

THERMITE REACTION

CHEM IIB – mini-lab

THEORY: stoichiometry, redox, thermochemical reaction

PURPOSE: To demonstrate that a chemist cannot describe a chemical reaction using stoichiometry alone.

BACKGROUND INFORMATION: Thermite is a generic name given to very high temperature reactions between a metal oxide and aluminum. Thermite produces a metal, aluminum oxide, and a large amount of heat.

The reaction starts when an exterior activation temperature is reached and then the reaction proceeds. A temperature of almost 1205 degrees C must be reached in order to start the thermite (sometimes referred to as thermit) reactions.

SAFETY: goggles and safety shield

PROCEDURE: (teacher performed)

1. Fill a large bucket of sand and make a funnel-shaped depression in the sand.
2. Use an 11-cm filter paper to form a paper cone and fill it to almost full with thermit- black mixture (ferric oxide and fine aluminum powder).
3. Light a thermit igniting stick by using a match or butane lighter. Make sure students are safely away from the reaction by using a safety shield or performing the experiment outside.

DATA: Observations

Describe the setup and reaction itself by using sight, sound, touch (feel the heat from the molten ore that is formed), and hearing.

DISCUSSION:

1. What does the thermit igniting stick remind you of?
2. Write a balanced equation for the reaction.
3. What type of thermochemical reaction is this? (exothermic or endothermic) Explain.
4. Is this a redox (reduction-oxidation) reaction? If so, explain.
5. Give a use for thermite in industry.
6. Calculate the delta H for the thermite reaction.
7. What is used to supply the high activation energy needed to start the reaction? What is activation energy?
8. Given 50.0 g of iron (III) oxide and 18.0 g of aluminum powder, how much energy is released during this reaction?
9. Assuming there are 700 food calories (1 food Calorie = 1000 calories) in a double cheeseburger, how many thermite reactions are equivalent to the energy content of a double cheeseburger?

RESOURCES: If you are using the Internet, write the site name or attach a copy of the reference material.

CONCLUSION: Summarize the results of the experiment and tie the purpose to the results. Make any final discoveries. (use back of sheet, if you need more room)