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Project Title

Thermite Reactions: A Comparison of Iron and Copper Oxides

Abstract

Objectives/Goals
To observe two different thermite reactions and determine whether copper oxide or iron oxide thermite would cause more observable damage (melting) to the test subject (made of plastic and metal); and to measure the duration of combustion of copper oxide and iron oxide thermite.

Methods/Materials
The reactions were conducted outdoors on a gravel driveway, cleared of flammable items in a 30 foot diameter circle. A welding mask was used to protect my eyes from the UV rays. A terra cotta flower pot was used to contain each reaction. Molecular weights of iron oxide and copper oxide were calculated and 0.1 mole of each was reacted with aluminum powder and the test subject. Three trials for each type of thermite were completed.

Results
Iron thermite clearly caused more observable damage to the test subject with extensive destruction noted in all three trials. In addition, the iron thermite reaction time was much longer, averaging 21 seconds compared to the <1 second duration of the copper oxide thermite. The copper thermite caused extensive superficial damage, without melting the test subject.

Conclusions/Discussion
The iron oxide thermite reaction led to more observable damage to the test subject and therefore would be more valuable in applications requiring melting of materials. In addition, the longer duration of reaction for the iron oxide thermite would give more opportunity for the reaction to be controlled than copper oxide thermite, therefore likely to be safer to use by personnel in a field situation.

Summary Statement

I demonstrated that iron oxide thermite caused more destruction and melting of the test subject (a plastic and metal object) and a longer duration of reaction than copper oxide thermite.

Help Received

None. I researched the topic, designed the experiment and performed the experimental trials by myself.