

10-18-13

Flame on a Lazy Susan

LT: Identify specific physical and chemical behaviors (properties) of air, lighter fluid, and paper towel

Physical properties of air:

- air is a mixture of gas
- can't see air at room temperature
- exert a force on air
- you breathe the air in
- can carry sound

Physical properties of papertowel:

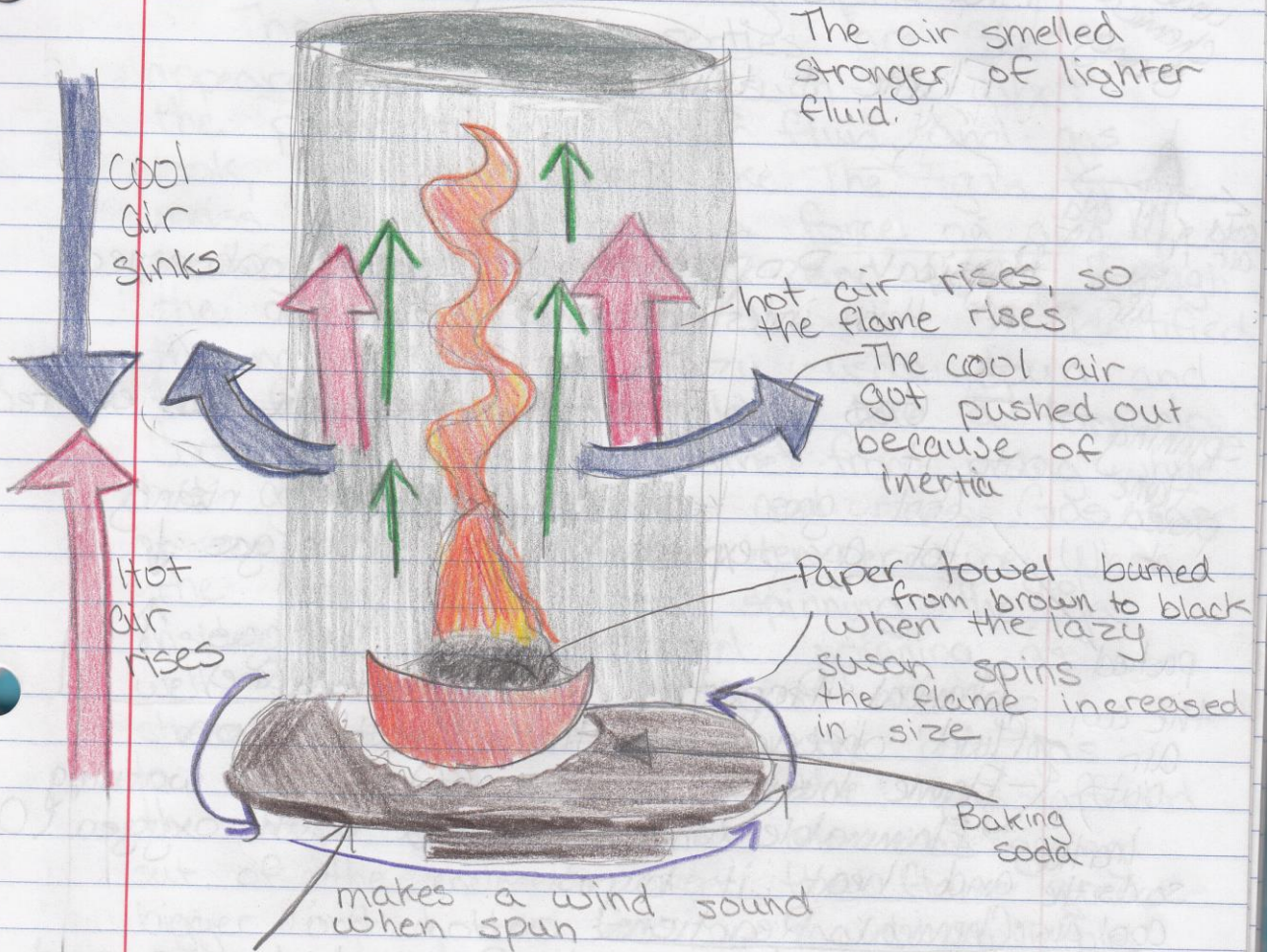
- a solid at room temperature
- light, not super dense
- bendable
- the color is brown
- tear easily

Physical properties of lighter fluid:

- a liquid at room temperature
- ability to produce gas
- standard temperature liquid, evaporates

