

Conceptual Questions

What is the Big Idea?

The properties of transitional metals are determined by the splitting of their d-orbitals.

What is a complex ion?

Basically a metal combines with a molecule with a lone pair to form a charged species

What is a counter ion?

Basically a charged molecule that is not apart of the complex ion. Usually denoted by being outside the brackets

What is a coordination compound?

A compound that consist of both counter ions and complex ions

What is a ligand?

A group of molecules that have a lone pair in order to bond to a metal

What is a chelate?

A type of ligand that can bond on a metal in two or more places

What determines how big of a gap between the split d-orbitals?

The strength of the splitting is determined where the ligands lies in the spectrochemical series

What is the difference between a low spin complex and a high spin one?

A high spin complex is the maximum number of unpaired electrons while low spin is the minimum number of unpaired electrons.

Ligand Field Theory vs. Crystal Field Theory

Crystal Field Theory

Assumes bond is entirely ionic

Better than LE Model because it focuses only on the d-orbitals, which gives the metal its properties

Explains color and magnetic properties

Ligand Field theory

Assumes both covalent and ionic properties

Explains which ligands cause small splitting and which cause large splitting between d-orbitals

Closer to pi bond=> weak field

Closer to pi antibonding => strong field

Common Ligand Names

I-

iodo

CN-

cyano

NH3

ammine

CH3NH2

methylamine

CO

carbonyl

NO

nitrosyl

F-

bromo

Cl-

chloro

OH-

hydroxo

en

enthylenediamine

ox2-

oxalato

Structural Isomer vs. Stereo isomerism

Structural Isomerism

same atoms but different bonds

Coordination:Ligand in coordination compound changes

Linkage:If ligand can bond in more than one place, the point of attachment can change

Stereoisomerism

same bonds different atoms

Geometrical: atoms can assume different arrangements

Optical:Mirror image is not identical to molecule

C

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