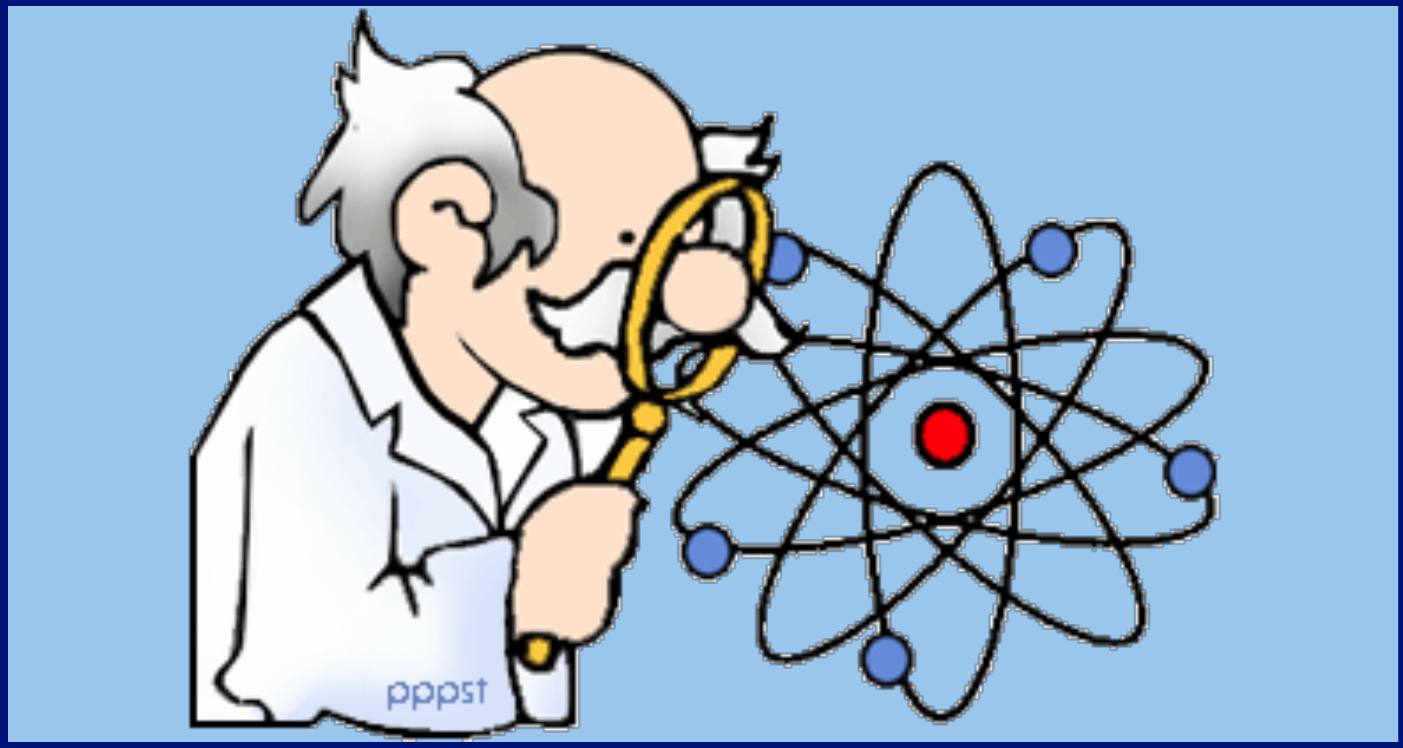
# MATTER



# Matter

- Matter is everywhere.
- Matter is anything that takes up space and has mass.
- Matter is constantly experiencing changes.

# Matter

- These changes can be either physical or chemical.

