**Chapter 4: Atomic Structure, Periodic Table, and the Mole**

**Objectives and Vocabulary**

**Objectives**

* Explain Dalton’s Atomic Theory (5 major points) and why it was more accepted than Democritus’ theory
* Construct a model of an atom, identifying the protons, neutrons, and electrons
* Compare qualitatively the masses of a proton and neutron versus an electron
* Identify the charges of protons, neutrons, and electrons
* Compare Bohr’s model of the atom with the modern model of the atom
* Recall that unreacted atoms have no overall net charge
* Recall that atoms are mostly empty space and that most of the mass comes from the nucleus
* Explain why electrons’ locations cannot be exactly determined, comparing it to everyday processes
* Explain what an orbital is and where orbitals can be found in an atom
* Explain the importance of valence electrons and where they can be found in an atom
* Relate the organization of the periodic table to the arrangement of the periodic table to the arrangement of electrons within an atom
* Explain why some protons gain or lose electrons to form ions
* Determine how many protons, neutrons, and electrons an atom has, given its symbol, atomic number and mass number
* Predict the element, number of protons, number of neutrons, electrons, atomic mass, and atomic number given at least two of the quantities mentioned
* Explain the significance of isotopes
* Calculate the average atomic mass given abundances of isotopes
* Explain how the abundance of isotopes affects an element’s average atomic mass
* Compare and contrast metals, nonmetals, metalloids (semiconductors) basic properties
* Locate alkali metals, alkaline-earth metals, transition metals on the periodic table
* Locate semiconductors, halogens, and noble gases in the periodic table
* Predict what family an element would belong to given a list of properties
* Relate an element’s chemical properties to the electron arrangement of its atom
* Predict possible advantages or disadvantages to synthetic (man-made) elements
* Explain the relationship between a mole of a substance and Avogadro’s constant
* Find the molar mass of an element using the periodic table
* Solve problems converting the amount of an element in number of molecules or atoms to grams to its mass in moles and vice versa

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**Vocabulary:**

|  |  |  |  |
| --- | --- | --- | --- |
| Nucleus | Proton | Neutron | Electron |
| Orbital | Valence electron | Periodic law | Period |
| Group | Ion | Atomic number | Mass number |
| Isotope | Atomic mass unit | Average atomic mass | Relative abundance |
| Metal | Nonmetal | Semiconductor | Alkali metal |
| Alkaline-earth metal | Transition metal | Halogen | Noble gas |
| Mole | Avogadro’s constant | Molar mass | Inert |