Unit 5
Physical and Chemical Properties and Changes

Section 10.1 and 12.1

The Nature of Matter

Level 3

- Can identify chemical and physical properties of matter. *And give examples of each.*
- Can identify whether a change is either a chemical or physical change.
- Can distinguish between pure substances and mixtures.
- Can identify mixtures as either Homogeneous or Heterogeneous.
- Can, based on chem. formulas, identify a pure substance as either an element, compound or molecule.
- Can state whether a material has high or low values of the below properties: TERMS
- Lab: when given an object can determine its volume.
- Can determine the density of an object from the slope of a mass vs. volume graph.
- Can identify which term (accuracy, precision and resolution) applies to a given lab/measurement situation or example.
- Can give examples of objects that have a mass of 1gm, a volume of 1ml and a length of 1cm.

Chemical and physical properties

Matter

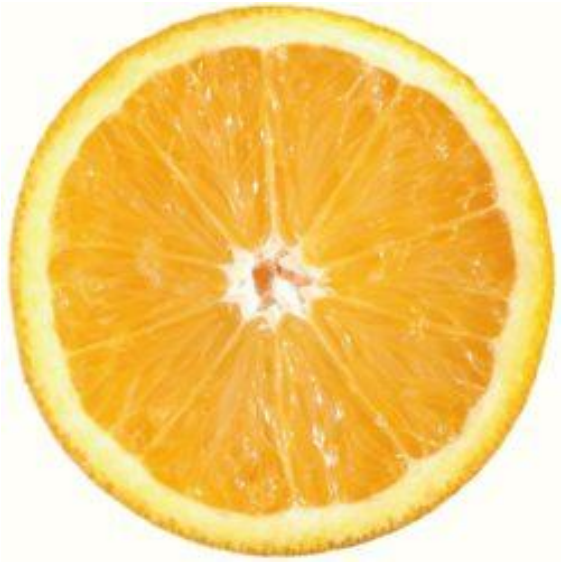
- Every element/compound is unique in some way from all others.
- If you know enough about a substance, you can figure out what it is.
- If you know what a substance is, you can know all types of things about it.

Matter

- All matter has 2 types of properties:
  - Physical properties
  - 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.)



Not on Test but Good to Know

Physical Properties

- Physical properties can be extensive or intensive:
  - **Extensive properties** depend on the amount of a substance that you have.
  - **Intensive properties** don't depend on how much you have.

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Physical Properties - Examples

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

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Physical Properties - Examples

- **Examples** of intensive 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)**
  - **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 <u>changing it into a different substance.</u>

