| Inquiry Question |
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| How does rust occur and what can I do to prevent it? |

**Name:** _____ **Date:** _____

If something is changed chemically the result is something very different than what you started with. The original substance or reactant changes into a new substance or product, with different properties. Most chemical changes are non-reversible which means you cannot easily get back to the original substance once it is changed.

There are many chemical changes happening around us all the time. Some of these chemical changes are a good thing, such as baking bread, while some are more destructive. Metals that contain iron, when exposed to moisture and oxygen, can start a chemical change in the metal which we often refer to as rusting.

Recall that matter never disappears but rather it just has new forms. The metal does not disappear but instead it is converted to a new substance called rust (an iron oxide).

In this project you will observe the process of rusting and learn what can be done to prevent it. It is important to plan ahead with this project as this activity will take about two weeks.

| General Instructions |
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| The goal of this project is to learn how rust occurs and how to prevent rusting. |

**Materials you'll need:**

- Box of steel wool pads. Although the kind without soap is preferable, the ones with soap will work equally well.
- Salt
- Water
- Vinegar
- At least two or three of the following: clear fingernail polish, spray-on car wax, furniture polish, polyurethane finish, and vegetable oil.
- Four saucers or small bowls

**Ideas and Hints:**

Experiment #1

1. Dampen a steel wool pad with approximately 2/3 cup regular water and put it in the first saucer.
2. Dampen a steel wool pad with approximately 2/3 cup salt water and put it in the second saucer.
3. Make a mildly acidic solution by mixing 1/3 cup vinegar with a 1/3 cup of water. Use this solution to dampen a steel wool pad and put it in the third saucer.
4. Leave an undampened steel wool pad in the fourth saucer. This is your control.
5. Inspect the steel wool pads at 12 hours, 24 hours, 36 hours, 48 hours, 72 hours and 96 hours. Which pad rusted the fastest? The second fastest? The third fastest? Take pictures of the rusted pads and write up your results.

Experiment #2

6. "Pre-treat" steel wool pads by coating them in any of the following: clear nail polish, spray-on car wax, vegetable oil, polyurethane finish, and furniture polish. You do not have to use all of these substances, but try to select at least two. Which do you think will prevent rust the best?
7. Dampen your pre-treated steel wood pads with water (just as you did in experiment #1) and put each of them on their own saucer. Come back and observe the steel wool pads at 12 hours, 24 hours, 36 hours, 48 hours, 72 hours, and 96 hours. Which pre-treatment worked the best? Why?

**Project submission:**

Write down your observations including diagrams, photos, or videos of your techniques. If you can drop-in to the school, you can present it to your teacher in-person. Otherwise, upload it to the project submission folder at the end of the unit.