

## CHAPTER OVERVIEW

### Unit 8: Electronic Structure of Coordination Complexes

Coordination compounds are important to all areas of chemistry, engineering, the life and environmental sciences, and beyond. In the synthetic laboratory catalytic amounts of coordination compounds enable organic chemists to synthesize new compounds selectively and in high yield under mild conditions. Applied industrially, coordination compound catalysts serve as vital catalysts that facilitate the conversion of raw petrochemical or bio-derived feedstocks into useful industrial and consumer products. Without them life as we know it would be impossible, as many biochemical systems are coordination complexes. Examples include the hemoglobin that transports oxygen around our bodies and the myoglobin that stores it, the photosystems that harvest light and use light energy in photosynthesis, the constituents of the respiratory chain, and many of the enzymes involved in the expression and transmission of genetic information. In studying coordination chemistry you are about to take your first steps into a vast and exciting world.

#### 8.1: Introduction to Coordination Complexes

##### 8.1.1: What are Coordination Complexes?

##### 8.1.2: History of Coordination Complexes

##### 8.1.3: Nomenclature and Ligands

##### 8.1.4: Coordination Numbers and Structures

##### 8.1.5: Isomerism

#### 8.2: Crystal Field Theory

##### 8.2.1: Crystal Field Theory

##### 8.2.2: Crystal Field Stabilization Energy

##### 8.2.3: Non-octahedral Complexes

#### 8.3: Crystal Field Theory and Magnetism

##### 8.3.1: Jahn-Teller Distortions

##### 8.3.2: Magnetism

##### 8.3.3: Magnetic Moments of Transition Metals

##### 8.3.4: Ferro-, Ferri- and Antiferromagnetism

#### 8.4: Ligand Field Theory

##### 8.4.1: Ligand Field Theory

##### 8.4.2: The Spectrochemical Series

##### 8.4.3: Factors That Affect Ligand Field Splitting

##### 8.4.4: Octahedral vs. Tetrahedral Geometries

#### 8.5: Absorption Spectroscopy of Coordination Complexes

##### 8.5.1: Absorption of Light

##### 8.5.2: Colors of Coordination Complexes

##### 8.5.3: Charge-Transfer Spectra

#### 8.6: Tanabe Sugano Diagrams

##### 8.6.1: Tanabe-Sugano Diagrams

##### 8.6.2: Selection Rules

##### 8.6.3: Applications of Tanabe-Sugano Diagrams

##### 8.6.4: Tetrahedral Complexes

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