Name _____

On Track Learning
Lab: Fire Retardation and Fabrics

Names of lab team members: _____

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Introduction

Fire has been a major concern of race car drivers since the beginning of racing. Before cars had seat belts as standard equipment, some race car drivers would ‘belt’ themselves into the car by tying themselves to the seat with a rope. However, many drivers refused to belt themselves in since others had lived through crashes because they were thrown from the car before it started on fire. Many drivers died or were seriously injured due to car fires.

Fire-retardant materials are used to protect drivers. In this lab you will look at a treatment that may increase a fabric’s fire retardation and test the treatment on different fabrics.

Lab Materials

- three cotton balls
- two different all-cotton fabrics cut into three 2 × 2 cm squares (for a total of six squares)
- borax (The 20 Mule Team product is 99.5 percent borax.)
- three 400 mL beakers, each with a stirring rod
- Sterno in a rectangular aluminum cake pan with water
- scale or electronic balance
- crucible tongs or tweezers
- aluminum foil
- scissors
- masking tape for labels
- matches or lighter
- wax paper
- stopwatch
- hot plate
- goggles
- plastic gloves

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Day 1

1. Where have you seen flame retardant fabrics in your home?

2. Put on your safety goggles and plastic gloves.

3. Fill the first beaker with 250 mL of water.

4. Prepare two solutions for the two remaining beakers:

- 250 mL solution of 10 g/L borax solution
- 250 mL solution of 50 g/L borax solution.

Hint: Use warm water in your mixture. It will help dissolve the borax. Use the stirrer stick to mix thoroughly.

250 mL of 10g/L borax solution:

Show your calculation to create this solution.

How many grams of Borax are needed to create this solution?

Before mixing your solution, check your calculation with your teacher.

250 mL of 50 g/L borax solution:

Show your calculation to create this solution.

How many grams of Borax are needed to create this solution?

Before mixing your solution, check your calculation with your teacher.

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5. Use tweezers or tongs to dip the fabric squares and cotton balls into each of the solutions. Keep the fabric in the solution for 3 seconds.

6. Squeeze out excess moisture over the sink. Be sure to wear plastic gloves.

7. Set fabric squares and cotton balls on wax paper. Carefully label each fabric sample as dipped in water, 10 g/L solution, or 50 g/L solution and water. Fabrics will dry overnight.

Day 2

1. Set up a rectangular cake pan with about ¼ to ½ inch of water with the Sterno in the center. Wait for your teacher's directions about lighting the Sterno.

Safety warning: Goggles must be worn by all students and tongs must be used by the student burning the fabrics.

2. Choose member roles:

1. Recorder: Accurately describe the results of each experience
2. Timer: Time three seconds of burning
3. Technician: Responsible for burning the fabrics. Be sure to use tongs!
4. Observer(s): Check accuracy and thoroughness of timing and recording of results

3. Test the fire retardation of each of the three fabrics in each of the three solutions – according to your teacher's instructions.

Fabric type and its original use	***Water (control)*** (Describe fabric following the burn)	***10 g/L Borax*** (Describe fabric following the burn)	***50 g/L Borax*** (Describe fabric following the burn)

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4. What did you observe? Which fabric and solution combination performed best?

5. Why is it important for a division of responsibilities among the lab partners?

6. Why is independent product test necessary?