# Matter

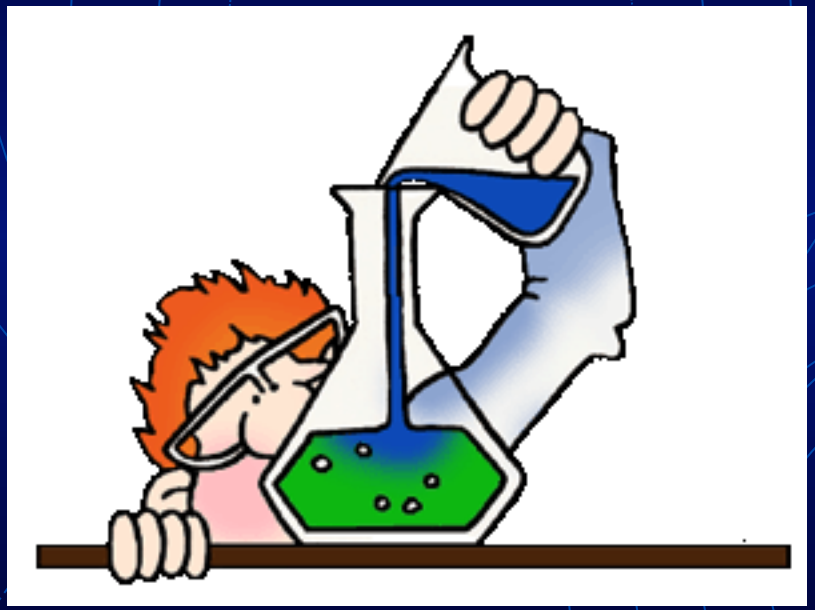
- Changes to physical properties are physical changes.
- Changes to chemical properties are chemical changes.

# Matter Properties

- Physical properties of matter are properties that can be measured or observed without changing the matter into something new.
- They are things you usually can identify with your senses.
- Other physical properties also include the state of matter, color, hardness, odor, boiling point, melting point, freezing point.

- Chemical properties are properties that can be measured or observed only when something changes to become an entirely different kind of matter. Examples of chemical properties include the ability to rust, reactivity, and flammability.
  - Oxidation: Ability to rust or change color because of a reaction with oxygen
  - Reactivity is the ability of matter to combine chemically with other things.
  - Flammability is the ability of matter to burn.

# Physical and Chemical Changes



# What is a Physical Change?

- A physical change alters the form of a substance, but does not change it to another substance.

Example:

Making Orange Juice

**Physical changes** are those changes that do not result in the creation of a new substance. If you melt a block of ice, you still have water ($H_2O$) at the end of the change.

If you break a bottle, you still have glass. Painting your nails will not stop them from being fingernails. Some common examples of physical changes are: melting, freezing, condensing, breaking, crushing, cutting, and bending.

Some, but not all physical changes can be reversed. You could refreeze the water into ice, but you cannot put your hair back together if you don't like your haircut!

Special types of physical changes include any object changing its state, such as when water freezes or evaporates.

# Physical Change

- **Physical changes** occur when matter changes its property but not its chemical nature.
- Physical property changes could include a change in: texture, shape, size, color, odor, volume, mass, weight, and density.

# Physical Change

# Physical Change

- Substance may seem different, but the way the atoms link up is the same.

# It's a physical change if

- It changes shape or size
- It dissolves.

# It's a physical change if...

- **It changes phase (freezes, boils, evaporates, condenses)**

# What is a Chemical Change?

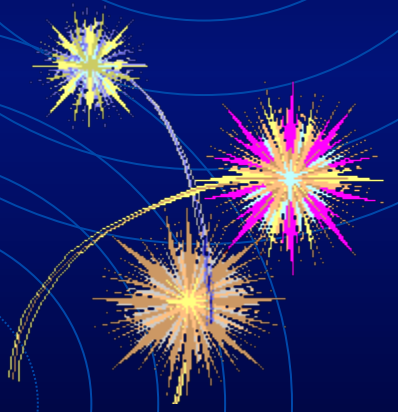
- When a substance undergoes a chemical change, it is changed into a different substance with different properties.

Example:

Baking a Cake

# Chemical Change

- A chemical change occurs when fireworks are used. Fireworks are made of metals such as magnesium and copper. These change chemically as they light up the sky.



