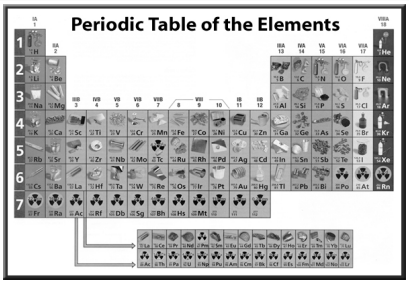
~~Atomic Structure, Periodic Table,~~ & Lewis Structures



Dalton's Atomic Theory

1. All matter is composed of extremely small particles called _____
2. All atoms of a given element are _____ , having the same size, mass, and chemical properties. Atoms of a specific element are _____ from other elements
3. Atoms cannot be _____ , _____ , or _____
4. Different atoms combine in simple whole number _____ to form compounds
5. In a _____ , atoms are separated, combined, or rearranged

JJ Thomson

- JJ used the _____ experiment to determine the _____ to _____ ratio of an electron.
- He identified the first subatomic particle, the _____
- He proposed the _____ model of the atom
- Credited Thomson for discovering the _____

Robert Millikan

- Millikan is noted for his famous Millikan's _____
- This experiment determined the _____ and the _____ of an electron

Earnest Rutherford

- Rutherford's _____ Experiment helped to determine the existence of the _____
- Rutherford proposed that the nucleus was _____ , _____ and _____ charged
- Proposed the _____ model which stated that there was a nucleus with a positive charge and electrons around the outside

James Chadwick

- Chadwick showed that the nucleus also contained _____
- He is credited for the discovery of the _____

Basic Definitions

- _____ – smallest unit of an element that retains the properties of that element

Protons, Neutrons, & Electrons

- Protons
  - _____ charge
  - found in the _____
- Neutrons
  - _____ charge
  - found in the _____
- Electrons
  - _____ charge
  - found on the _____ of the nucleus
- Nucleus
  - made up of _____ and _____
  - overall _____ charge

Atomic Structure

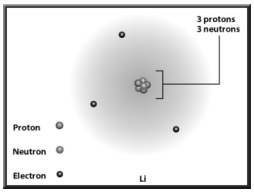


TABLE 2.1 Comparison of the Proton, Neutron, and Electron

Particle	Charge	Mass (amu)
Proton	Positive (1+)	1.0073
Neutron	None (neutral)	1.0087
Electron	Negative (1−)	5.486×10^{-4}

Atomic Numbers

- _____(Z) - number of _____ in the nucleus of an atom of that element.
- The number of protons determines the _____ of an element
- The number of protons for an element _____ be changed.

Atomic Numbers

- Atoms have no overall electrical charge so the number of _____ must equal the number of _____ .
- The number of electrons can be changed when determining the charge of an _____ .

Masses

- The sum of the protons and neutrons in the nucleus is the _____ (A) of that particular atom.
- Isotopes of an element have different mass numbers because they have different numbers of _____

Isotopes

- When writing isotopes, the atomic number (or number of protons) will appear at the _____
- The mass number (number of protons plus neutrons will appear at the _____
- The element symbol will appear to the _____
- The different number of neutrons has NO bearing on chemical reactivity

mass number
atomic number **X**

Writing the Names of Isotopes

- Write the name of the element – the mass number
- For example $^{12}_{6}$ C would be named:

Try the following

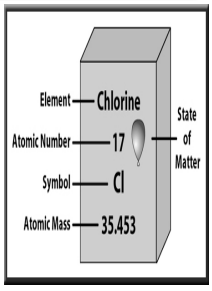
Name	Symbol	# Protons	# Neutrons	# Electrons	Mass #
Carbon – 11					
	$^{197}_{79}$Au				
		1	2		
				25	55
Oxygen - 15					

Try this one

Name	Symbol	# Protons	# Neutrons	# Electrons	Mass #
Iodine $^{-1}$ - 130					

Atomic Mass

- _____–weighted average mass of all the naturally occurring isotopes of that element.



Calculating Atomic Mass

- Copper exists as a mixture of two isotopes.The lighter isotope (Cu-63), with 29 protons and 34 neutrons, makes up 69.17% of copper atoms.The heavier isotope (Cu-65), with 29 protons and 36 neutrons, constitutes the remaining 30.83% of copper atoms. Calculate the atomic mass of Copper.

Calculating Atomic Mass

Try this one…

Calculate the atomic mass of germanium.

Isotope	Abundance (%)	Atomic Mass (amu)
Geranium-70	21.23	69.924
Geranium-72	27.66	71.922
Geranium-73	7.73	72.923
Geranium-74	35.94	73.921
Geranium-76	7.44	75.921

You can tell many things from an isotope formula

- Hydrogen has three naturally occurring isotopes in nature: Hydrogen – 1, Hydrogen – 2, and Hydrogen – 3.
  - Which is the most abundant in nature?
  - Which is the heaviest?

Periodic Table

- _____– arrangement of elements in order of increasing atomic number with elements having similar properties in vertical columns
  - _____– vertical columns
  - _____– horizontal rows

Group Names

Group	Name
1A	
2A	
3A	
4A	
5A	
6A	
7A	
8A	

Groups

- The group tells you the number of _____
- Valence electrons - electrons in the _____ shell of the atom

Characteristics

- Elements in the same group exhibit similar chemical characteristics due to the fact that they all have the same number of _____ .
- The most stable number of valence electrons is _____
- This is called an _____

Physical States and Classes of the Elements

- The majority of the elements are _____ . They occupy the entire left side and center of the periodic table.
- _____ occupy the upper-right-hand corner.
- _____ are located along the boundary between metals and nonmetals.

Metals

- _____ are elements that have luster, conduct heat and electricity, and usually bend without breaking.
- All metals except _____ are solids at room temperature

Transition Metals

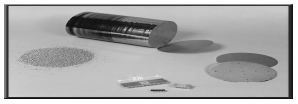
- The elements in Groups B of the periodic table are called the _____
- All transition elements are _____ .
- Many transition metals can have more than one charge

Non Metals

- Most _____ don't conduct electricity, are much poorer conductors of heat than metals, and are brittle when solid.
- Many are gases at room temperature; those that are solids lack the luster of metals.

Metalloids

- _____ have some chemical and physical properties of metals and other properties of nonmetals.



Nuclear vs. Chemical

- Occurs when bonds are broken and formed
- Atoms remain unchanged, but the may be rearranged
- Involve only valence electrons
- Have small energy changes
- Reaction rates are influenced by temperature, pressure, concentration, and catalysts

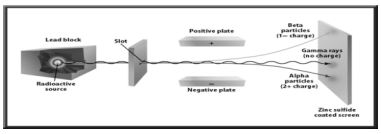
- Occurs when nuclei emit particles and/or rays
- Atoms of one element are converted into another element
- May involve protons, neutrons, or electrons
- Have large energy changes
- Reaction rates are not affected

Types of Radiation

- The three most common types of radiation are alpha (α), beta (β), and gamma (γ).

Deflection

- The effect of an electric field on three types of radiation is shown.



Nuclear Reactions

- Write the reaction for radium - 226 converting into radon-222
- Write the reaction of carbon-14 decaying into nitrogen – 14
- Write the reaction of uranim-238 undergoing alpha and gamma decay

Fission and Fusion

- _____ – splitting the nucleus into fragments
  - Releases large amounts of energy
  - Nuclear power plants use fission to generate power
- _____– combining of atomic nuclei
  - Release large amounts of energy
  - Require extremely high temperatures
  - The lowest temperature possible is 40,000,000 K
  - Know to occur on the sun