

CONNECTION TO SOCIAL STUDIES**● Incandescent Light Bulbs**

In 1752, Ben Franklin with his kite experiment demonstrated that lightning is related to electricity. Experiments to understand electricity continued and various useful electric devices were invented. In 1879, Thomas Edison invented a system of electric lighting that would eventually bring electric lighting into homes. The key to Edison's electric lighting system was the incandescent light bulb.

Incandescent light bulbs are glass bulbs from which all air has been pumped out. The air is replaced with chemically inactive gas, like nitrogen. *Incandescent* means "glowing." The glow from an incandescent light bulb comes from the filament, a little wire, which is often visible, inside bulbs. Today, the common material for filaments is tungsten. When electricity flows through the filament of an incandescent bulb, the tungsten wire gets hot enough to glow and give off light. Atoms of tungsten evaporate from the white-hot filament. The escaped tungsten atoms collect on the glass and darken it. Over time, the filament grows thin and eventually breaks.

Halogen Bulbs

A variation of the incandescent light bulb is the halogen bulb. Gases inside halogen bulbs are chemically active. Each time a tungsten atom leaves the filament, halogen molecules inside the glass pick it up and return it to the filament. Redepositing the tungsten atoms back on the filament allows the filament to last longer. These halogen molecules can do this job only if the glass of the bulb is allowed to get extremely hot—much hotter than incandescent bulbs get.

Your Turn to Think

1. Which type of light bulb, ordinary incandescent or halogen, would last longer? Why?
2. What causes the tungsten atoms to evaporate from the filament?
3. Would the above investigation be valid if you used a 50 W halogen bulb and a 60 W regular bulb? Why or why not?