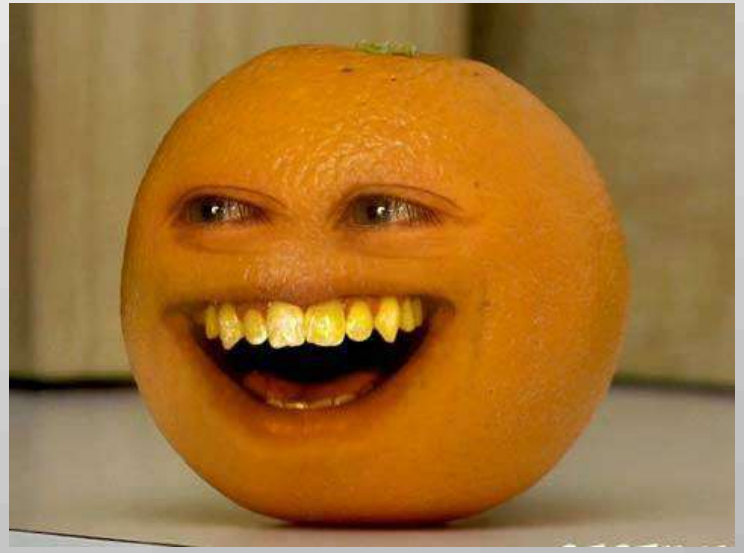
Chemical and physical properties

Matter

- All matter has 2 types of properties: Physical properties and chemical properties.

Physical properties

- A **physical property** is a characteristic of a substance that can be observed without changing the substance into another substance.
  - (You can see it without changing what you're looking at into something else.)

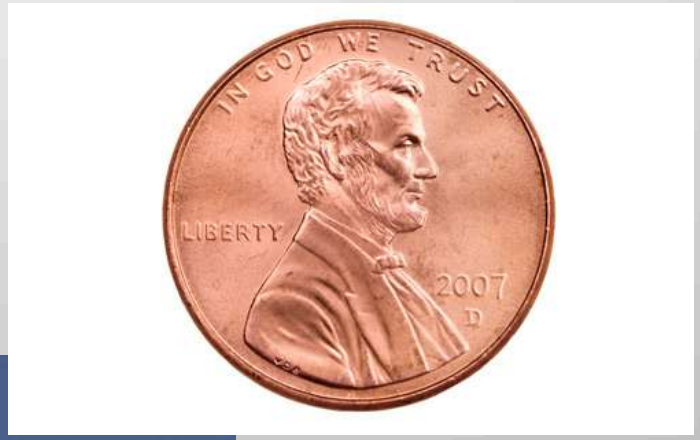


Physical Properties - Examples

- **Examples** physical properties include:
  - Volume
  - Mass
  - Weight
  - Size

Physical Properties - Examples

- **Examples** physical properties include:
  - Density
  - Melting point
  - Boiling point



Physical Properties - Examples

- **Other physical properties** include:
  - Color
  - Hardness
  - Odor
  - Taste
  - State of matter
  - Texture
  - Luster (shine)
  - Flexibility
  - Heat conductivity
  - Electrical conductivity
  - Solubility (ability to dissolve in water.)
  - Shape
  - Viscosity
  - Ductility
  - Malleability

Chemical properties

- A **Chemical property** is a characteristic of a substance that can only be observed by changing it into a different substance.

Chemical properties - Examples

- **Examples** of chemical properties include:
  - The ability to burn
  - Ability to tarnish
  - Ability to rust
  - Ability to decompose
  - Ability to react with other chemicals
  - Instability
  - Ability to do acid/base reactions

