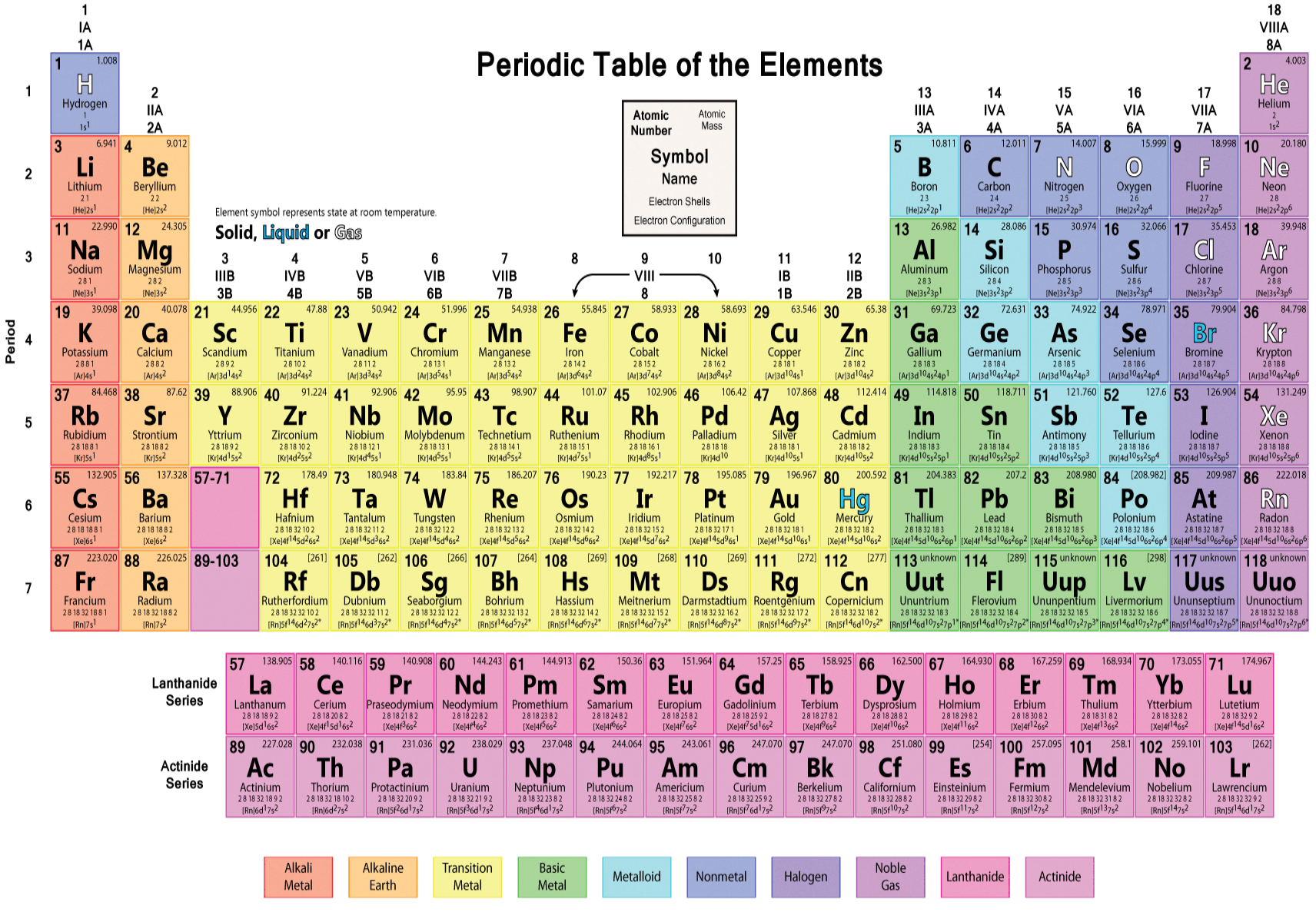
Matter

Matter, Minerals & Properties of Minerals

2.1 Matter

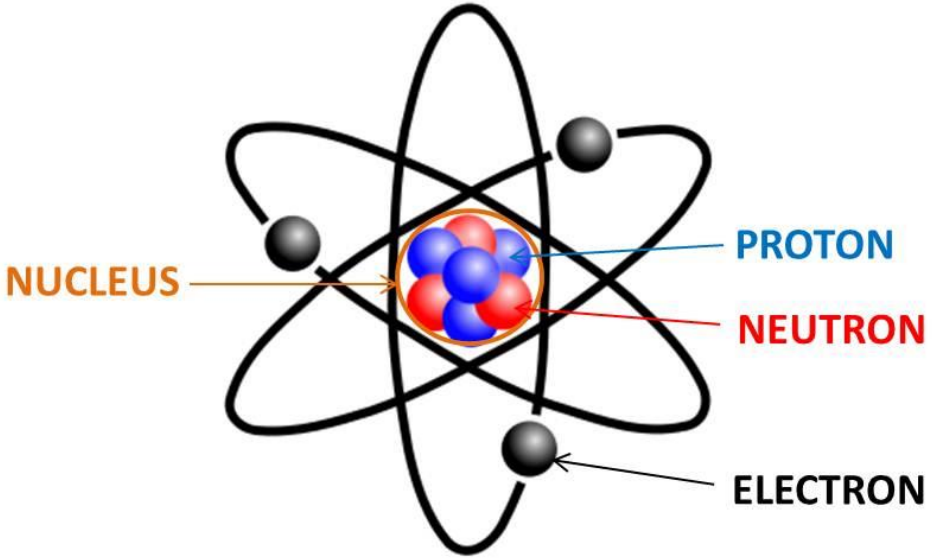
- **Matter**: anything that has mass and takes up space.
  - Mass: the amount of matter in an object.
  - Volume: the amount of space an object takes up.
- **Atom**: the basic unit of matter
- **Elements**: made up of one type of atom.
- over 100 elements are known.

