UNIT 2 Atomic Structure:

1. Atoms are made up of **sub-atomic particles**, called protons, neutrons and electrons.

2. **Nucleons** - particles found in the nucleus:
   - Protons: 1 AMU, +1 charge
   - Neutrons: 1 AMU, no charge

Neutrons and protons have the same mass
Nuclear Charge = Number of Protons in the nucleus

3. Electrons:
   - are found in energy levels outside the nucleus
   - **1/1836 AMU ≈ 0**, -1 charge
   - very small compared to the size of a neutron or proton

4. **AMU = atomic mass unit = 1/12 of the Carbon-12 atom**. Periodic table is based on the Carbon 12 atom

5. **Atomic Number = number of protons**

6. **Atomic Mass = weighted average of all the different atoms of the element**

Create a chart to calculate weighted average

Isotope	Quantity Relative Abundance (% /100)	Mass	Total Isotope Mass

Add all isotope masses to get weighted average

7. **Mass Number = atomic mass rounded to the nearest whole number. It is equal to the number of protons and neutrons**

8. In a neutral atom the **number of protons = number of electrons**

9. **Isotopes** are atoms of the same element having different masses, due to a different number of neutrons found in the atom. **ATOMIC NUMBER REMAINS THE SAME!!!**

10. Rutherford's **Gold Foil Experiment** stated the atom was composed of **mostly empty space, and the nucleus is small and positively charged.**

11. Bohr Model of the atom: electrons are found in Principal Energy Levels (PELS). A PEL is represented by "n" and the maximum number of electrons in a PEL is equal to "$2n^2$".

PEL	Maximum Number of Electrons in a PEL
"n"	**"$2n^2$"**
1	2
2	8
3	18
4	32

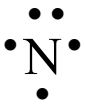
12. **BOHR MODEL electron configuration is given on the Periodic Table for each element.**

13. Electrons in the ground state can **absorb energy** only in specific amounts called "**QUANTA**". **ENERGY = QUANTUM**

14. Electrons jump to higher energy levels, become unstable/excited/high energy, and immediately fall back down to the ground state. The atom **emits energy** in the form of **light as it returns** to the ground state, creating a **bright-line spectrum**.
This is the chemistry behind neon signs and fireworks.

15. Valence electrons: electrons found in the outermost PEL. There is a maximum of 8 valence electrons. The rest of the atom, the non-valence electrons and the nucleus is called the **kernel.**

16. Electron Dot Structure: shows valence electrons. Maximum of 8 valence electrons.
Example: **Nitrogen**
Electron Configuration **2 - 5**



17. The quantum mechanical model of the atom is the MODERN model – sometimes called the WAVE mechanical model. It states an electron is most likely found in a 3D region of space called the **orbital.**