California State University of Bakersfield, Department of Chemistry

Sulfur Thermite

Standards:

MSETS1-1. Design the crieteria and constraints of a problem with successful solution, taking into account relevant scientific principles and potentioal impacts on people and the natural environment that may limit possible solutions.

Introduction:

How many times have you needed to weld together a Train rails and thought how in the world will I do this? Well now that very sought after question has been solved, use sulfur thermite. Thermite has been known and used before, but mainly different materials are used in the making of it. For this termite we will use sulfur, aluminum powder, and wait for it sand… yes sand.

Materials:

- 25 g Aluminum powder
- 30 g Sulfur powder
- 22.5 g sand
- 30 g potassium permanganate
- 2 clay flower pots

- More sand as needed to fill the bottom of the clay pot
- 2 inch magnesium strips
- 2 ml of glycerin
- 1 inch square of duct tape

Safety:

- Always have an adult with you to help you during your experiment.
- Always where your eye safety and gloves.
- Follow all fire safety precautions.

Procedure:

1. Make sure the powders are as fine as possible, use a mortar and pestle if necessary.
2. Mix the 25 g Aluminum, 30 g Sulfur powder, and 22.5 g sand together.
3. Place the square of duct tape over the hole in the bottom of one of the flower pots. Now stack this pot inside the other pot.
4. Fill this pot approximately ¾ full with excess sand.
5. Make a cone shaped depression in the sand. Pour the mixture of aluminum, sulfur, and sand into this depression.
6. At the top of the mixture make another depression for the potassium permanganate.
7. Insert the 2 strips of magnesium into the potassium permanganate.
8. This is now ready to start, make sure you do this experiment in a well-ventilated area far from flammable materials.
9. Use a pipet to put the glycerin onto the potassium permanganate.
10. The reaction will take up to a minute before it starts, but when it does it will go up quick and burn at over 1000° F.
11. Once the reaction has stopped and the product has cooled down, the product can be processed further to isolate the residual silicon.
12. This is done by breaking out the black chunks from the product, and placing these chunks into 4 M HCl. This should be done in a fume hood or outside due to the sulfur smell.
13. Leave the product in the HCl for a few days.
14. After a few days pull out any chunks of residue left in the HCl these chunks when washed off should have a gray semi-metal appearance this is the Silicon.
15. Dispose of you HCl properly then collect your Silicon into a container.

Data and Observations:

Record your observations in this space

Questions:

What did you see? Anything you were not expecting? Describe it here.

References:

1. COSI, Center of Science and Industry. For Educators, Classroom Activities. http://www.cosi.org/educators/classroom-activities/item/buoyant-bubble (accessed Jul 18, 2013).