

CHAPTER 21, 22 LEARNING OBJECTIVES

(Sections 21.4, 22.1-22.3, 22.6-22.7)

To satisfy the minimum requirements for this course, you should be able to:

Section 22.1

Recognize the general properties of transition metals and be able to:

- write electron configurations and orbital box diagrams for transition metals and their ions
- explain why most transition metals have multiple oxidation states
- explain trends in sizes of transition metal atomic radii

Section 22.6

Explain the coordinate covalent bonding of ligands in coordination compounds and complexes and be able to:

- recognize potential ligands for a transition metal compound
- identify the coordination number of a given complex
- define a chelating ligand and explain why they tend to be stronger ligands than monodentate ligands

Interpret the names and formulas of coordination compounds and complexes and be able to match the name of a compound with its formula.

Section 22.7

Describe crystal field theory and its applications to interpreting colors and magnetic properties of coordination compounds and be able to:

- draw the splitting of d orbitals in an octahedral field of ligands (Figure 22.16)
- explain the difference between high-spin and low-spin complexes
- determine the number of unpaired electrons in a given high- or low-spin octahedral complex
- explain why transition metal complexes have a large variety of colors

Metallurgy (Sections 21.4, 22.2-22.3)

Describe the different techniques used to produce metals from their ores and be able to:

- discuss how iron ore is processed into iron and steel
- discuss how copper is extracted from its ores and purified
- describe how electrolysis is used to obtain aluminum and sodium

To learn the material in this chapter, you should:

- Review the “In Closing” and “Key Terms” sections of 22.
- Do the following:
 - Exercises: 21.5, 22.1, 22.3, 22.4, 22.8, 22.10, 22.11, 22.13, 22.14
 - Problem Solving Practice: 21.1, 21.2, 22.1, 22.3, 22.4, 22.6, 22.7, 22.8, 22.10
- Test your knowledge by completing the assigned OWL modules.