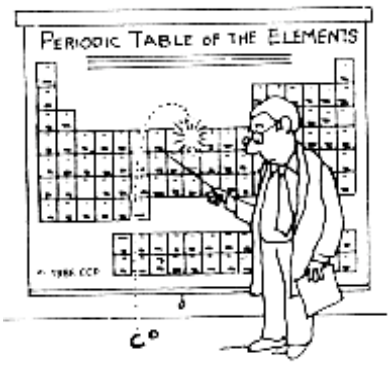
CHAPTER 20. TRANSITION ELEMENTS AND COORDINATION CHEMISTRY



We will spend two lecture days on this chapter.

- Day 1. Sections 1 – 3, 5, 6: The first day we will cover electronic configurations, properties of transition elements, oxidation states, coordination compounds, and ligands.
- Day 2. Sections 8, 10, 12: On the second day we will cover isomers and crystal field theory.

Section 20.1 ❑ Write valence electron configurations for transition metal atoms and ions. Given electron configurations for transition metals and their ions, locate the transition metal on the periodic table.
❑ Do problems 1 and 2 on page 816, problem 22 on page 856, and problems 32 and 34 on page 858.

Section 20.2 ❑ Compare the properties of the first-transition-series elements. Include appearance, valence electron configurations for atoms and ions, common oxidation states, and trends in melting points, atomic radii, densities, ionization energies, and standard oxidation potentials.
❑ Do problem 24 on page 857, and problem 38 on page 858.

Section 20.3 ❑ Assign oxidation states to transition metals.
❑ Based on variations in Z_{eff}, predict which of two transition metal cations or oxoanions is the strongest oxidizing or reducing agent.
❑ Do problem 3 on page 821, and problems 46 and 48 on page 858.

Skip Section 20.4

Section 20.5 ❑ Write formulas of coordination complexes.
❑ Identify the ligands and their donor atoms.
❑ Determine the coordination number and the oxidation state of the metal and the charge on any complex ion.
❑ Do problems 6 and 7 on page 828.

Section 20.6 ❑ Given the electron dot structure of a molecule or ion, determine whether it can serve as a chelate ligand.
❑ Draw structures for transition metal compounds containing chelate ligands, identifying the Lewis acid, Lewis base, ligand donor atoms, and chelate rings, and determine the coordination number, coordination geometry, and oxidation state of the metal.
❑ Do problem 8 on page 831, and problems 72(a-e only) and 78 on page 859.

Skip Section 20.7

Section 20.8 ❑ Identify linkage isomers and ionization isomers.
❑ Determine the number and structures of diastereoisomers possible for a given coordination complex.
❑ Do problem 11 (a-e) on page 840, problem 28 on page 857, and problem 88 on page 860.

Skip Section 20.9

Section 20.10 ❑ Given the visible absorption spectrum of a transition metal complex, determine the most likely color of the complex, and calculate the energy difference between ground and excited states that corresponds to an absorption peak wavelength.
❑ Do problem 16 on page 846.

Skip Section 20.11

Section 20.12 ❑ Give a crystal field theory description of octahedral, tetrahedral, and square planar coordination complexes, and predict the number of unpaired electrons.
❑ Do problem 19 on page 854, and problems 96, 100, 102, 104, and 106 on pages 860 and 861.