**Teacher’s Guide-**

**Flour and Fire Demonstration**

In this demonstration, you will provide the students a memorable visual representation of the effect of particle size on both reaction rate and intensity.

OBJECTIVE: Students will observe that-

* Smaller particles produce a more vigorous reaction.

MATERIALS:

* Tongue depressor
* Wood chips or pencil shavings
* Flour (whole wheat and white)
* Flour-Fire Vestibule
* Candle
* Lighter or matches
* Container of water
* Watch or timer

SET-UP: Making the Flour-Fire Vestibule

This container is useful both as a wind block for the candle, as well as to direct the flour.

Use the following video as a guide for its construction: <http://www.youtube.com/watch?v=86A0nqWPgVA>

Be sure that the diameter of the tubing is at least ¼” or greater, in order to allow sufficient airflow. Also, use only bleached, white flour, which is smaller in size than wheat flour and easier to ignite.

PART ONE: Tongue Depressor and Pencil Shavings

1. Have a container of water ready in case of emergency.
2. Show the students both the tongue depressor and pencil shavings in a plastic baggie. You may choose to pass the materials around the class. Explain that each are made of the same base material (wood). Have students make observations about each of the materials, draw a quick sketch of each and predict which will burn more quickly.
3. Light the candle and hold the tongue depressor over the flame. Have students track the time it takes for the tongue depressor to catch fire and record in Data Table 1.
4. Place the pencil shavings in a pile on a non-flammable surface. Hold a lighter or match to the pile. Students should again track the time it takes to ignite the pencil shavings and record their results in Data Table 1.

PART TWO: Flour Fire

*Caution: This demonstration will produce a small fireball and should be practiced prior to classroom use. Make sure that there is plenty of space around the demonstration area in order to maintain safety.*

1. Show students a plastic baggie of each type of flour. Allow them to observe the flour, including touch, and write observations of the materials.
2. Hold a flame (match, lighter, candle) up to a packed pile of flour. Nothing should happen because of the lower surface area.
3. Put 1-2 cups of whole-wheat flour in the bottom of the Flour Fire Vestibule. Light the candle in the middle. Make sure the area around the container is clear. Blow air through the tubing into the container, making sure not to inhale. This should stir up a cloud of flour dust that ignites once over the candle flame. Have plenty of matches available (if using matches) because the candle does extinguish occasionally during the demonstration.
4. Clear out the wheat flour from the container and repeat step 3 with white flour. This should produce a more substantial flame.
5. All materials can be reused or safely disposed of in regular trash.