

Chemistry:

CHAPTER 1

- Charge of electron $\approx 1.6 \times 10^{-19}$; Avogadro's # $\approx 6 \times 10^{23}$
- Mass number (A) on top of element, atomic number (Z) below
- $E = \frac{hc}{\lambda} = -R \left[\frac{1}{n_1^2} - \frac{1}{n_2^2} \right]$; $E = qV$ (energy = charge on e- x electron volts); $c = \lambda \nu$ ($c = 3 \times 10^8$)
- Heisenberg uncertainty – impossible to determine momentum and position simultaneously
- Pauli exclusion – no electrons have same quantum #'s
- Max e- in a shell $\approx 2n^2$, max e- in subshell $\approx 4l+2$
 - Possible values for l ≈ 0 to $n-1$, possible values for ml $\approx -l$ to $+l$
- s can hold 2 e-, p ≈ 6 , d ≈ 10 , f ≈ 14
- Aufbau principle (building up) – lowest $n+l$ will fill first
- For anions add extra e-, for cations remove e- from subshells with highest n first
- Hund's – half filled orbitals with parallel spins (bus seats)
- Paramagnetic – unpaired parallel spin e-, attracted to magnetic field
 - Diamagnetic – paired e-, repelled by magnetic field
 - Ferromagnetic – unpaired e-, randomly oriented dipoles, become magnetized in field
- A faraday is equal to one mole of electric charge

CHAPTER 2

- Z_{eff} increases from left to right, constant up and down
- Ionic radius is smallest near metalloid line and increases out
- F is smallest, most EN, highest IE and EA; Cs is the largest and least EN
- Complex ions from transition metals associate with water to form **hydration complexes**
- Atomic radius has the opposite trend of all others



CHAPTER 3

- C, N, O, F, Na, Mg always abide by octet rule; H, He, Li, Be, B can have incomplete; period 3 or higher can have expanded
- **Coordinate covalent bond** – both e- are contributed by one atom (lone pair attack, acid-base)
- Ionic \approx EN difference greater than 1.7, polar covalent ≈ 0.5 to 1.7, nonpolar \approx less than 0.5
 - Ionic are stronger than covalent (which are both stronger than IM forces)
 - Van der Waals occurs more with close proximity and large molecules
- **Dipole moment** $\approx p = qd$
- Triple bonds are shorter and have more energy
- Major resonance contributor is more stable (less formal charge, negative on more EN atom)
 - **Formal charge** = valence – nonbonding – $\frac{1}{2}$ bonding
- Electron geometry is when bonding and lone are equal, molecular geo is when lone repel more

Chemistry Study Guide Key

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