# Chemical Change

- Changes the way the molecules link up
- Makes new substances

# Chemical Change

- **Chemical changes** are changes matter undergoes when it becomes new or different matter.
- It changes in an UNEXPECTED way
- To identify a chemical change look for signs such as color change, bubbling and fizzing, light production, smoke, and presence of heat.

# 5 Signs of a Chemical Change

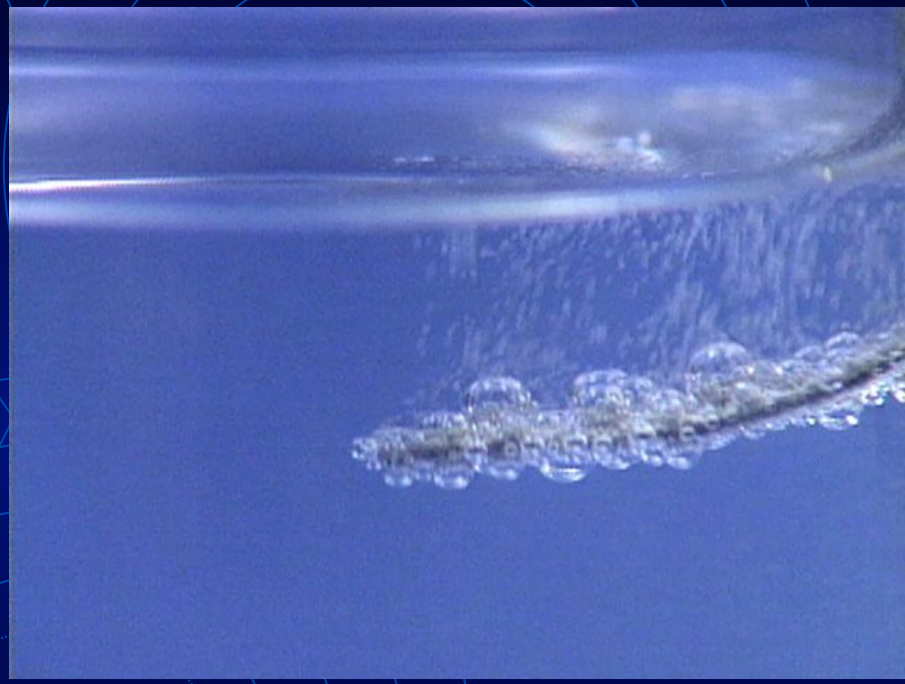
1. Color Change
2. Precipitation

# Precipitation

- Precipitation – the solid that forms from a solution during a chemical reaction.
- It looks like a cloudy solid in an otherwise clear solution.

