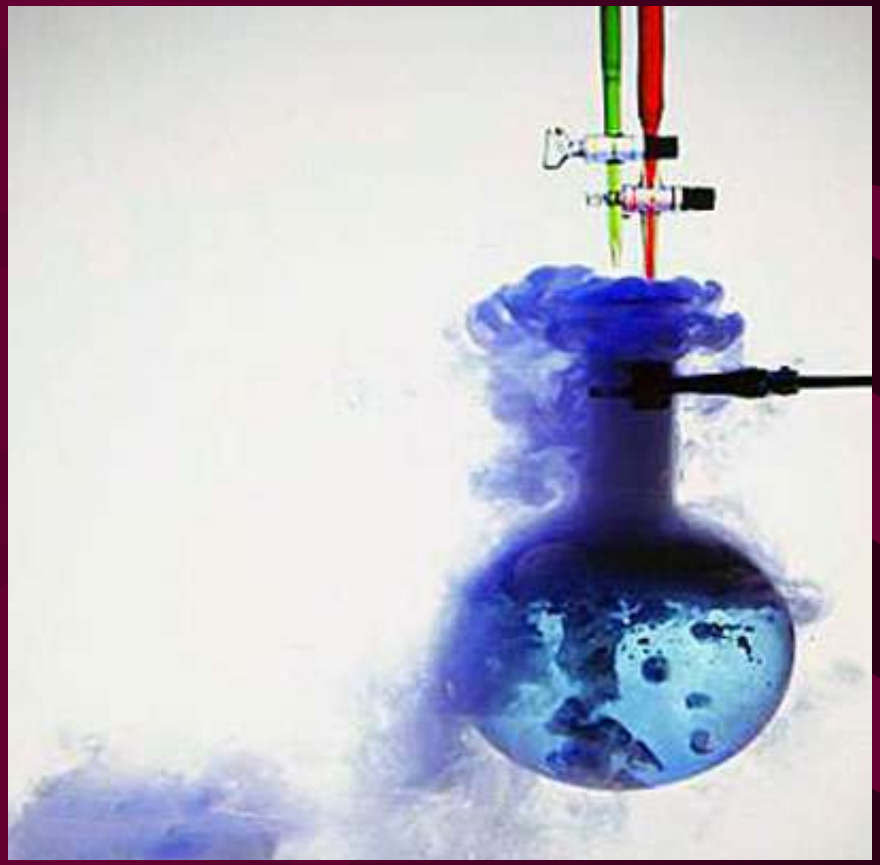
Change & Chemical Properties

Well, no…not *that* kind of change.



Yeah…THAT kind of change!

#1 Don't Forget…

…what your job is during this powerpoint. Pay attention and focus on the information we're learning. In the meanwhile, get your paper ready.

write your name

Notes – Chemical Properties & Change

Remember, just write what's in red and don't forget to use outline form.

#2 Before we start…

One of the big goals in 8th grade science is for you to be able to tell physical properties apart from chemical ones. To do this, you have GOT to know what physical properties are.

So, make your science teacher happy. Somebody remind us what makes a property a *physical* property.

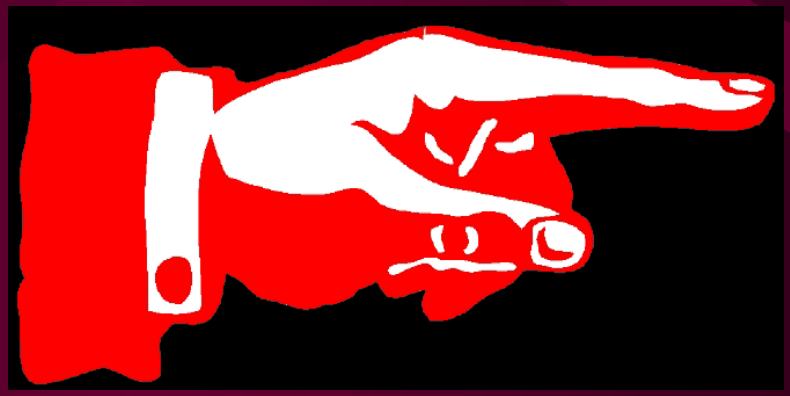
Right. A physical property doesn't change the substance you're observing into any new substances.

