CALIFORNIA SCIENCE & ENGINEERING FAIR
2018 PROJECT SUMMARY

Name(s)

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Project Number

38668

Project Title

Rust Wars: The Effect of Acidity on the Oxidation of Steel

Abstract

Objectives/Goals

This experiment was performed to test how fast steel wool corrodes after being soaked in different acidic liquids. It was expected that if lemon juice is used, then the steel wool would corrode the most. This was expected because lemon juice has the lowest pH of all five liquids, so it would cause the most corrosion.

Methods/Materials

In this experiment, five liquids were used (distilled water, lemon juice, tomato juice, orange juice, and vinegar). Five trials were done with each liquid. For each trial, a strip of steel wool was soaked in a liquid, then put inside a test tube with a thermometer for 20 minutes. Corrosion releases heat, so after the 20 minutes was up, the temperature of the steel wool was recorded. The more corrosion, the higher the temperature.

Results

The vinegar had the highest average temperature: 24.32°C. It was the second most acidic liquid used. Lemon juice, the most acidic had the second highest average temperature: 24.28°C.

Conclusions/Discussion

The results did not support the hypothesis. Even though the lemon juice was the most acidic, it got the second highest average. Vinegar got the highest average temperature. However, in general more acidic liquids tended to have higher temperatures than less acidic liquids. There may be some other aspects of these liquids that affects corrosion, in addition to pH.

Summary Statement

In general acidity increases the corrosion of steel wool, but this relationship is imperfect and may be impacted by other factors.

Help Received

I designed and conducted the experiments, my father found and purchased the materials, my mother took pictures, and my younger siblings assisted me by handing me materials.