- Nothing extreme happened
- the paper towel became wet
- put a screen over it
- flame gets larger when spun

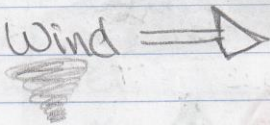
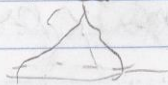
■ cool air
■ hot air



Can't easily
undo a
chemical
change

Flame on a Lazy Student Notes

Flame + wind \Rightarrow



Physical Properties of gasses observed in this investigation

spinning
flame
proved
it

Gas has mass - a force can be exerted onto it

Cool gas keeps a flame from rising
Hot gas expands and rises

Cool gas \downarrow
Hot gas \uparrow

(flame)

pushed
the cool
air
out

Chemical Properties of lighter fluid observed in this investigation

inertia
sends the
cool air
out

Flame burned becomes CO_2 - global warming
Flammable - when combined with oxygen (O_2) and heat it burns

Chemical Reactions:

reactant A + reactant B + reactant C \rightarrow product
reactant special word for ingredient

burning is
a chemical
property

lighter fluid + paper towel + $\text{O}_2 \rightarrow$
smoke + other carbon
substances

water on
fire takes
out oxygen

As more flame is exposed to more air,
the reaction increases
A reaction continues as long as reactants
and energy are available.

Exothermic reaction - gives heat to the heat

Analysis Paragraphs

The physical properties are the appearance of objects such as what the paper towel, lighter fluid, and gas look, feel and smell like. The gas has mass. When you put a force on air like moving your hand back and forth through the air you can feel it. We also identified the mass when the lazy susan spun and the flame started looking like a tornado. Cool gas keeps a flame from rising while hot gas (flame) expands and rises. Gas has or can have a different temperature. When the lazy susan was spinning the ^{cool} gas inside the screen started spinning as well. Inertia makes the cool air go straight out, which allows the hot gas to rise. The temperature of the gas affected the flame since the cold air was going out of the enclosed area the flame grew bigger and hotter. Gas is mainly invisible, you couldn't see the gas during the lab, but we knew it was there because it has a mass. The times you can see a gas is when it is really cold outside you can see the breath you take. Also when it is really hot outside you can see the hot gases coming off the ground. When someone is cooking on a grill you can see the gases above it if you look very carefully. The lighter fluid is a liquid at room temperature, but if you leave it out it will evaporate. In the container the

lighter fluid is so compressed it is a liquid. That is why it is a liquid and then able to evaporate. The paper towel*

* is brown and is able to bend easily

Chemical reaction occurs when something burns. After the three reactants burned is the odor in the air changed. Just when the match that lit the paper towel burn it released hydrogen sulfate which going back to our energy unit is showing potential chemical energy transforming to chemical energy. The release of light energy was also seen the light coming off of the fire is also a chemical reaction. When the temperature increases the kinetic energy increases, which then increases the interactions of between reactants. Since there was baking soda on the lazy susan and since it was a powder-like substance it created more surface area. Because there was a larger surface area for the flame to grow it increased the contact between the reactants. The flame was able to grow bigger because the surface area allowed the flame to take up more area allowing the flame to use more oxygen to help it grow. The whole demonstration is a huge example of combustion. Combustion is burning, this type of reaction needs three different types of reactants, oxygen (O_2), something that will burn (a paper towel and lighter fluid), and heat. The type of reaction we had was a combustion. One specific type of combustion

we used was combustion of carbon. When Mr. Loucks blew out the match after lighting it he was blowing CO_2 out or carbon dioxide. Every time we breath out we breath out CO_2 and CO_2 extinguishes flames. The lighter fluid also changed from a liquid to a gas and since it was burned to different forms it was a chemical reaction.

The flame on a lazy susan demonstration gave us a started into chemistry. When Mr. Loucks spun the lazy susan which spun the flame, inside the screen, it spun a tornado looking flame. This flame alone showed us physical properties of the three reactants, a paper towel, lighter fluid, and O_2 . It help us understand that the drag felt in air gives the gas mass. It also showed us chemical reactions like when the paper towel + lighter fluid + $\text{O}_2 =$ smoke and other carbon substances. The flame that grew and spun on a lazy susan has a lot more than what is just seen. All three main reactants plus some other ones, like baking soda, were added together to create a chemical reaction. All three reactants even though they did increase the rate of a reaction were not catalyst because the reactants were changed with the reaction. Although a catalyst can be added to a chemical reaction to increase the rate of reaction without changing its substance. The cool air sits above the flame until it is spun then the cool air gets pushed out because of inertia.