#3 So…

…what do you think a *chemical* property is, then?

Right, a chemical property is one you can observe during a chemical reaction. It creates a new substance that wasn't present when you started.

Let's write that.



#4 Chemical Properties

Notes – Chemical Properties & Change

I. Chemical Properties – properties of a substance that can only be observed during a reaction. It always results in a new substance being formed.

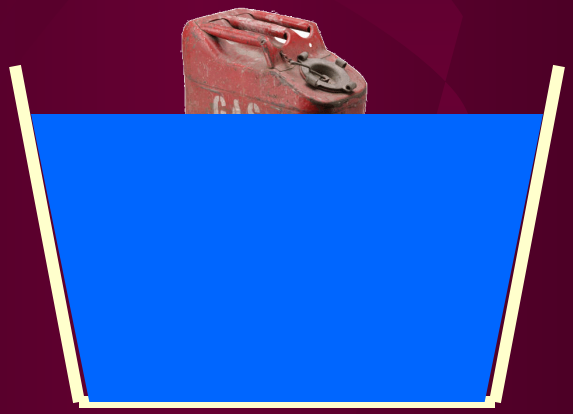
That's a pretty long definition, but it's awfully important to know. ESPECIALLY that 2nd sentence.

#5 Let's See Some Chemical Properties

Let's say you had a substance. Like a can of gasoline.

How could you demonstrate one of its chemical properties?

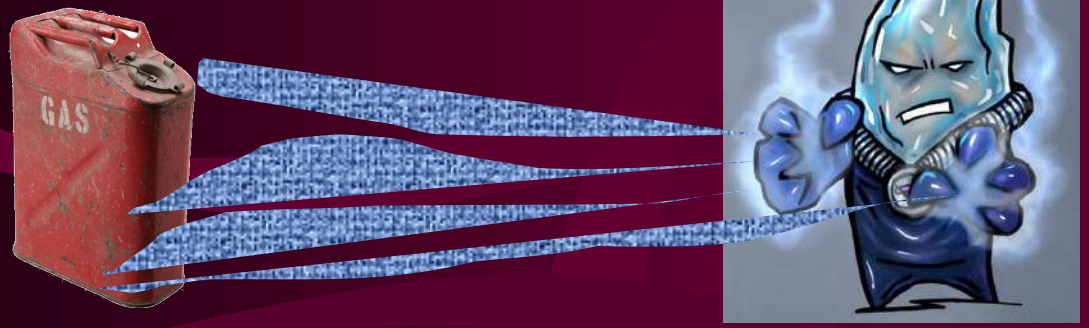
You could…find its density?



Nope. Density is a physical property.

#6 What else?

Hmm…we could…freeze it?

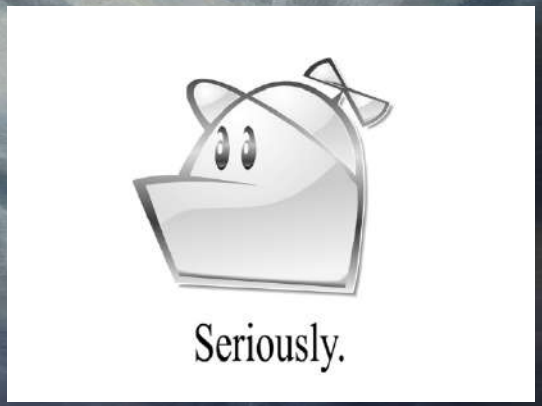


Well, no, not really. Freezing a liquid is just a physical process. It's not a new substance. Nice try, ice guy.

