

Thermite Reaction

Thermite be an explosion, thermite not be. Therwill be molten iron.

Chemicals and Equipment Needed

- Fe₂O₃ – **F2**
- Al powder – **E1**
- Package of Mg ribbon – **F3**
- Mg turnings – **F3**
- Tall ring stand with small iron ring – **J1/2**
- Small filter paper – **U4**
- Propane torch - **A4**
- Striker – **U2**
- Blast shield – **next to J**
- Thermite Kit (all dedicated equipment) – **L5**
 - Sand trough
 - Beaker
 - Scoopula
 - Glass stirring rod
 - Horseshoe magnet (if needed)
- 2 terra cotta flower pots – **L5**

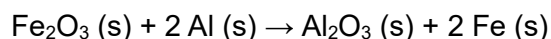
Hazards: The reaction generates intense heat and molten iron! And is really awesome!

Preparation

- Tare the scale to one of the dedicated beakers, with a paper towel underneath. Measure out 22g Fe₂O₃ and 6.7 g Al powder. Mix the reagents together with the glass rod, and smooch the large lumps of Fe₂O₃. Mix in a tablespoon or so of Mg turnings to help the mixture light.
- To make the fuse: cut 2 long pieces of Mg ribbon, 20 – 25 cm long. Lay the pieces on top on one another and twist together (or around a glass rod), leaving a few centimeters at one end, and flare those pieces out to make a base for the fuse. You want the fuse to sit in the powder and stick straight up for easy lighting. Make an extra fuse if needed
- Nest the flower pots inside one another, and place the filter paper in the bottom of the inside pot, covering the hole. Holding the fuse in place over the filter paper, pour the iron-aluminum mixture over the fuse, making sure the mixture covers the fanned part of the fuse and sits up in the mixture.
 - You usually need 2 people for this, one to hold the fuse in place, the other to pour the mixture.
- Place the sand trough on top of the ring stand base, position the iron ring above it, and place the flower pots inside the ring
- On delivery: position the blast shield between the reaction and the audience.

Presentation

- This is a quarter mole reaction.
- Light the propane torch and use it to light the fuse. The heat from the burning Mg ribbon ignites the mixture to initiate the thermite reaction. Stand back, as this spectacularly exothermic redox reaction throws up a significant amount of large sparks.
- The molten iron quickly solidifies and can be tested with a magnet. This reaction has historically been used to weld railroad ties together and weld the sides of ships. It is especially useful because the reaction does not require an external (and potentially flammable) O₂ source, and the reaction is not reactive on its own:



Clean-Up: The solid products, including any wayward pieces of Mg ribbon, can be left in the trough.

NOTES:

- This was originally learned from George Gilbert of Denison University, but has been modified.
- Get small (3.5", 9cm) pots at JoAnn's or Michael's. They must be plain terra cotta, unglazed. Buy like 40 at a time.
- Thermite joke courtesy of The Professor John M. Herbert, of Ohio State University.\