



California State University of Bakersfield, Department of Chemistry

## Don't Smoke at a Gas Station



### Standards:

2-PS1-1. Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.

5-PS1-1. Develop a model to describe that matter is made of particles too small to be seen.

5-PS1-3. Make observations and measurements to identify materials based on their properties.

MS-PS1-2. Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.

MS-PS1-4. Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.

HS-PS1-4. Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy.

HS-PS1-5. Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.

### Introduction:

*This experiment is to show why there is no smoking in a gas station and why you have to be aware of static electricity.<sup>1</sup> The gasoline fumes are highly flammable and when the spark is created... it blows!*

### Materials:

- Ethanol, 200 proof
- Plastic bottle with a 2 nails in both sides
- Cork stoppers fitting the plastic bottles

- Cattle prod

**Safety:**

- Always have an adult with you to help you during your experiment.
- Always wear eye protection and gloves when doing chemistry experiments

**Procedure:**

1. Place about 10 mL of ethanol into a 500 mL plastic bottle with a wide neck that has 2 nails driven into its sides
2. Seal the bottle tightly with a cork stopper
3. Shake the bottle vigorously then place it on a table
4. Then use the cattle rod to create a spark on the nails sticking out of the bottle (the spark will ignite the ethanol fumes, blowing the cork stopper out of the bottle)

**Data and Observations:**

Record your observations in this space

**Questions:**

1. Did the experiment work and if so was the reaction immediate?

**References:**

1. Don't smoke in a Gas Station. Chemical Circus Demonstration Manual. 2013