses of the 6 pieces of steel wire before you add anything to them.
2. Label test tubes #1, #2, etc.. Prepare each piece of steel wire with your inhibitors. Wrap one with magnesium ribbon, one with copper wite, one with zinc, paint one, and spray another with oil. Leave one as a control.

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3. To test tube #1 add the plain piece of steel wire, this will be your control. Record the mass of the steel wire.
4. In test tube #2 add a piece of steel wire that you have painted with the paint
5. In test tube #3 add a piece of steel wire that you have wrapped in zinc (Zn)
6. In test tube #4 add a piece of steel wire that you have wrapped in magnesium (Mg)
7. In test tube #5 add a piece of steel wire that you have wrapped in copper (Cu)
8. In test tube #6 add a piece of steel wire that you have dipped into oil
9. Add 5 mL of water to each test tube.
10. Add 5 mL of hydrogen peroxide (H_2O_2) to each test tube
11. Add one packet of salt to each test tube.
12. Measure and record the temperature (use °C) of the liquid in each test tube and and make initial observations.
13. After 15 minutes, record your final observations and the final temperature and mass(remove covering if possible)
14. Pour the liquid into the sink and remove the steel wire from the test tube. Remove the outer wrapping and reweigh the steel pieces. Record your data and make close observations of the rusting that may or may not have taken place.
15. Clean-up, your area and tape the pieces of steel wire to the bottom of your observation sheet.

OBSERVATION SHEET:

Data Table:

	Test Tube 1 Control	Test Tube 2 Painted	Test Tube 3 Zinc wrapped	Test Tube 4 Magnesium Wrapped	Test Tube 5 Copper Wrapped	Test Tube 6 Oil Dipped	Test Tube 6 Aluminum Foil
Mass Steel wire (g) (before adding covering)							
pH(Initial)							
Initial Observations							

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Mass of steel wire (g) after 15 minutes (removing covering)							
pH (Final)							
Observations Final							

QUESTIONS:

1. What happened to each piece of steel wire after 15-20 minutes? What happened to each of the three metals (copper, zinc and magnesium) that were used to protect the steel wire? Explain in detail what happened to ***each*** sample you tested. (5 pts)

2. What inhibitor stopped/reduced the formation of rust? There may be more than one correct answer. (2 pts)

3. Which of the inhibitors that you tested worked the best and why did you pick this inhibitor over the others?. (3pts)

4. State at least one other way to reduce the formation of rust on metals. What other materials would you like to try to inhibit the formation of rust. List why you think they might work?(1 pt)

5. Think back to the engaging part of this lesson with the roller coaster accident. Which way should the metal parts of the roller coaster best be protected? How do you think it was being protected?

6. What happened to the temperature of the liquid over the 15 minutes? Make a Graph showing the Initial temperature and the Final temperature of each test tube over time. Don't forget a title and to label your axis.

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