

PHYSICAL &  
CHEMICAL  
CHANGES

# PHYSICAL AND CHEMICAL CHANGES

Law of Conservation of Mass: Mass is never created or destroyed, it is always conserved

\*Crash Course #3 to 5:21

\*Applies to physical and chemical changes

# PHYSICAL AND CHEMICAL CHANGES

Physical Change:  $\Delta$  without  $\Delta$ ing the matters identity

Examples:

-Dissolving  $\text{NaCl(s)} \rightarrow \text{NaCl(aq)}$

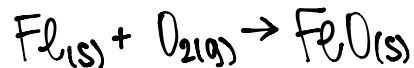
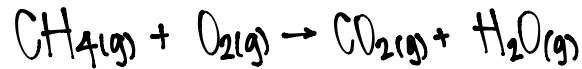
- $\Delta$  of state  $\text{CO}_2\text{(s)} \rightarrow \text{CO}_2\text{(g)}$

# PHYSICAL AND CHEMICAL CHANGES

Chemical Change:  $\Delta$  in identity of matter

Examples:

- Combustion
- Oxidizing
- CORROSION



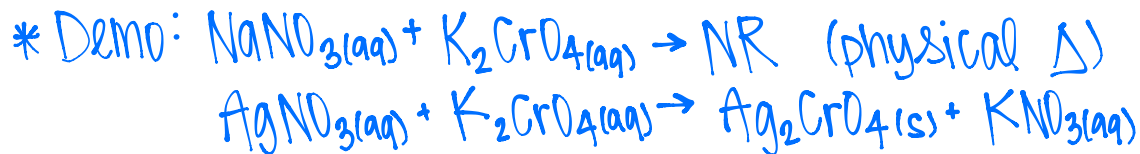
\* Demo: Cut paper (physical  $\Delta$ )  
Burn paper (chemical  $\Delta$ )

# PHYSICAL AND CHEMICAL CHANGES

## Types of Chemical Changes

### 1. Formation of a Precipitate <sup>← PPT</sup>

Precipitate: solid formed from 2 solutions when one product is insoluble in the other



# PHYSICAL AND CHEMICAL CHANGES

Types of Chemical Changes

2. Color Change

- Must be obvious (ex: Yellow → Red)

\* Demo:  $\text{NaOH(aq)}$  w/ BTB &  $\text{NaHSO}_4$

\* Dilution is NOT a chemical change

# PHYSICAL AND CHEMICAL CHANGES

## Types of Chemical Changes

### 3. Gas Production

- Bubbles form
- fizzing
- Increased pressure in a closed system



# PHYSICAL AND CHEMICAL CHANGES

## Types of Chemical Changes

### 4. Heat Exchange

- Exothermic: *Temperature increases*
- Endothermic: *Temperature decreases*






PHYSICAL &  
CHEMICAL  
PROPERTIES

# PHYSICAL AND CHEMICAL PROPERTIES

## Physical Properties of Pure Substances

1. Electrical Conductivity Ability to carry electrons
  2. Heat Conductivity Ability to transfer energy as heat
  3. Melting Point Temperature when solid  $\Delta$  to liquid
  4. Boiling Point Temperature when liquid  $\Delta$  to gas
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# PHYSICAL AND CHEMICAL PROPERTIES


## Physical Properties of Pure Substances

5. Density Mass to volume Ratio
6. Index of Refraction Ability to bend light
7. Malleability Ability to be hammered into thin sheets
8. Ductility Ability to be stretched into a thin wire

\* how it looks

# PHYSICAL AND CHEMICAL PROPERTIES

## Chemical Properties of Pure Substances

1. Reaction with acids and bases
  2. Reaction with oxygen (combustion)
  3. Acting as oxidizing/reducing agent
  4. Reaction with other elements
- 

# PHYSICAL AND CHEMICAL PROPERTIES

Chemical Properties of Pure Substances

5. Decomposition into simpler substances
6. Corrosion

# PHYSICAL AND CHEMICAL PROPERTIES

Intensive Property: Does NOT depend on sample size

Examples:

- Boiling Point
- Melting Point
- Reaction with substances
- Density
- Ductility

# PHYSICAL AND CHEMICAL PROPERTIES

Extensive Property: DOES depend on sample size

Examples:

- Mass
- Volume
- Width