Massachusetts
Institute of
Technology

CHEMISTRY

5.35

Lecture Overview

- Review bonding in Co compounds with Crystal Field Theory
- Describe reactions in the lab
- Practical aspects of FTIR Spectroscopy
- Modeling hydration kinetics in Co complexes
- Resources for researching/writing reports (Erja Kajosalo)

Approaches to Laboratory Learning

Be wary of the Cookbook Approach

Be wary of “He Said, She Said”

Be wary of Ego

Learning “the hard way” is sometimes the best way

The All Results Journals:Chem is a peer-reviewed journal dedicated to publishing articles with **negative results** and outcomes that were not expected and were not before considered for publication in all areas of Chemistry (pure and applied). The Journal is TOTAL Open Access (no fees to publish and read) and is being indexed by well-known scientific databases such as Web of Knowledge, Scirus, and Pubmed. This assure maximum exposure of your articles.

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http://www.arjournals.com/ojs/index.php?journal=Chem

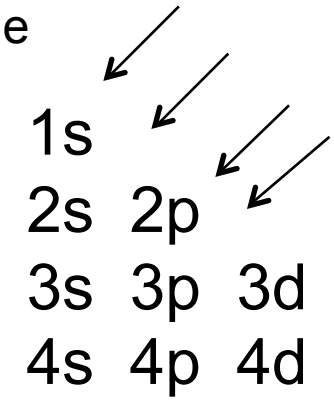
Introduction to Coordination Chemistry

Alfred Werner – Nobel Prize in 1913

Bioinorganic chemistry – currently hot research area

Co is a Group 9 element

Aufbau Principle



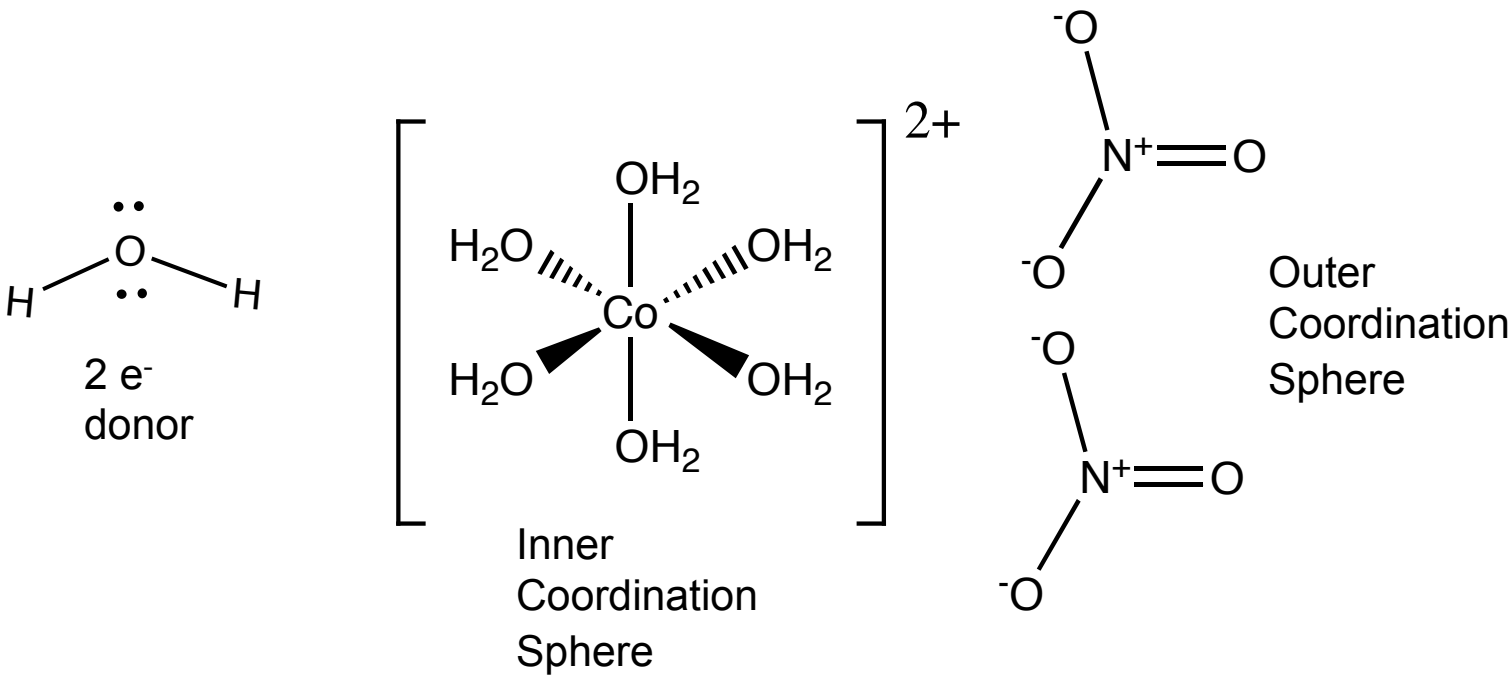
Co : [Ar] $4s^2$ $3d^7$

Co^{2+} has d^7

Co^{3+} has d^6

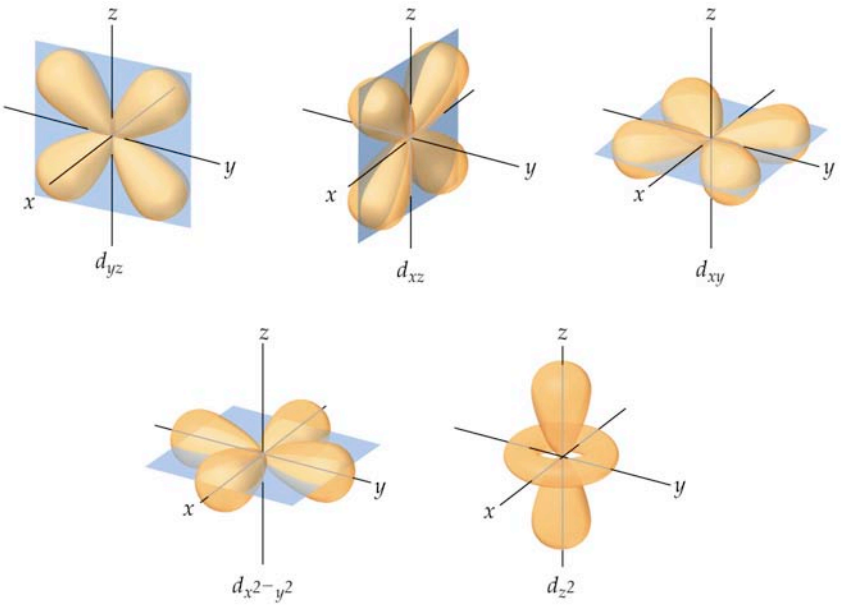
Cobalt Complexes

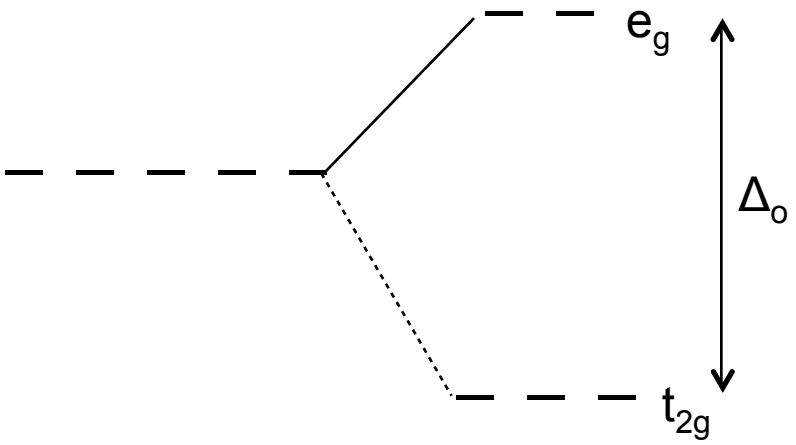
Cobalt(II) nitrate hexahydrate



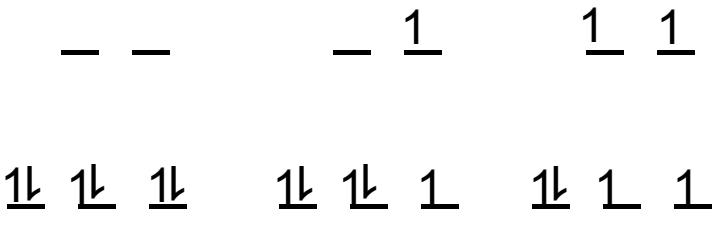
How could you determine if this is correct?

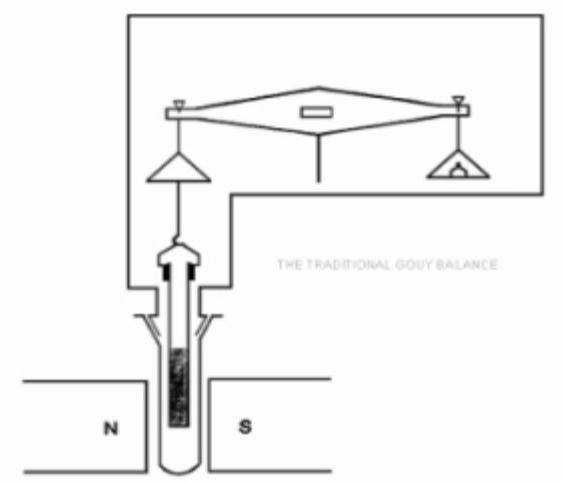
d Orbitals in Cobalt Complexes (Crystal Field Theory)





Co^{3+} d^6





Reactivity of Cobalt Complexes

Co^{2+} d^7

S= 1/2

S = 3/2

Co^{2+} => more reactive “labile”
Co^{3+} => less reactive “non labile”

We take advantage of this in the lab!

5.35 / 5.35U Introduction to Experimental Chemistry
Fall 2012