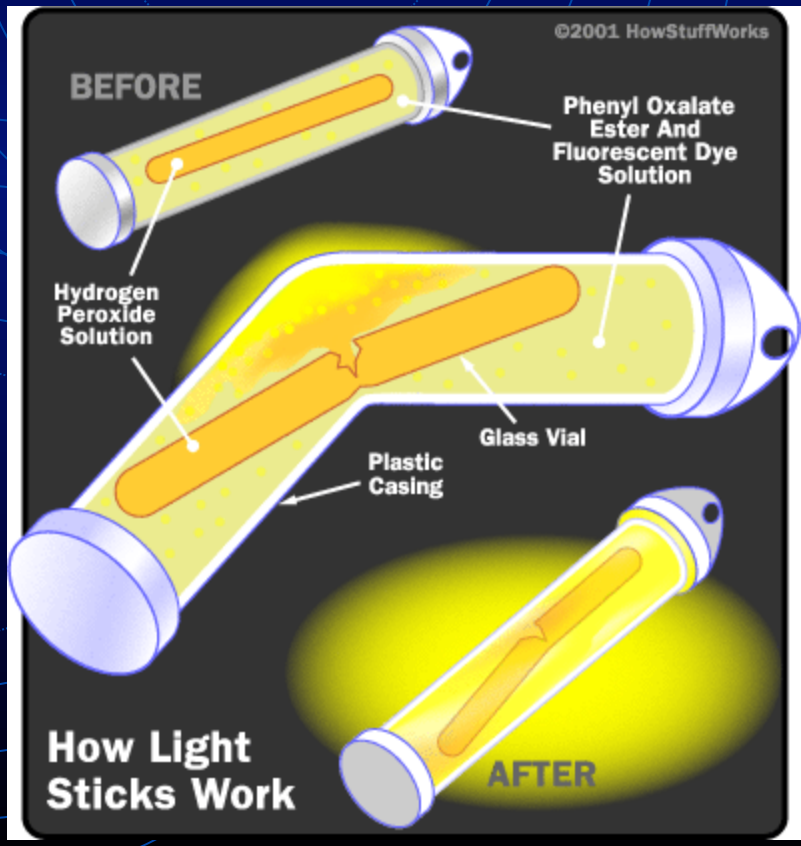
# 5 Signs of a Chemical Change

3. Gas Production
4. Temperature Change



# 5 Signs of a Chemical Change

5. Changes in Characteristic Properties (odor, light given off)



# It's a chemical change if....

- It burns
- Temperature changes without heating/cooling

# It's a chemical change if...

- It bubbles (makes a gas)

# It's a chemical change if...

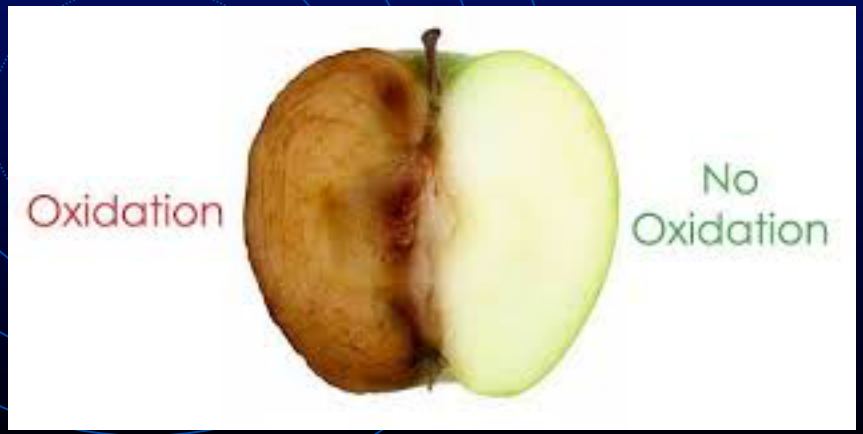
- It changes color
- It forms a precipitate

# CHEMICAL PROPERTIES

Chemical properties can ONLY be observed AS the substances are changing into different substances.

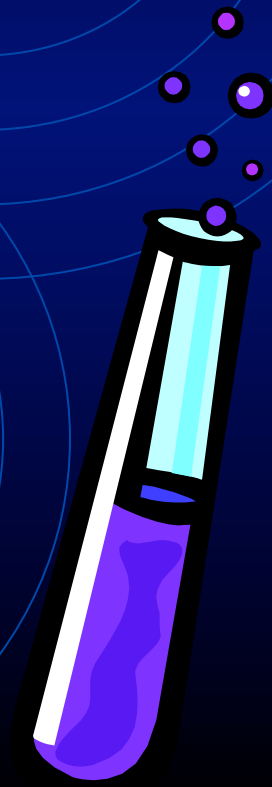
**Chemical changes**, or chemical reactions, are changes that result in the production of another substance.

# Oxidation: rusting or changing color because of a reaction with oxygen



FLAMMABILITY: A material's ability to BURN in the presence of OXYGEN

REACTIVITY:
How readily (easily) a substance combines chemically with other substances.



When you burn a log in a fireplace, you are carrying out a chemical reaction that releases carbon. When you light your Bunsen burner in lab, you are carrying out a chemical reaction that produces water and carbon dioxide.

Common examples of chemical changes that you may be somewhat familiar with are; digestion, respiration, photosynthesis, burning, and decomposition.

