**Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Period\_\_\_\_\_\_\_Date\_\_\_\_\_\_\_\_\_\_\_\_**

**Unit 7 Guided Notes: The Atom**

History of Atomic Models

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(~400 BC)
	+ Proposed that \_\_\_\_\_\_\_\_\_ was composed of tiny \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ particles
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_=small, solid, indestructible particles of different shapes and sizes
	+ These were just ideas, not truly science
* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**(next 2000 years)
	+ Mixture of science and mysticism
	+ Lab procedures were developed, but did not perform control experiments like real scientists
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Model
		- Atom is a small \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ Developed notion of conservation of \_\_\_\_\_\_\_\_\_\_\_ and that atoms combine in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* 5 Main Points of Dalton’s Atomic Theory
	1. Elements are made of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	2. Al atoms of a given element are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	3. Atoms of a given element are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ than those of any other \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	4. Atoms of one element can \_\_\_\_\_\_\_\_\_\_\_\_ with atoms of other elements to give \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	5. Atoms cannot be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Problems with Dalton’s atomic theory
	+ Problem with #1: Atoms can be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, but only in a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ reaction
	+ Problem with #2: does not account for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (atoms of the same element but different \_\_\_\_\_\_\_\_ due to different number of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)
	+ Problem with #3&4: NONE
	+ Problem with #5: NONE, except for nuclear reactions that can change atoms of one element to a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(1896)
	+ Discovered \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		- Spontaneous emission of radiation from the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		- Three types:
			* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
			* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
			* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(1903)
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Experiments
	+ Discovered \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_particles of \_\_\_\_\_\_\_\_\_\_\_\_\_ the atom
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Model
		- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_sphere (Pudding) with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(plums) dispersed throughout
* Ernest \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(1911)
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Experiment
	+ Discovered the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the atom
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Model
		- Dense positive nucleus surrounded by negative electrons
* Niels \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(1913)
	+ Bright Line Spectrum
		- Tried to explain the presence of specific colors in hydrogen’s spectrum
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ can only exists in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Model
		- Electrons move in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* Erwin \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(1926)
* Quantum Mechanics: Electrons can only exist in specified energy states
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Model**:** \_\_\_\_\_\_\_\_\_\_\_\_\_: region around the nucleus where electrons are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to be found
* James \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(1932)**:**  discovered \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Atomic Structure

**Chemical Symbols**

* Capitals matter!!!
* Element symbols contain \_\_\_\_\_\_\_ capital letter followed by \_\_\_\_\_\_\_\_\_\_\_\_\_\_ letter(s) if necessary.
* Example:

**Atomic Structure Basics**

* Remember, the atom is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ unit of \_\_\_\_\_\_\_\_\_\_\_ and is made up \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* **Subatomic Particles**

* Electrons
	+ \_\_\_\_\_\_\_\_\_ compared electrons to \_\_\_\_\_\_\_\_\_\_\_\_\_\_, saying that electrons \_\_\_\_\_\_\_\_\_\_\_\_ the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in specific and \_\_\_\_\_\_\_\_\_\_\_\_\_\_ paths
	+ However, an electron’s \_\_\_\_\_\_\_\_\_\_\_\_\_ location \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ be determined
	+ Electrons exist in energy levels called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ The number of \_\_\_\_\_\_\_\_\_\_\_\_ orbitals depends on how many \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ an atom has
	+ Electrons occupy the orbitals that have the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ Four different kinds of orbitals: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_: region where there is a \_\_\_\_\_\_\_\_\_\_\_probability of finding an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ Electrons located in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ orbital are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ These electrons determine the atom’s \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and its abilities to form \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ Atoms with the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of valence electrons have \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Bohr Model Diagrams



* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ Equals the # of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ Equals the # of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in a NEUTRAL atom
	+ Always a \_\_\_\_\_\_\_\_\_\_\_\_\_\_ number
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ Atomic mass unit: \_\_\_\_\_\_\_\_\_
	+ 1 proton=\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ 1 neutron=\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ 1 electron=\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ Lightest subatomic particle is an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ Equals the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ Measured in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: atoms of the \_\_\_\_\_\_\_\_\_\_ element with different \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		- Differ in number of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
		- Examples: Carbon-13, Carbon-14, Boron-10, Boron-11



* Calculating # of Neutrons
	+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ Example: Aluminum
		- 13 protons
		- \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_=\_\_\_\_\_\_\_\_\_\_\_ neutrons
* Isotopes
	+ Elements of the same element with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ Hyphen Notation=\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Chlorine-37
	+ Atomic #=
	+ Mass #=
	+ # P=
	+ #E=
	+ #N=
* Average Atomic Mass
	+ Weighted \_\_\_\_\_\_\_\_\_\_\_\_ of all \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	+ This is the mass on the periodic table
	+ Round to \_\_\_\_\_\_\_\_ decimal places
	+ Example: calculate the average atomic mass of oxygen if its abundance in nature is 99.76% O-16, 0.4% O-17, and 0.20% O-18
	+ Find the chlorine’s average atomic if approximately 8 of every 10 atoms are chlorine-35 and 2 are chlorine-37
* Average Mass of Compounds
	+ Use the periodic table to find the masses of the elements present.
	+ Add them up appropriately accounting for the number of each element.
	+ Example: Hydrogen gas, H2
	+ Example: ammonia, NH3

* + Example: Potassium sulfate, K2SO4