PROPERTIES OF MATTER

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How would you describe yourself so that someone else could identify you?

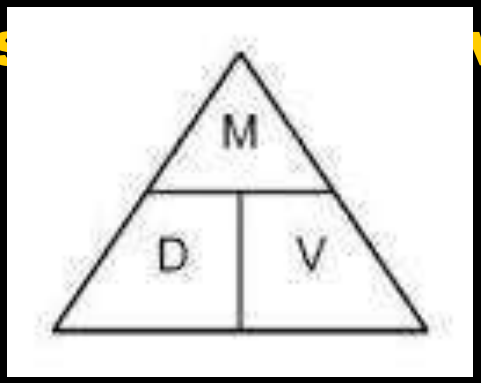
- On a separate sheet of paper, write as many physical descriptions of yourself as you can. Do not put your name on the paper.

Physical Properties

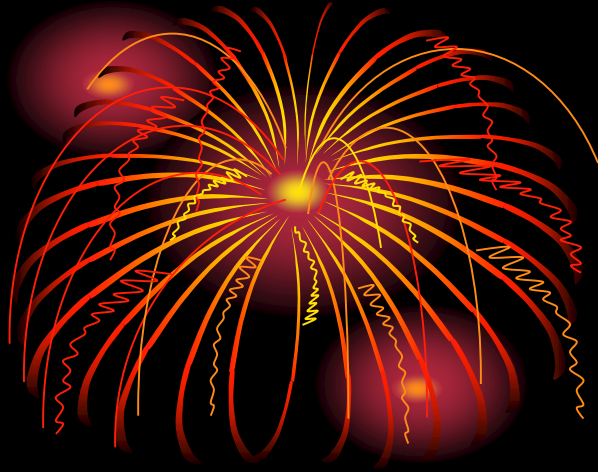
- A property of matter that can be observed or measured without changing the identity of the matter.
- Physical properties identify matter.
  - Examples include but are not limited to:
    - Density
    - Malleability
    - Ductility
    - Solubility
    - State
    - Thermal Conductivity

Physical Properties

- Density
- Amount of mass in a given volume
- A substance is always the same at a given pressure and temperature regardless of the size of the sample of the substance.
- The density of one substance is usually different from that of another substance.
- Density equals mas volume.
  - D = m / v



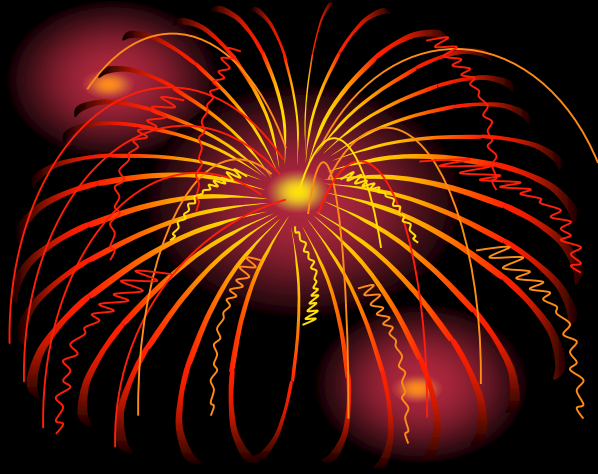
Physical Property



- **Malleability**
- **The ability to be pounded into thin sheets.**
  - **Example:**
  - **Aluminum can be rolled or pounded into sheets to make foil.**

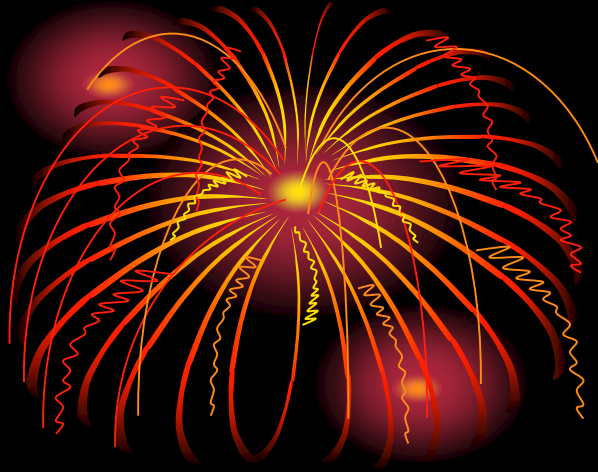
- **Ductility**
- **The ability to be drawn or pulled into a wire**
  - **Example**
  - **Copper in wiring – soldering wires or joints**

