Splitting a Flame

Purpose

1. To demonstrate how a candle works
2. To observe matter as it changes state

Materials

1. Candle and holder
2. 2 Small piece of wire screen
3. Matches
4. Tongs or oven mitts to hold screen

Procedure

1. Light candle in holder.
2. Using tongs or oven mitts, hold screen above candle flame.
3. Slowly lower the screen down onto the candle flame. The flame will not go through the screen even if you lower it all the way down to the wick.
4. Lower the screen until it is stopping about half of the flame.
5. Bring the flame of a match near the flame above the screen. The flame will appear above the screen.
6. Repeat steps 4 & 5, Holding 2 pieces of screen together. Slowly move the screens about a half inch apart. The space between the two screens will be empty and there will be a flame above and below the screens.

Results

When the screen is in the flame, the flame disappears. When a match is held over the screen the flame reappears over the screen and under it. When 2 screens are use a flame appears over the screen, under the screen, but not in-between the two screens.

Conclusion

The candle flame melts the wax of the candle, which flows up the wick, just as water flows up a paper towel. As the wax gets too close to the flame, it gets hot enough to start to break apart into other substances. One of those substances is a gas, which burns. This gas makes up the candle flame. When the flame hits the screen the metal of the screen cools the gas enough so that it doesn't burn. The unburned gas flows through the screen so you can relight it on the other side.
Sir Humphrey Davy used this idea to develop a lamp for miners. Coal miners had to be very careful as the coal dust and gases which were often found in coal mines would burn. The flame of a lamp could cause an explosion, but the did not have electric lights, so a flame was their only choice for light to see with. Davy built a lamp what was surrounded by a metal screen. This kept the lamp flame from setting off the flammable gas and dust, and saved many lives.