Well, how about if we describe the gasoline's luster?

LUSTER????

SERIOUSLY???



Ok, well…we get the idea. Being a pyro is not cool. Seriously.

#8 Write It!

Notes – Chemical Properties & Change

I. Chemical Properties – properties of a substance that can only be observed during a reaction. It always results in a new substance being formed.

Flammability – does the substance burn (react with oxygen to release heat)?

Ok, good. We have our first chemical property. Explain to your science teacher why flammability is a chemical property…or why "burning" is a chemical change.

#9 Another One?

There were a few horror movies made in the 70s, 80s, and 90s and even *this* decade starring these guys:

Besides many gross events, one of the things the people in the movie quickly realize is that if you cut or damage one of these aliens, it bled a concentrated acid that would "melt" or "corrode" anything it came into contact with. Nasty.

Yeah, like that.

#10 So What?

Well, I think those movies have perpetuated a myth common to many people that acids are all super-harmful, extremely dangerous, eat-through-anything chemicals. Really? Here's some examples of acidic compounds:

What a horrible collection! So…not ALL acids are insta-death, huh.

#11 Acids

Now, some of those acids *can* be pretty powerful substances. The next time you lose a tooth or eat a chicken wing, soak that bone in coke for a few days and observe it…no wonder dentists don't like soda.

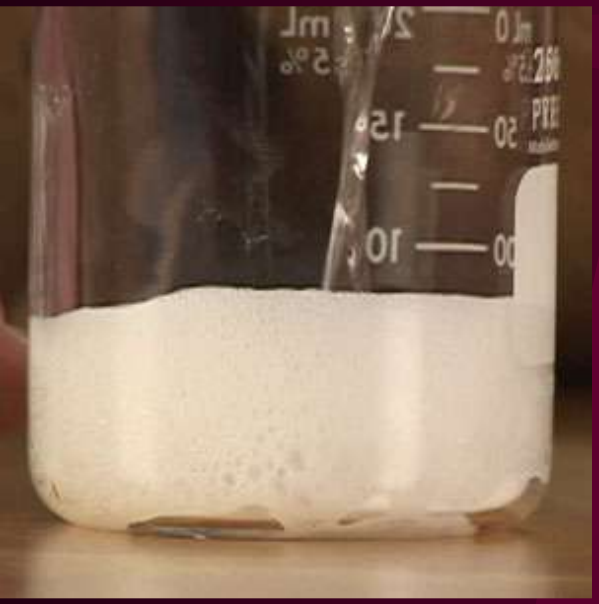
Acids (and their opposites…bases) are just reactive chemicals that behave in certain ways.

Here are some common bases:

#12 Is There a Point To This?

Well, yeah. Acids and bases are just a few of MANY kinds of chemicals that can react with each other. When chemicals react, they rearrange their atoms & molecules to produce new substances. New substances! Chemical change!

You're familiar with baking soda and vinegar, right?



They combine…

They react and make a new substance (CO_2 gas)

And we all know that gas under high pressure can be fun…or deadly.

#13 Let's Write This.

Notes – Chemical Properties & Change

I. Chemical Properties – properties of a substance that can only be observed during a reaction. It always results in a new substance being formed.

Flammability – does the substance burn (react with oxygen to release heat)?

Reactivity – does the substance chemically combine with other chemicals, such as acids & bases?

#14 Vinegar and Baking Soda is Easy. How else do you tell?

Well, there are some common signs to look for to help you determine if a new substance has been formed. Here are some.

But Wait!

You have to remember that the things you are about to see & write down aren't 100% foolproof. In other words, there are plenty of examples for these "chemical change" indicators that are actually physical changes. These are just *general* rules.

#15 Energy Release

A chemical reaction often releases forms of energy such as light and heat.

Glow sticks work when a capsule of phenyl oxalate is broken (by you) and it mixes with hydrogen peroxide. This releases energy that causes a colored dye to glow with light.