Periodic Table of the Elements



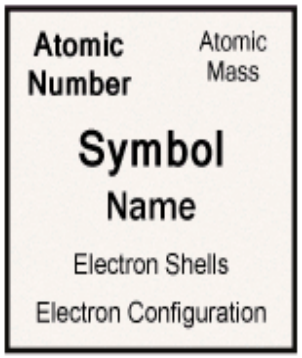
2.1 Matter: the atom

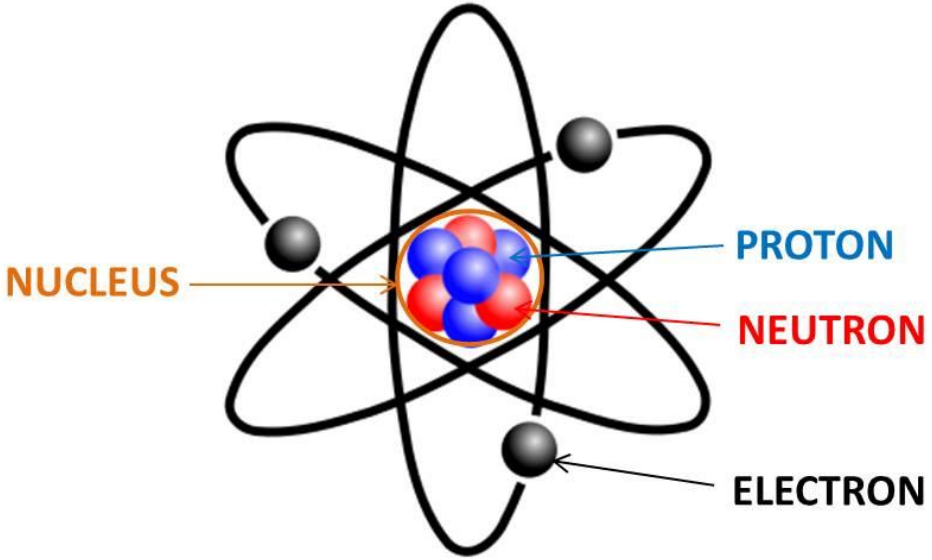
- **Atom** is the smallest particle of matter
- Nucleus: the central part of an atom; contains 2 subatomic particles
  - **Protons** (have a positive charge)
  - **Neutrons** (have no charge)
- Energy levels/shells surround the nucleus
  - Electrons are on these levels (have a negative charge)



