LECTURE 29/36 NOV/15/02

SQUARE-PLANAR
TETRAHEDRAL

LIGAND FIELD THEORY

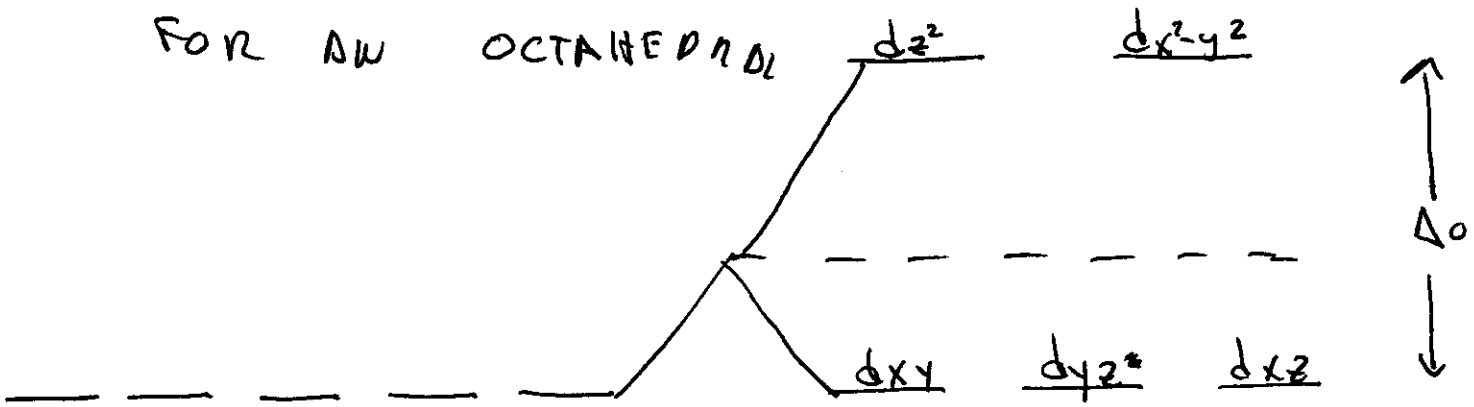
READ: TODAY'S LEC GRAY 154-183

NEXT LEC VOL II CTC-445-468

DUE DATES:

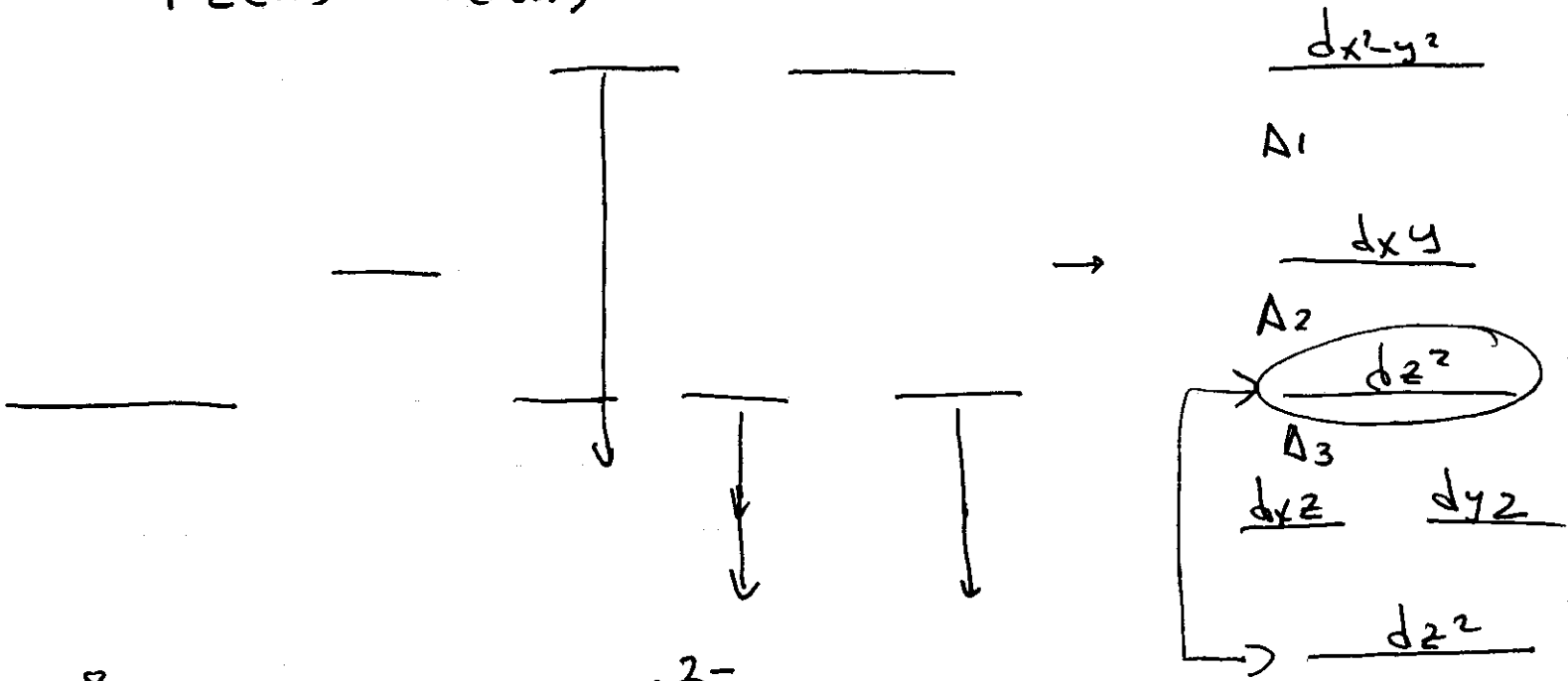
NOV - 18	LAB REPORT
NOV - 25	PS 7
DEC - 2	REPORT
DEC - 6	PS 8