# What kind of change is it if someone…

- Tears up paper?
- Physical change
- Mixes salt and water?
- Physical change

# What kind of change is it if someone…

- Burns paper?
- Chemical change
- Evaporates salt water?
- Physical change

# What kind of change is it if someone…

- Mixes vinegar and baking soda?
- Chemical change

# Chemical or Physical Change?

- **Cutting paper?**
- **Physical**

# Chemical or Physical Change?

- **Ice melting?**
- **Physical**

# Chemical or Physical Change?

- **Toast burning?**
- **Chemical**

# Chemical or Physical Change?

- **Rocket fuel burning?**
- **Chemical**

# Chemical or Physical Change?

- **Sawing wood?**
- **Physical**

# Chemical or Physical Change?

- **Metal rusting?**
- **Chemical**

# Chemical or Physical Change?

- Disappearing puddle?
- Physical

# Chemical or Physical Change?

- Candle burning?
- Chemical

# Chemical or Physical Change?

- Dry ice?
- Physical

# Physical or Chemical Change?

- Painting Wood
- PHYSICAL

# Physical or Chemical Change?

- Burning Paper
- CHEMICAL

# Physical or Chemical Change?

- Digestion of food
- CHEMICAL

# Physical or Chemical Change?

- Sugar dissolving in water
- PHYSICAL

# Physical or Chemical Change?

- Iron turning red when heated
- PHYSICAL

# Physical or Chemical Change?

- Evaporation
- PHYSICAL

# Physical or Chemical Change?

- A pond freezing in winter
- PHYSICAL

# Physical or Chemical Change?

- Melting ice
- PHYSICAL

# Physical or Chemical Change?

- Cutting wire
- PHYSICAL

# Physical or Chemical Change?

- Painting fingernails
- PHYSICAL

# Physical or Chemical Change?

- Cutting fabric
- PHYSICAL

# Physical or Chemical Change?

- Baking muffins
- CHEMICAL

# Physical or Chemical Change?

- Shattering glass
- PHYSICAL

# Physical or Chemical Change?

- Decomposition of old leaves
- CHEMICAL

# Physical or Chemical Change?

- Wrinkling a shirt
- PHYSICAL

# Physical or Chemical Change?

- An old nail rusting
- CHEMICAL

# Is it a chemical or physical change?

- Sugar dissolving in tea

  - Chemical Change
  - Physical Change

NO!

OOPS!

Did it change size, color, shape (Physical Change)?

or

Did it become different matter (Chemical Change)?

Cor

# Is it a chemical or physical change?

- Logs burning

- Chemical Change
- Physical Change

NO!

OOPS!

Did it change size, color, shape (Physical Change)?

or

Did it become different matter (Chemical Change)?

Cor

# Is it a chemical or physical change?

- Breaking water up by separating it into hydrogen and oxygen

  - Chemical Change

  - Physical Change

NO!

OOPS!

Did it change size, color, shape (Physical Change)?

or

Did it become different matter (Chemical Change)?

Cor

# Is it a chemical or physical change?

- Cutting paper

- Chemical Change
- Physical Change

NO!

OOPS!

Did it change size, color, shape (Physical Change)?

or

Did it become different matter (Chemical Change)?

Cor

# Is it a chemical or physical change?

- Crushing an aspirin


  - Chemical Change
  - Physical Change

NO!

OOPS!

Did it change size, color, shape (Physical Change)?

or

Did it become different matter (Chemical Change)?

Cor

# Is it a chemical or physical change?

- Metal rusting


  - Chemical Change
  - Physical Change

NO!

OOPS!

Did it change size, color, shape (Physical Change)?

or

Did it become different matter (Chemical Change)?

Cor

# Is it a chemical or physical change?

- Lighter fluid burining

- Chemical Change
- Physical Change

NO!

OOPS!

Did it change size, color, shape (Physical Change)?

or

Did it become different matter (Chemical Change)?

Cor

# Is it a chemical or physical change?

- An egg rotting


  - Chemical Change
  - Physical Change

NO!

OOPS!

Did it change size, color, shape (Physical Change)?

or

Did it become different matter (Chemical Change)?

Cor

# Is it a chemical or physical change?

- An egg breaking

  - Chemical Change
  - Physical Change

NO!

OOPS!

Did it change size, color, shape (Physical Change)?

or

Did it become different matter (Chemical Change)?

Cor