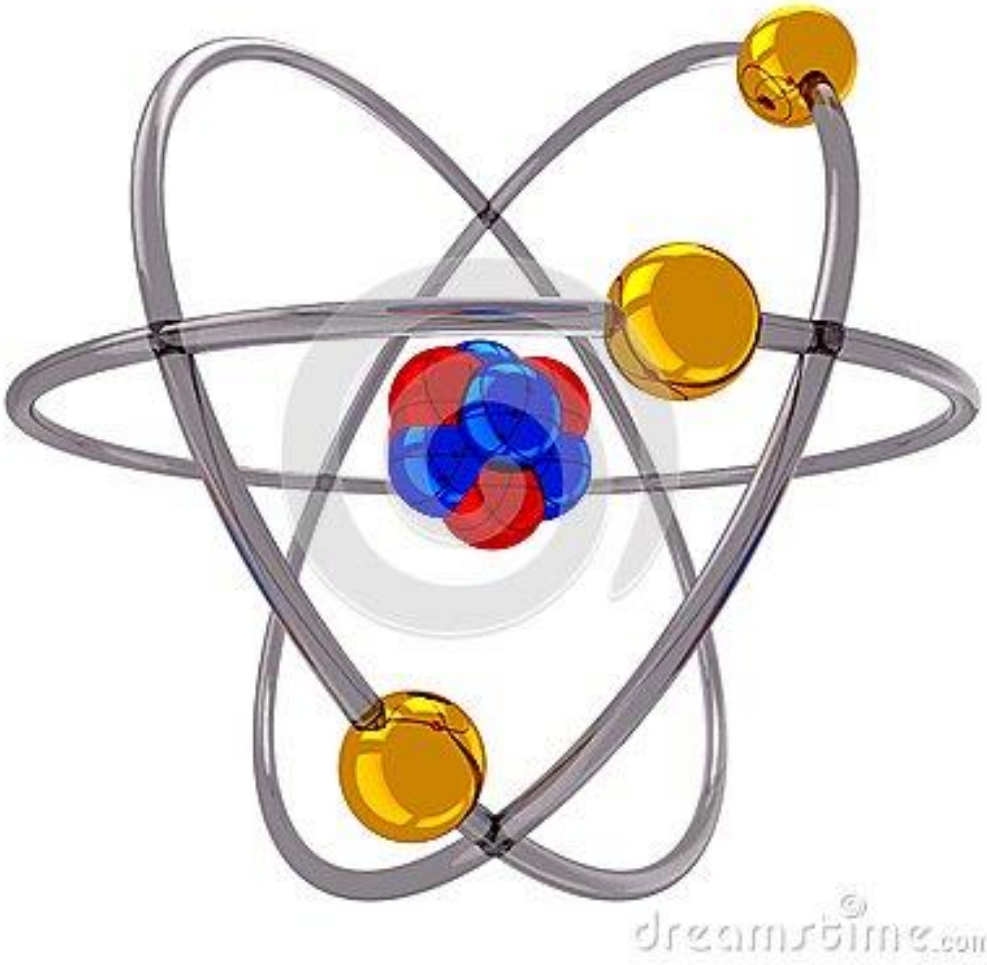
2.1 Matter: the atom

- The **atomic number** is the number of protons in the nucleus of an atom.
- The **mass number** is the number of neutrons and protons in the nucleus of an atom.
- **The number of electrons = number of protons**



