

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.



Red represents warm air and blue represents cool air. This diagram shows that the warm air inside of the tea bag rises up above the cool air surrounding it on the outside.

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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