

# THERMITE IN YOUR HAND

## GOALS/PURPOSE

- Demonstrate an exothermic single replacement reaction
- Provide a quick, easy and safe version of the traditional thermite lab

## MATERIALS/EQUIPMENT

- Two rusty iron spheres
- Aluminum foil

## SAFETY

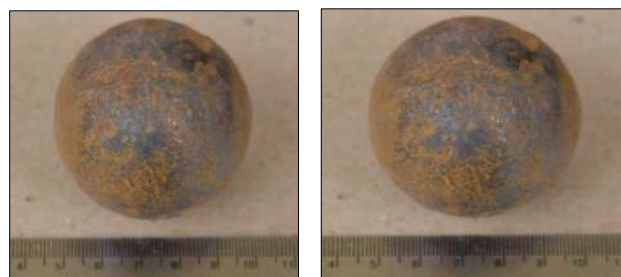
- Produces sparks that may shoot several feet
- Goggles should be worn
- Be careful to keep a tight grip on the spheres so they don't fall on your foot
- Be sure to keep your hands on the sides to avoid smashing your fingers



**Fig. 2.25** White sparks and a loud crack should be produced when the spheres strike and slide past each other

## PROCEDURE

1. Wrap one of the rusted iron spheres with aluminum foil. If the spheres are smaller than 2 in. in diameter, it can be helpful to use a larger sheet of foil to wrap the sphere and twist the excess foil into a "handle" to hold while striking the spheres together.
2. Hold the aluminum foil-wrapped sphere in your non-dominant hand and the non-wrapped sphere in your dominant hand.
3. Using a glancing blow, strike the two spheres together (at the rusted spots). White sparks and a loud crack are produced as the spheres strike each other.
4. To repeat, rotate the rusted iron sphere to strike a fresh surface of iron oxide.



**Fig. 2.26** A single replacement reaction occurs between the iron oxide (rust) and aluminum when the two spheres are struck with enough force

## INSTRUCTOR NOTES

- This lab is a quick, easy and safe version of the traditional thermite lab.
- A single replacement reaction occurs between the iron oxide (rust) and aluminum when struck with enough force. The reaction is very exothermic—sparks and noise are produced. Aluminum is more reactive than iron so it will replace the iron in iron oxide to form aluminum oxide and pure iron:  $2\text{Al} + \text{Fe}_2\text{O}_3 \rightarrow \text{Al}_2\text{O}_3 + 2\text{Fe} + \text{heat}$
- The spheres will need to be rusted ahead of time. A quick way to rust the iron spheres is to submerge the spheres in a plastic cup with 3% hydrogen peroxide and salt. A vigorous reaction will soon begin to occur. This is quicker than using salt water because of the extra oxygen released by the breakdown of the hydrogen peroxide. After about an hour, pour off the solution and periodically spray the spheres with hydrogen peroxide. Rotate the spheres occasionally. After several hours let the spheres dry before performing the demonstration.