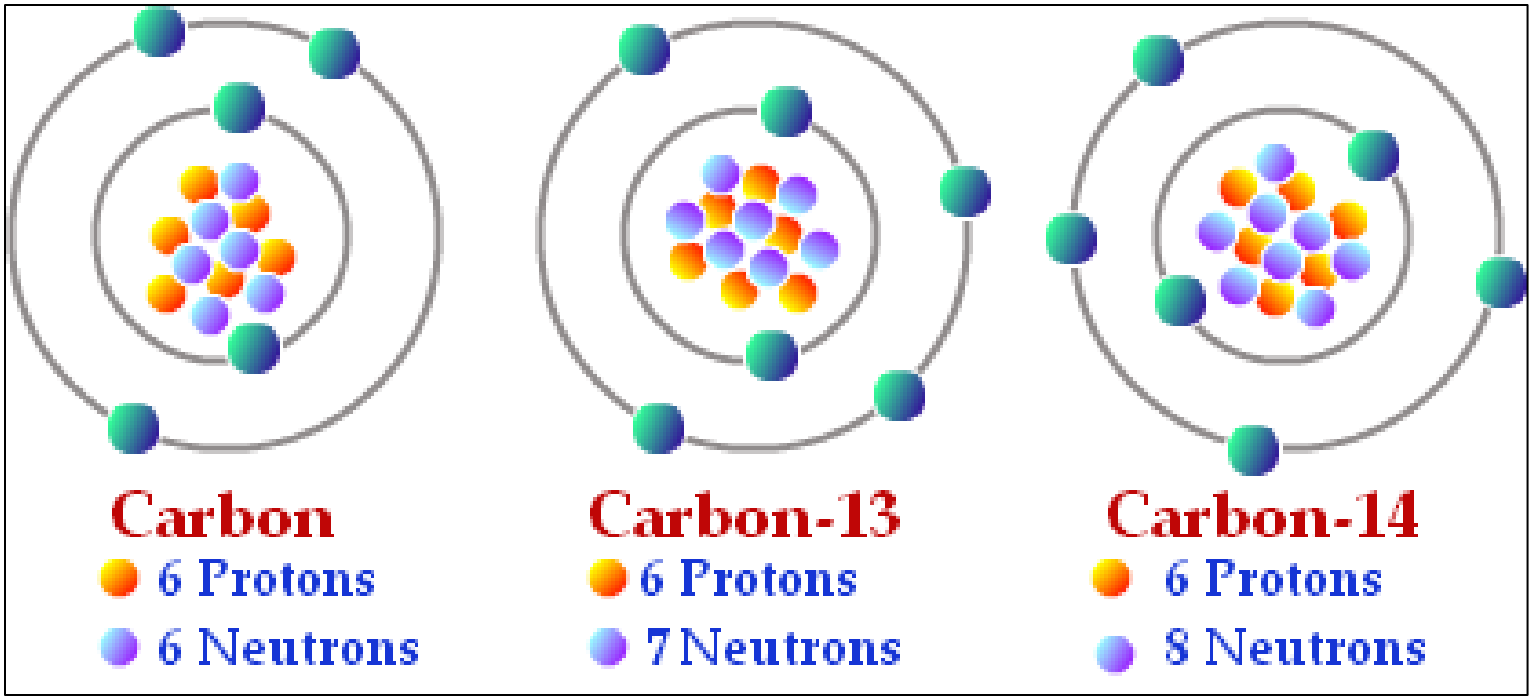


Model of an Atom



2.1 Matter: isotopes

- **Isotopes** of an element have the **same number of protons** but different numbers of neutrons.
  - Mass number is different (neutrons + protons)



2.1 Matter: chemical bonds

- When an atom's outer energy level does not have the maximum number of electrons, the atom is likely to form a **chemical bond** with one or more atoms.
  - When two or more elements combine, it makes a compound.

3 Types of Chemical Bonds:

1. **Ionic bonds** form when atoms give/take electrons.
2. **Covalent bonds** form when atoms share electrons.
3. **Metallic bonds** form when metal ions share electrons.