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

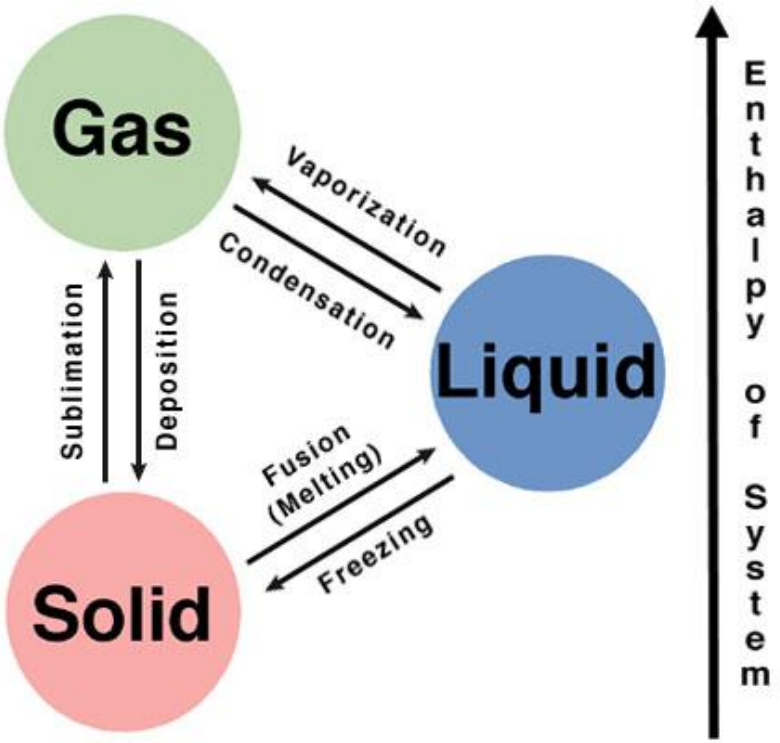
Chemical and physical changes

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

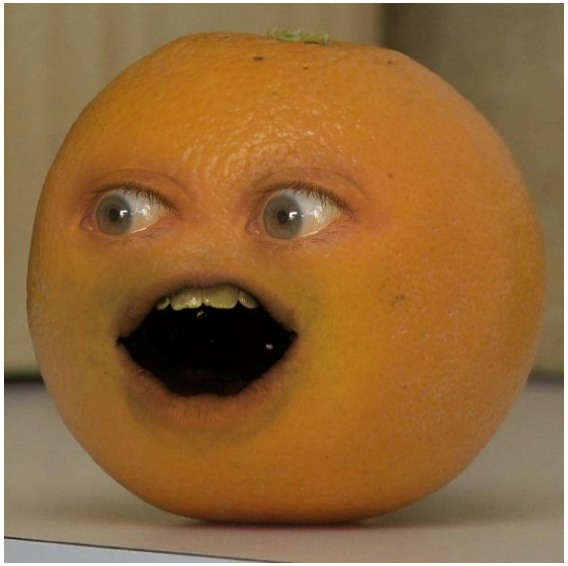
- Physical changes might be caused by:
  - Grinding
  - Cutting
  - Crushing
  - Bending
  - Breaking
  - Heating/cooling
    - (change in phase)
  - squishing

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**

Physical change

- What could you do to these items to cause a physical change to occur?

