

### Introduction

**Chemistry** study of matter, its properties, changes it undergoes, and energy associated with its changes

central science. everything is composed of matter

**Matter** takes up space and has mass  
anything composed of atoms and molecules

**Atom** building block of matter  
always in constant motion  
has endless combinations

### States of Matter

	Def Vol	Def Shape	Inc Temp Result	Compressibility
Solid	/	/	small	x
Liquid	/	x	small	x
Gas	x	x	large	/

### Chemical Properties of Matter

*observed when chemical makeup is altered*

Ability to Burn

Ability to Decompose

Ferment

Reacts With

### Physical Properties of Matter

*can be measured without changing the substance or chemical composition*

Color

Odor smell

Luster how shiny

Malleability to be beaten into thin sheets

Ductility to be made into thin wires

Physical use of senses

### 2 Properties Under Physical Property

**Extensive** amount of matter in the sample  
mass, volume, no. of cal present  
identifiers of unknown matter

**Intensive**  
depends on state of matter  
density, hardness, melting point, boiling point

### Evidence of Chemical Change

Absorption/Release of Energy

Color Change

Light Evolution

Production/Liberation of Gas

Formation of Precipitate

### Law of Conservation of Mass

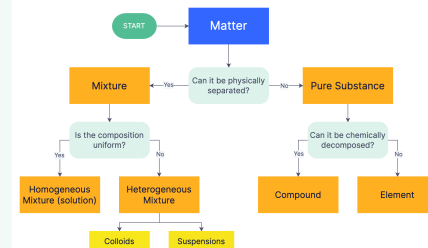
-mass of products = mass of reactants.

Always

-no change in quantity despite chemical/physical change

-not created nor destroyed. converted from one substance to another

### Classification of Matter



### Classification of Matter

**Pure Substance** cannot be physically separated  
elements and compounds

**Mixture** 2+ substances physically combined  
constant BP and MP nonexistent

retains characteristic properties of components

**Heterogeneous Mixture** can be physically separated

components are distinguishable

**Homogeneous Mixture** particles distributed evenly throughout

components not distinguishable

### Separating Techniques/Methods

-to remove unwanted particles

-to obtain important substance

-to obtain pure substances

**Mechanical Separation** manual separation based on physical properties

**Magnetic Separation** when component has magnetic property



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### Separating Techniques/Methods (cont)

Filtration	diff of solid particle size
Decantation	diff densities, pour out liquid, leave solid
Distillation	2 substances have diff BP
Evaporation	vaporize liquid, leave residue behind
Density Separation	less dense floats, more dense sinks
Centrifuge	circular motion to sink denser components
Paper Chromatography	diff in solubility  faster flow through solid = lower solubility

### Parts of Lab Report

Theoretical Framework	main idea (statement of problem)  introduce experiment, discuss theory, law, or concept behind what's investigated
Materials & Procedure	list of all items used  paragraph or narrative explaining details  procedure
Data & Results	data tables, figures with titles, short descriptions  label all tables, graphs, charts  attach separate sheet if necessary

### Parts of Lab Report (cont)

Analysis & Discussion	discuss what results mean  answer to all guide questions (par form)  follow format in objective type items
Conclusion	answer statement of the problem  summary of the data  discuss insights, application to real-life situations  possible errors (experimental errors, scope & limitations, ) & recommendations
References	CSE citation style
Reflection	each member needs own reflection  go beyond reflection questions given
Contribution	tabulate contributions of each member  which part conducted

### Atomic History & Subatomic Particles

Ancient Greek Philosophers	
Atomists	- everything is made of tiny indivisible particles

### Atomic History & Subatomic Particles (cont)

Leucippus	- matter is composed of 2 <b>indivisible</b> things, atoms, and void
Democritus	- atoms from one object are <b>different</b> from another object  -Democritus' Building Blocks (first figure for atoms)
Natural Elementals	- everything is made of <b>natural elements</b>
Empedocles	- everything is made of water, earth, fire, & air
Aristotle	- everything is infinitely divisible, and made of water, earth, fire, air, and aether



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### John Dalton's Postulates

Indivisible Atoms	elements are made of small indivisible particles called atoms
Mass & Properties	mass & properties of all its other atoms are same, for all elements
Atomic Ratios	atoms in given compound are present in a constant whole--number ratio
Reactions	atoms are not created nor destroyed; they combine, separate, or rearrange

### History of Atomic Models

Dalton's Atom	a singular circle
Thomson's Plum Pudding Atom	electrons needed a positive "-something" to counter the charge
Rutherford's Nucleus Atom	discovered the nucleus, something that deflected the particles
Bhor's Planetary Model	discovered shells and energy levels
Bhor's Planetary Model v2.0	discovered neutrons
	light elements bombarded with alpha particles will produce lots of ionizing radiation

### Atom Structure

Atom	electrically neutral
	spherical
	contains, protons, neutrons, (+) charged nucleus surrounded by (-) electrons
Electrons (e <sup>-</sup> or beta)	move rapidly around nucleus (probability cloud)
	Charge: -1.602x10 <sup>-19</sup> C
	Mass: 9.109x10 <sup>-31</sup> kg
	Diameter: ~10 <sup>-18</sup> m
Protons (p <sup>+</sup> or H <sup>+</sup> )	all (+) charge of nucleus results from protons
	Charge: +1.602x10 <sup>-19</sup> C
	Mass: 1.672x10 <sup>-27</sup> kg
	Diameter: ~10 <sup>-15</sup> m
Neutrons (n <sup>0</sup> )	no charge
	Mass: 1.674x10 <sup>-27</sup> kg
	Diameter: ~10 <sup>-15</sup> m
Atomic Number (Z)	=no. of p <sup>+</sup> in nucleus = no. of e <sup>-</sup> in atom
Mass Number (A)	=p <sup>+</sup> + n <sup>0</sup> in nucleus (there are no electrons in the nucleus because nucleus is + charged)
Isotope	isos = same, topos = place
	different no. of n <sup>0</sup> , but same no. of p <sup>+</sup>



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