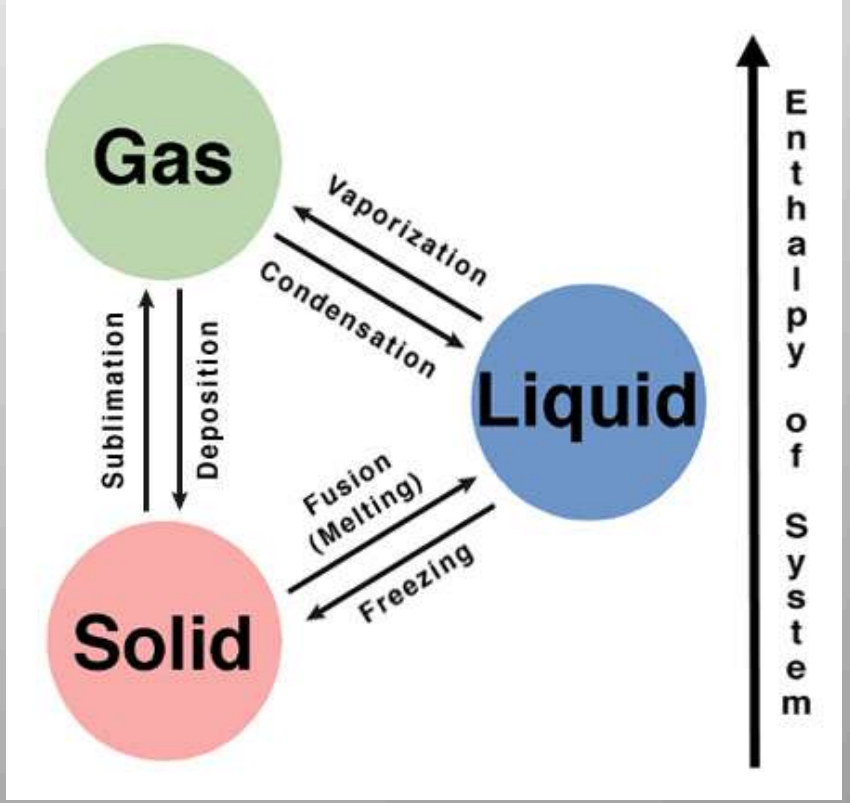
Chemical and physical changes

Physical Change

- A **Physical change** is a change in a substance that does not change what the substance is.

Physical Change - examples

- **Examples** of physical change include:
  - Change in shape
  - Change in size
  - Change in phase
    - Melting (solid to liquid)
    - Boiling (liquid to gas)
    - Evaporation (liquid to gas)
    - Condensation (gas to liquid)
    - Freezing (liquid to solid)
    - Sublimation (solid to gas)
    - Deposition (gas to solid)



Physical Change

- Physical changes might be caused by:
  - Grinding
  - Cutting
  - Crushing
  - Bending
  - Breaking
  - Heating/cooling
    - (change in phase)
  - squishing

Physical Change

- **Evidence that a physical change has occurred might include**:
  - Change in shape
  - Change in form
  - Change in size
  - Change in **phase** (This is always a physical change!)
  - Physical changes are usually reversible

Chemical change

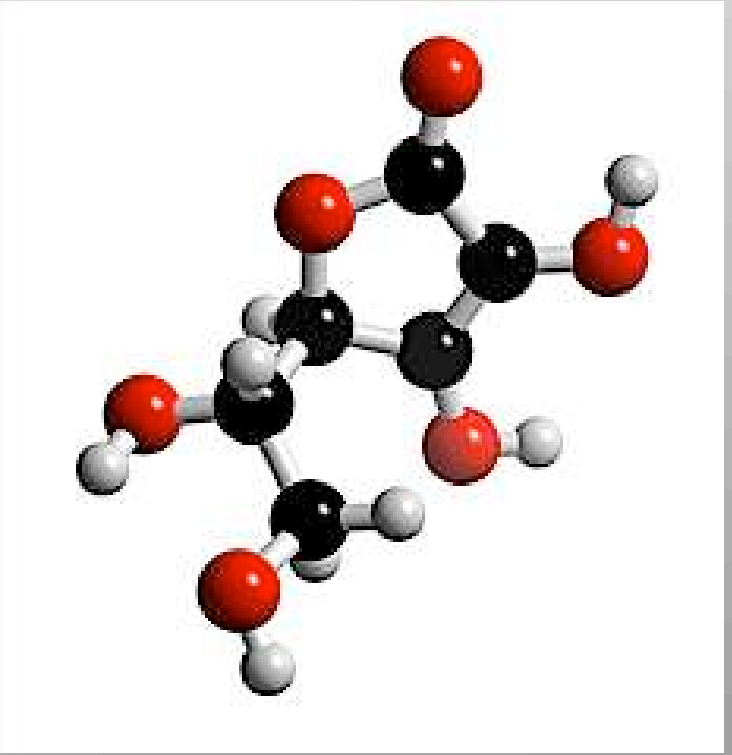
- A **chemical change** is a change in which a substance is changed into a different substance. (You've changed what it **is**.)

Chemical change

- **Examples** of chemical changes include:
  - Burning
  - Rusting
  - Tarnishing

Chemical change

- Chemical changes occur when a **chemical reaction** causes bonds between atoms to break or to form.