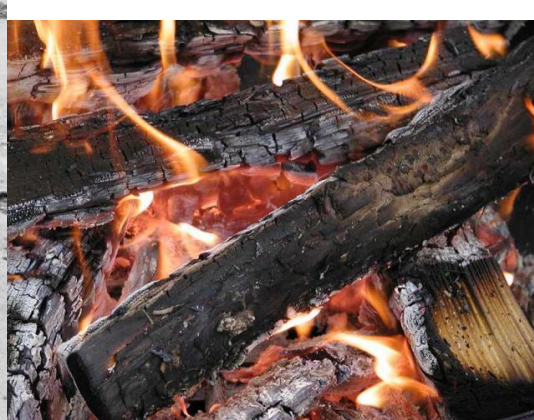


Chemical change

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

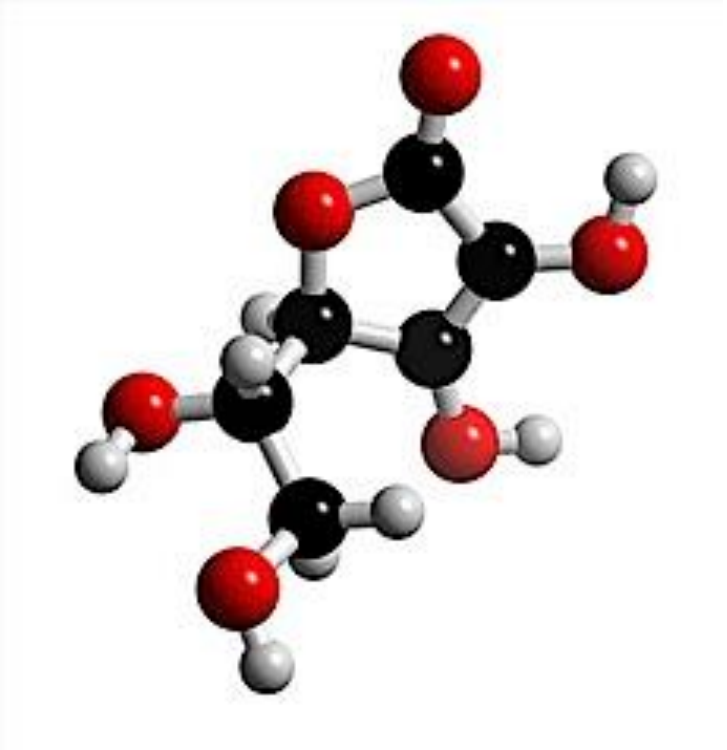
Chemical change

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



Chemical change

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



Chemical Change: Evidence

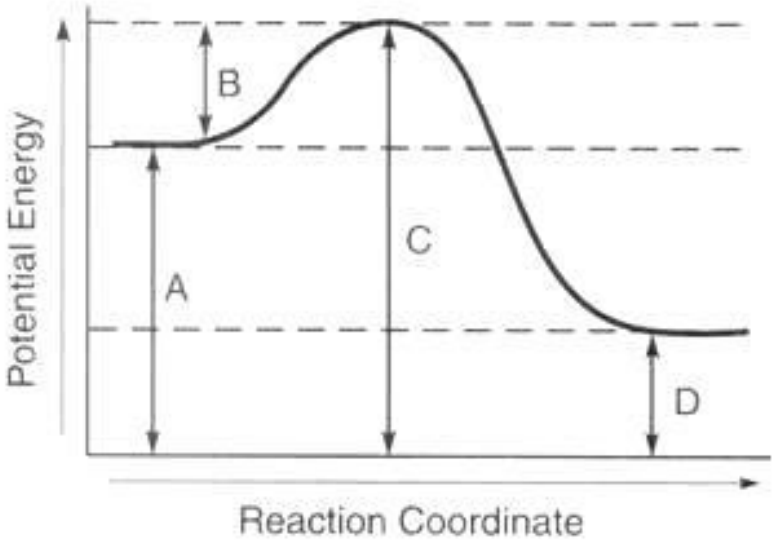
- **Evidence that a chemical change has occurred might include:**
  - A color change
  - An odor change
  - Formation of a precipitate (you mix two liquids and make a solid)
  - Gas is formed (bubbles)
  - Changes in physical properties.

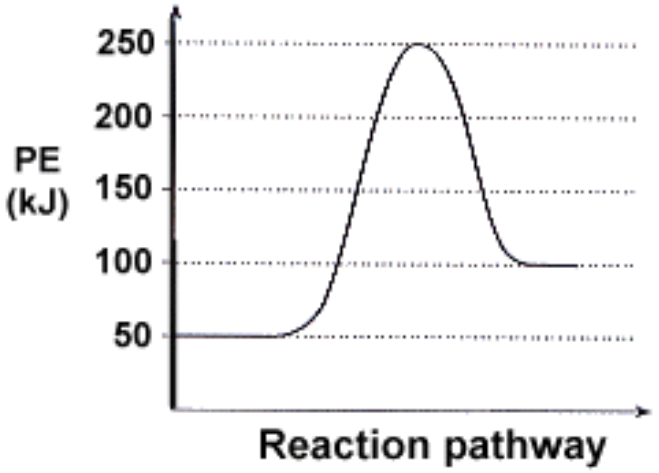
Physical and Chemical change

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

Chemical change – Chemical reactions

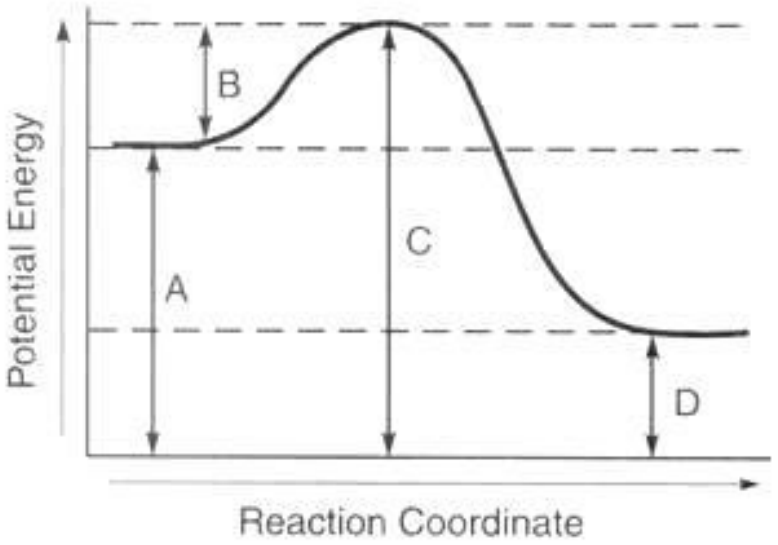
- When a chemical change occurs, energy is either released or absorbed.





Physical and Chemical change - heat

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