When you burn something, the fuel is reacting with oxygen in the air to produce fire–a combination of heat AND light.

#16 Back to the Notes…

Flammability – does the substance burn (react with oxygen to release heat)?

Reactivity – does the substance chemically combine with other chemicals, such as acids & bases?

Signs that a chemical change has happened:

energy released (a change in temperature heats up or cools down/light)

ex: match burns, cold packs cool

#17 Yeah, And?

Well, back to vinegar and baking soda…the huge release of gas is a good sign that a new substance (the gas, duh) has been produced.

Hydrochloric acid creates hydrogen gas when reacting with zinc metal.

#18 ☺

Flammability – does the substance burn (react with oxygen to release heat)?

Reactivity – does the substance chemically combine with other chemicals, such as acids & bases?

Signs that a chemical change has happened:

- energy released (heat/light)
  - ex: match burns
- gas or bubbles form
  - ex: vinegar + baking soda → CO_2

#19 Ok! What else?

A permanent, unexpected change in color often lets you know that a substance has been chemically, not physically, changed into a new substance.

mmm…the perfect cookies

Whoa! ☹ The total change in color to “char black” is a chemical change.

Flammability – does the substance burn (react with oxygen to release heat)?

Reactivity – does the substance chemically combine with other chemicals, such as acids & bases?

Signs that a chemical change has happened:

- energy released (heat/light)
  - ex: match burns
- gas or bubbles form
  - ex: vinegar + baking soda → CO_2
- permanent unexpected color change
  - ex: burning wood changes its color

#21 Are there more?

Yes. Here's another one…imagine what this:

odor released
ex: baking bread creates
new gases

Perfectly good cookies. RUINED.

…*smells* like. Probably not the way it smelled 10 minutes before being pulled out of the oven.

#22 One Last One…

What do the previous four indicators of chemical change have in common?

They let you know that a chemical change has happened?

Well, yeah, no kidding.

BESIDES that?

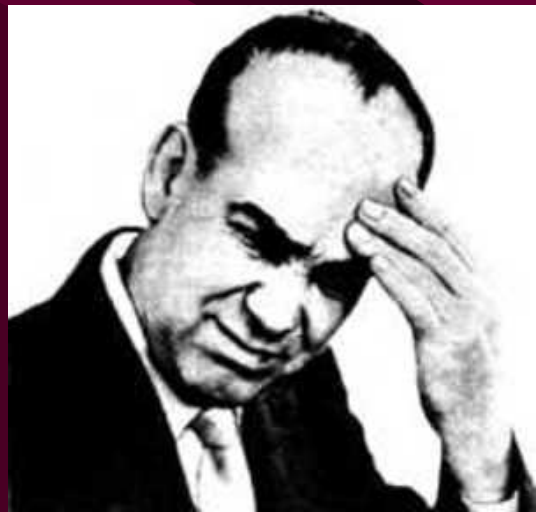
#23 They're All Hard to Reverse!

Yeah! Imagine trying to stuff the heat and light back into a burning candle.

Uh huh…ouch.

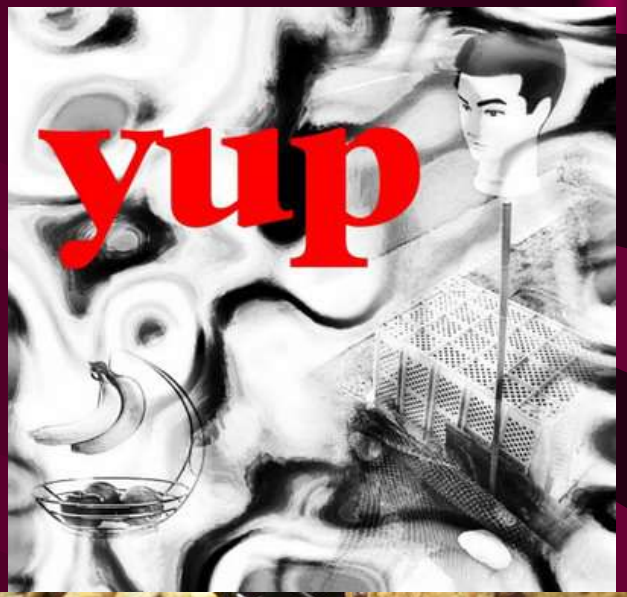
Or imagine trying to get burned cookies to go back to being brown. Or take it another step. Try to get a nicely baked cookie to "unbake" and turn into cookie dough.

