

Send a tea bag flying in this fiery activity! Heat makes the air inside a tea bag less dense than the air outside of it. A convection current is created causing the ash to soar upwards like a rocket.

TEKS:

SCI 3.5 A: The student is expected to measure, test, and record physical properties of matter, including temperature, mass, magnetism, and the ability to sink or float.

SCI 3.6 A: The student is expected to explore different forms of energy, including mechanical, light, sound, and thermal in everyday life.

SCI 3.6 C: The student is expected to observe forces such as magnetism and gravity acting on objects.

Materials:

- Lighter
- Plate or pan (metal or ceramic; NOT paper or plastic)
- Scissors
- Tea bag

How To:

- 1. Cut off the top of the tea bag, removing the staple and string.
- 2. Empty the tea leaves into a trash can.
- 3. Unfold and straighten the tea bag so that it looks like a hollow cylinder. It doesn't need to be perfect, but it does need to be opened up. Your tea bag should be hollow inside—like a tube.
- 4. Stand the straightened tea bag up on its end on the plate or pan with the tube opening facing upward.
- 5. Before you can launch your tea bag rocket, move to an open area with no wind to make sure that your rocket launches safely. A garage is a great place to do this activity, or outside if there is absolutely no wind. Do not launch your rocket inside as it may start a fire!
- 6. With an adult helping you, use the lighter to light around the top edge of the tea bag (you want it to catch fire). Let it burn all the way down and then watch it lift off and soar into the air! It will float gently back down. What remains? **Safety: And adult should assist when using a lighter to launch the tea bag rocket.**

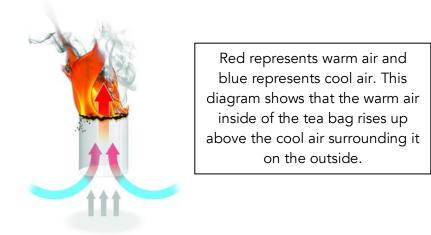


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STEM Explanation:

Why does your tea bag rocket fly up into the air? When you set fire to the tea bag, the heat from the fire causes the air molecules inside the tea bag to become energized and move around quickly. Eventually, the air molecules inside the tea bag are moving so fast that they spread up and out of the tea bag. This makes the air inside the tea bag less dense, or less tightly packed together, than the colder, and more tightly packed together, air outside of the tea bag. Density is the measurement of how compact (or tightly packed together) something is. For example, a bag of feathers is less dense than a bag of cement of equal volume. Can you think of other objects' densities you can compare?

It is the density difference between the warm and cool air that causes your tea bag rocket to fly. As the diagram below shows, the warmer, less dense air inside the tea bag rises up above the cooler, denser air. As warmer air moves up, colder air moves in to replace it. This causes a thermal convection current to form that lifts up the tea bag.



http://www.popsci.com/sites/popsci.com/files/styles/large 1x /public/import/2014/MANUAL tea%20bag.jpg?itok=MisAd5mj

As the tea bag burns, it turns into very lightweight ash. The ash is easily lifted up by the force of rising hot air. When the ash cools, it falls back down, hopefully landing right back on the plate!

Career Connection:

Thermal engineers specialize in thermodynamics. Thermodynamics is the study of heat energy changing into other forms of energy like chemical, mechanical, and electrical. Thermal engineers can work with heating/cooling equipment or at power companies such as gas, electric, and nuclear.

Resource:

http://www.stevespanglerscience.com/lab/experiments/tea-bag-liftoff/



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