CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
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Project Number
J1219

Project Title
Corrosion Corrupts

Abstract

Objectives/Goals
Corrosion damage is very expensive destroying billions of dollars of equipment and structures in the US alone, each year. Applying protective coatings that significantly reduce the effect of corrosion extending the life of equipment will provide the economy with tremendous costs savings and reduce irreparable damage to the environment.

Methods/Materials
An easy to handle thin sheet of copper foil was cut into small strips. These sheets were cut into strips that were treated with one or more corrosion protective materials. The strips were then attached to a wire rack that was placed into a heated oven to accelerate the simulated environmental effects of temperature on the metal. The strips were then sprayed with a salt spray to simulate the effect of sea water. Finally the strips were subjected to a mild acidic spray simulating the effect of acid rain. At each step the samples were evaluated for corrosive attack and the results tabulated and compared to results for the uncoated control strips.

Results
The protective effect of the combination of the urethane coating and the prior BTA, closely followed by the BTA/Acrylic Polymer coating sequence provided the best overall protection from the accelerated thermal aging tests. These tests were combined with a simulated environmental salt spray and acid rain simulations to provide a more effective test process in determining the coatings performance level in their protection of coated/treated copper.

Conclusions/Discussion
Although costly it is worth the additional expense and manufacturing time to provide protective coating on metals. In most cases it adds to the benefit when the metals are coated with more than one coating as this assists in providing the surface with protection from additional sources of corrosion. In the case of the metal, copper and the combination of a chemical treatment followed by a polymer material sealant the combination effect provides improved protection even under an accelerated thermal lifecycle test combined with salt spray and mild acid exposure.

Summary Statement
Developing a protective coating or sequence of coatings that are effective in preventing metal corrosion.

Help Received
Father helped be obtain materials and chemicals used in the experiment. My mother proof read my report and presentation.