Physical Property



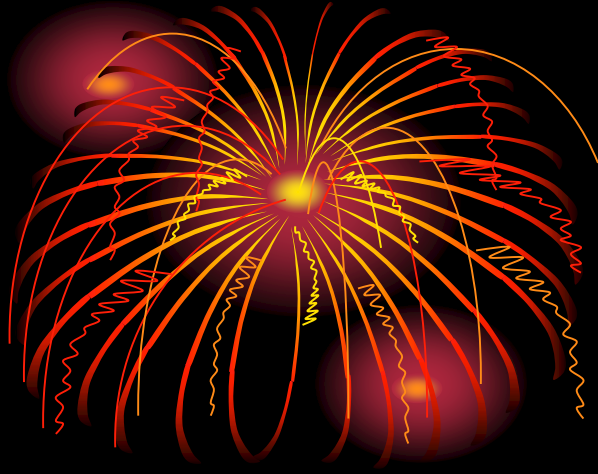
- **Solubility**
- **The ability to dissolve in another substance.**
- **Example:**
  - **Sugar or salt dissolve in water**
- **Three ways to increase solubility**
  - **Heat or make warmer**
  - **Grind or smash**
  - **Stir or mix**

Physical Property



- **State of Matter**
- **The physical form in which a substance exists at room temperature, such as:**
  - **Solid – matter has a definite shape and volume**
  - **Liquid – matter takes the shape of its container and has a definite volume**
  - **Gas – matter changes in both shape and volume**

Physical Property



- **Thermal Conductivity**
- **The ability to transfer thermal energy from one area to another.**
  - **Examples:**
  - **Plastic foam is a poor conductor, so a hot drink won't burn your hand.**
  - **The inside of the toaster (hot coils)**

Chemical Property

- A property of matter that describes a substance based on its ability to change into a new substance with different properties.
- Combustibility
- Flammability
- Reactivity
  - Acids
  - Bases
  - Oxidation

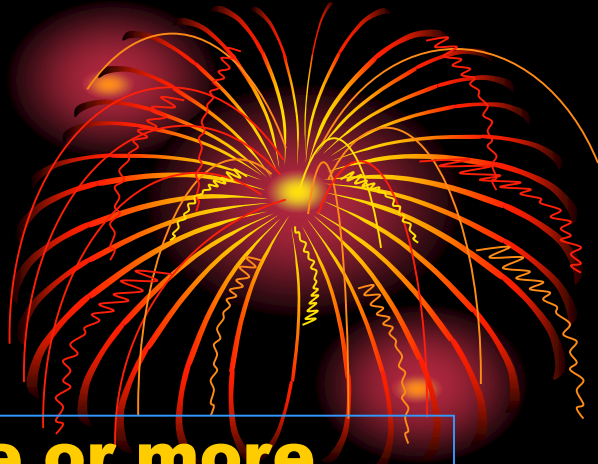
Chemical Properties

- Can be observed with your senses.
- Are Not as easy to observe as physical properties
  - Example:
    - **Flammability** – Only when wood burns
    - **Combustibility** – Only when fireworks explode
    - **Reactivity** – Only when iron Oxidizes (rust)

Physical Change

- A change that affects one or more physical properties of a substance.
- Do Not form new substances.
- Can often be Undone
  - Example Butter on counter can be placed back in refrigerator.
  - Change of State
    - Solid to Liquid
    - Liquid to Gas

Chemical Change



- A change that occurs when one or more substances are changed into entirely new substances with different properties.
- Can Not change back under normal conditions (some can be changed back by other chemical means)
- Common Examples:
  - Reactivity – Oxidation (rust) on a bicycle
  - pH (Acid / Base) – Effervescent tablets
  - Flammability – Burnt wood
  - Combustibility - Fireworks

5 Signs of a Chemical Change

- **The only sure way to know there has been a chemical change is the observance of a new substance formed**

- **Sometimes that is hard to do, so look for the signs……**

Sign 1 a Chemical Change

- **Odor Production-this is an odor far different from what it should smell like**
- **Ex: Rotting eggs, food in fridge, decomposing flesh**

2nd Sign of a Chemical Change

- **Change in Temperature**
- **Exothermic-When energy is released do during the chemical change ex: wood burning**

Change in Temperature

- **Endothermic- Energy is absorbed causing a decrease in temperature of the reactant material ex: cold pack in first aid kit**

3rd Sign of a Chemical Change

Change in Color

Ex: fruit changing color when it ripens, leaves changing color in the Autumn, dying your hair

4th sign of a Chemical Change

- **Formation of Bubbles**
- **This can indicate the presence of a gas. Bubbles produced when boiling water is not a chemical change.**

5th Sign of a Chemical Change

- **Formation of a Precipitate**
- **When two liquids are combined and a solid is produced**

Thank You to all