

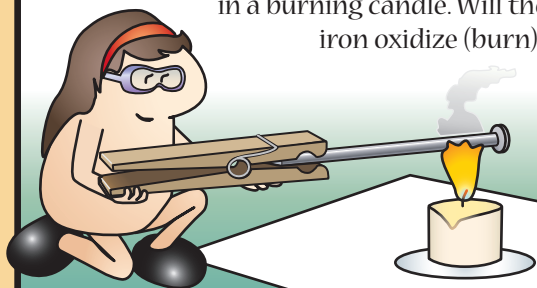
Another FREE SAMPLE LAB from TOPS LEARNING SYSTEMS!

This TOPS Idea is taken from an original series of black-and-white line masters, adapted to stand alone as an independent mini-lesson. Please purchase our original book to get the whole in-depth program.

will iron burn?

...adapted from **OXIDATION #11**
by TOPS Learning Systems

1. Clamp a nail in a clothespin. Hold it in a burning candle. Will the iron oxidize (burn)?



FOR SAFETY:

- ✓ Use eye protection.
- ✓ Don't touch hot metal – let it cool.
- ✓ Use paper or foil to protect tabletop.
- ✓ Keep clothing and hair away from flame.

2. Repeat with steel wool. Try...
... a tightly rolled "snake" a thin, wispy "cloud" ...



3. How should you prepare iron to make it burn? Does your answer apply to wood? Explain.
4. Write a number in each box to balance this chemical equation:



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OBJECTIVE

To study the rapid oxidation of iron to iron oxide. To understand that smaller particle size speeds the burning process.

LAB NOTES

Copy the lab for each student or lab team.

Steps 1-2. Common sense dictates careful supervision when using fire or any potential hazard. Caution students that iron can burn skin severely even if it appears cool. A paper mat serves both to protect table tops and give visual evidence of burn hazards (smoke and burned holes). Or, use foil to reduce smoke in the air.

Step 2. Kids will want to burn wisps of steel wool again and again. If you have time to permit this, require that they take advantage of the repeats to thoroughly observe all details and write full observations using complete sentences.

Step 4. This equation shows only the simplest of three possible iron oxides: FeO, Fe₂O₃, and Fe₃O₄ (a mixed valence oxide also written as FeO•Fe₂O₃). These oxides, when hydrated, turn the familiar red of rust.

ANSWERS

1. The nail collects soot (from partially burned candle wax), but neither glows nor burns.
2. The "snake" glows red hot, but very little burns. The "cloud" ignites and continues burning even if removed from the flame. Thicker strands glow; thinner ones burn like tiny fuses. Tiny spheres of molten iron are produced; some fall and burn little holes in the paper, some stay on the strands.
4. $2 \text{Fe} + \text{O}_2 \rightarrow 2 \text{FeO} + \text{energy}$

EVALUATION

Q. You hold a match to a lump of coal, and it does not burn. What further experimentation might be needed to see if the coal will oxidize?

A. Powder some of the coal, and shake the small particles over the flame to see whether it will now oxidize.

MATERIALS

- A candle and holder (a lump of clay works).
- A sheet of scratch paper or aluminum foil.
- A lighter, or matches and a disposal can.
- A nail, and a clothespin to hold it.
- Steel wool, finest grade available (not presoaped pads).

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