

Stuff to Know for the Final

- ***Transition Metals***
 - Electron configuration
 - Neutral metal
 - Metal ions
 - Number Valence electrons
 - Lewis acids and bases
 - Coordination of Ligands
 - Complex ions, charge on metal
 - Mono-dentate, poly-dentate
 - Coordination number
 - Chelating Ligands
 - # coordination sites, charge
 - Chelate effect
 - Diamagnetic, Paramagnetic
 - Color absorbed/transmitted
 - Crystal Field Splitting Energy
 - Electron configurations
 - Spin pairing energy
 - High spin/Low spin

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- Molecular Orbital Theory
 - Shapes of orbitals
 - Identify bonding, antibonding, sigma, pi, node, star
 - Know relative energy of molecular orbitals
 - Use MO diagram to determine bond order and number of unpaired electrons
- Bonding and Structure of Solids
 - Compare strength of IMF's
 - Use phase diagram, know definitions
 - Identify crystalline or amorphous solid
 - Predict type of crystal formed; molecular, atomic, network covalent, metallic, ionic
 - Know properties of types of solids; ability to conduct electricity, hardness, MP/BP comparison,

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Periodicity (Ch. 7, 22)

- Ionization Energy
- Electron Affinity
- Compare radii of atoms
- Compare radii of ions
- Effective Nuclear Charge
- Formation of ions
- Trends in metallic character
- Trends in reactivity
- Trends in electronegativity
- Metallic character
- Reactions of hydroxides with H₂O
- Identify acidic or basic hydroxides or oxides
- Period 2 versus 3 bonding trends

Chemistry of the Elements

Know the trends!

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Chemistry of the Elements

Know the trends!

- **Occurrence of elements**
 - Abundance
 - Where in nature
- **State of elements**
 - Isolation and purification
 - Nonmetals
 - Metals (metallurgy)
- **Periodic Trends**
 - Size
 - Ionization energy and Electron affinity
 - electronegativity
- **Metallic Character**
 - Trends in Acid/base properties
 - Trends in oxidation states
- **Trends in bonding**
 - Period II vs. Period III
 - Effects of Bonding: Hydrides
- **Summary of Periodic Trends**
 - For Groups I, II, III, IV and V

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Bonding in Metals

Electrical Properties

- Bonding in metals
- Band theory
- Electrical conductivity
- Semiconductors
- Examples (n-type and p-type)
- Semiconductor devices (diodes and LEDs)
- Electrical properties of Ceramics

Structure of Metals

Mechanical Properties

- Malleability of metals and alloys
- Real-world example (high-strength Al)
- Defects in metals
- Hardening of metals/alloys
- Alloys
- Iron and steel
- Amorphous alloys

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Modern Materials

- Polymers
 - Polymer synthesis
 - Polymers: properties
- Ceramics
 - Silicates: Glasses
 - Aluminosilicates: Zeolites