

# CHEMISTRY CONTENT FACTS

The following is a list of facts related to the course of Chemistry. A deep foundation of factual knowledge is important; however, students need to understand facts and ideas in the context of the conceptual framework. This list is not intended to provide a comprehensive review for State and National Assessments. Its purpose is to provide a highlight of the factual material covered in Chemistry. This list is not all inclusive, be sure to check Nevada State Standards and your district syllabi.

## Atomic Structure

- **Parts of the atom:**
  - Proton: (+) charged; 1 atomic mass unit
  - Neutron: not charged; ~1 atomic mass unit
  - Electron: (-) charged; 1/1836 atomic mass unit
- **Nucleon** - particles found in the nucleus (protons & neutrons)
- **Nucleus** - contains most of the mass of the atom; has a positive charge; The # of protons is called the atomic number and produces the nuclear charge
- 1 U (formerly amu) - the atomic mass unit; based on 1/12 the mass of a *carbon 12* atom
- In a neutral atom the # of protons = the # of electrons
- **Atomic #** - the # of protons in an atom; used to identify the element
- **Atomic mass** = the # of protons + the # of neutrons
- **Isotopes** - elements that have the same atomic # but different atomic masses due to a difference in the # of neutrons in the nucleus
- To figure out the # of neutrons in an element subtract the atomic # **FROM** the mass number
- ${}_6\text{C}^{14}$  has 6 protons, 6 electrons and 8 neutrons
- Atomic mass is really a *weighted average* of all of the isotopes that exist in nature for that element. i.e. Carbon's atomic mass = 12.011 because there is  ${}_6\text{C}^{12}$  and  ${}_6\text{C}^{14}$  in nature but  ${}_6\text{C}^{12}$  is more abundant and therefore skews the average toward 12
- **Quantized model of the atom** - states that electrons are most probably in certain energy levels. An absorption of energy will cause electrons to **TEMPORARILY** jump to higher levels and when the electrons fall back down to lower levels they **EMIT** this energy in the form of light
- 13. **Valence electrons** - electrons in the outermost energy levels. i.e.  ${}_9\text{F}^{19} 1s^2 2s^2 2p^5$  has 7 valence electrons **SINCE** the outer most principle energy level is the 2<sup>nd</sup> one. Kernel electrons are the electrons **NOT** considered to be part of the valence shell
- **Electron dot diagram** - uses dots for the valence electrons

- **Orbital diagrams:** illustrate the orbitals occupied by 0, 1, or 2 electrons. Arrows represent the electrons & two electrons or arrows can fit into each orbital. The electrons in the same orbital **MUST** spin in opposite directions
- **Hund's rule** - before an orbital can get a second electron each orbital in that sublevel must have at least one electron
- **Order of filling sublevels:**  $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10}$ : **WHY?** The  $4s^2$  sublevel needs less energy to fill than the  $3d^{10}$  sublevel