Chemical Change: Evidence

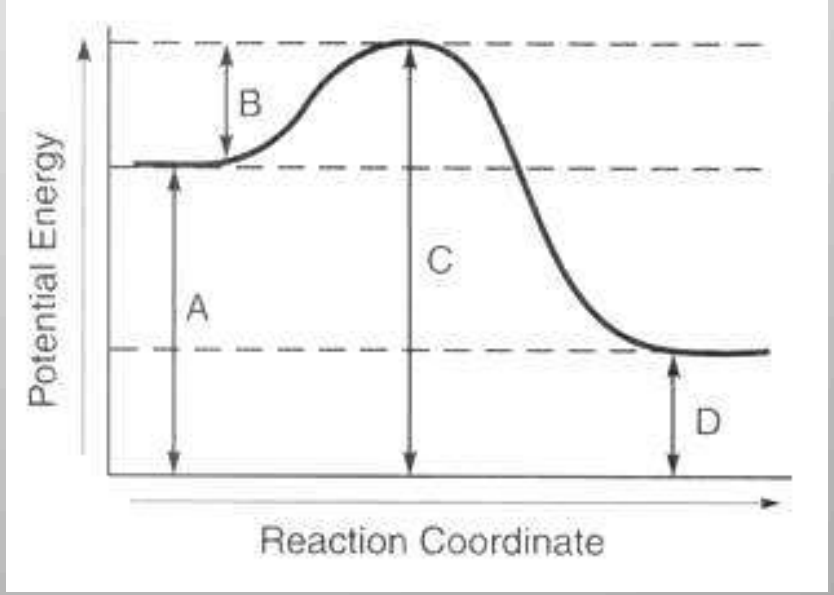
- **Evidence that a chemical change has occurred might include:**
  - A color change
  - An odor change
  - Formation of a precipitate (you mix two liquids and make a solid)
  - Gas is formed (bubbles)
  - Changes in physical properties.

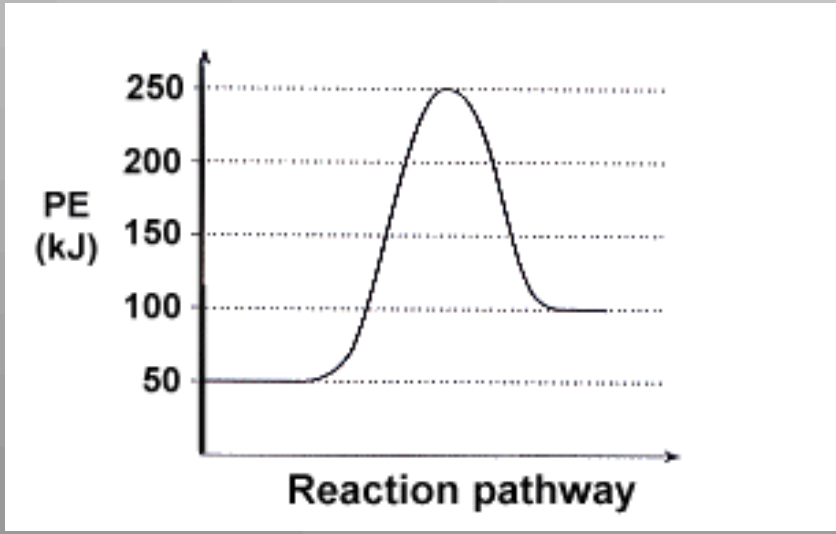
Physical and Chemical change

- During a chemical change **energy can be released** in the form of:
  - Heat
  - Light

Chemical change – Chemical reactions

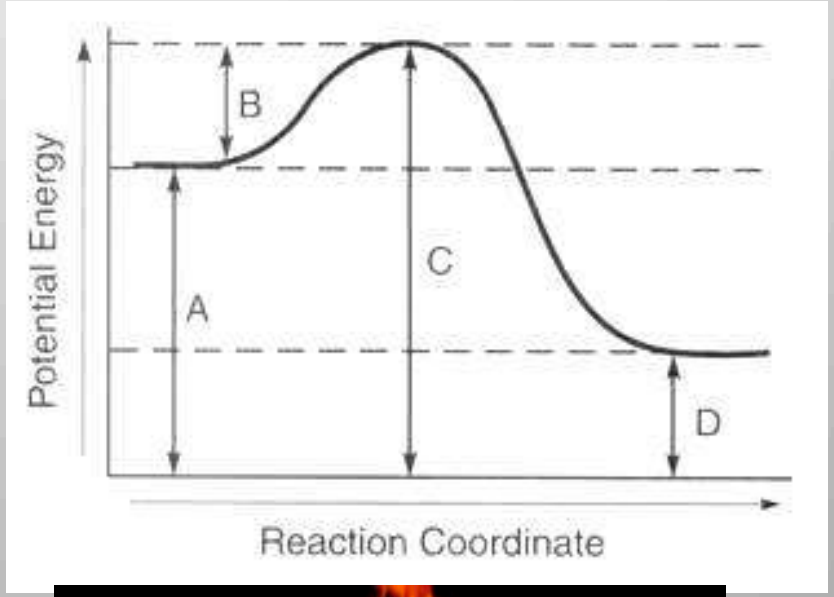
- When a chemical change occurs, energy is either released or absorbed.





Physical and Chemical change - heat

- A chemical reaction that releases energy in the form of heat is called **exothermic.**
  - Heat comes OUT
    - Exo = out
    - Thermic = heat
  - It will feel HOT.



Physical and Chemical change - heat

- A chemical reaction that absorbs energy in the form of heat is called **endothermic.**
  - Heat goes IN
    - Endo = in
    - Thermic = heat
  - It will feel COLD