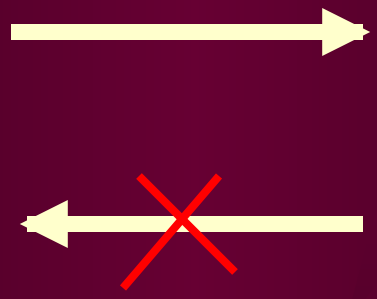
gee…how ?



#24 Irreversibility

difficult to reverse
ex: can't turn a cookie back into dough





#25 The OTHER kind of change

So…the *other* kind of changes tend to:
Not release heat or light
Not release gas or bubbles
Not change the color of something permanently
Not release new odors
Be somewhat reversible

You can cut, mash, smash, stretch, flatten, divide, shave, freeze, thaw cookie dough and it's STILL cookie dough. Those kinds of changes haven't made new substances.

Let's see you put this all together. A physical change happens when no new substance is made. The opposite kind of change, a chemical change, DOES create a new substance.

#26 Physical Changes

difficult to reverse

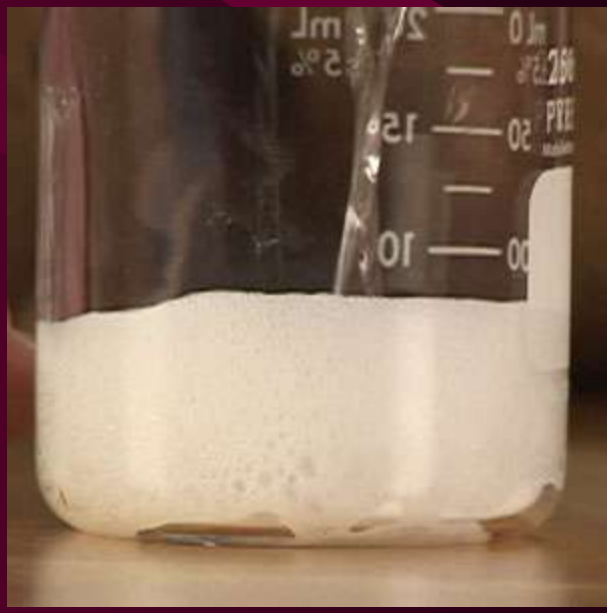
ex: can't turn a cookie back into dough

II. Physical Changes – Do not result in a new substance being formed. (changes in size, shape, or state of matter).

ex: cut, smash, stretch, freeze, melt, boil

#27 Evidence of Chemical Change

Production of a gas
ex: vinegar and baking soda produces CO_2



#28 Evidence of Chemical Change

Formation of a precipitate
ex: vinegar and milk forms curds (cheese)

#29 Evidence of Chemical Change

Change in temperature
ex: water and baking soda feels cool
ex: hydrogen peroxide and yeast feels hot

#30 Evidence of Chemical Change

Change in color
ex: pH indicator going from colorless to color
NOT an ex: food coloring in water

#31 Evidence of Chemical Change

Evidence of Chemical Change

Formation of a gas

The release of a gas not seen before

Formation of a precipitate

Solid material that forms

Change in Temperature

You can feel heat or cold

Unexpected Color Change

pH indicator reacts with acid and forms a new substance with a new color

#32 And That's…

THE END