FOR AN OCTAHEDRAL



FOR SQUARE-PLANAR COMPLEXES

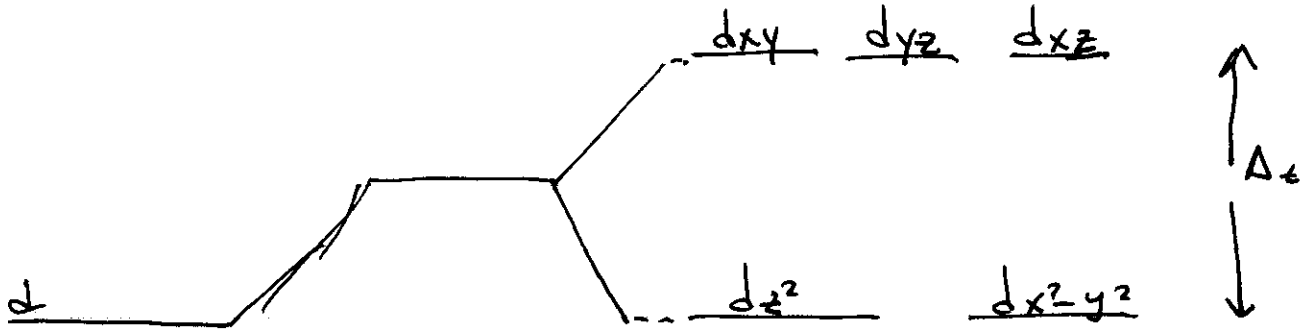
Pt(II) Pd(II)



d^8 Low-spin $PtCl_4^{2-}$

OCTAHEDRAL COMPOUNDS ARE MORE COMMON AND MORE STABLE (6 LIGANDS)

TETRAHEDRAL POSITION OF THE LIGANDS OPOSITE TO OCTAHEDRAL



LESS COMMON

VCl_4

$Co(NCS)_4^{2-}$

$CoCl_4^{2-}$

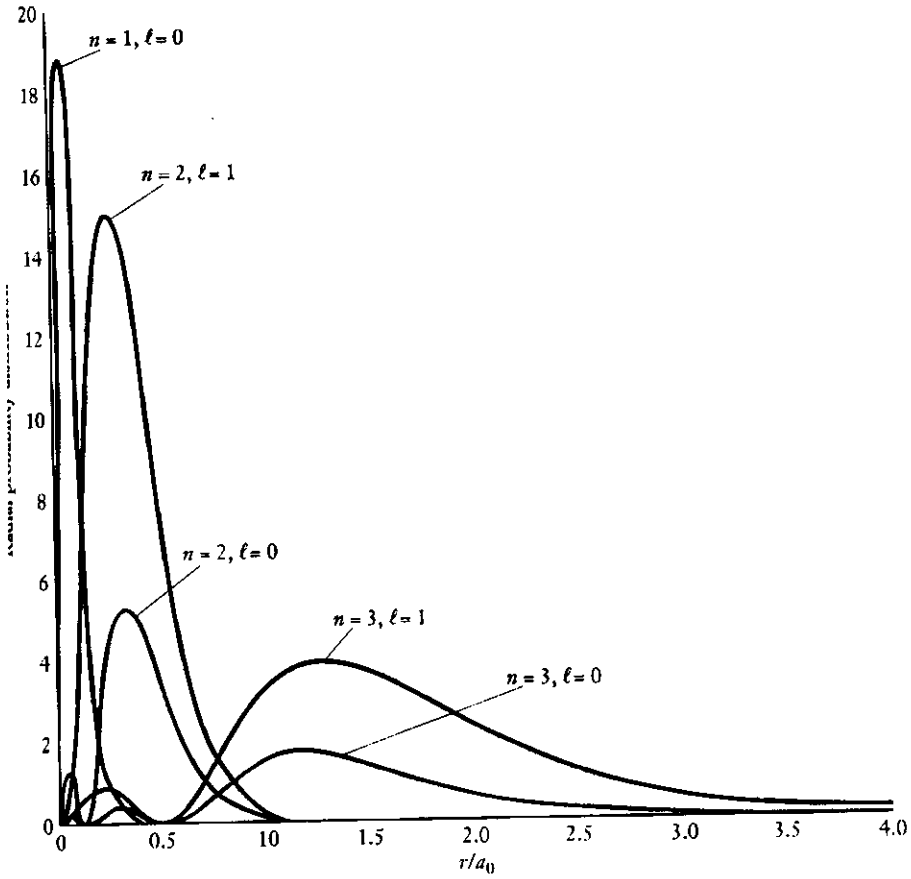


FIGURE 15.34 The shell structure of an argon atom calculated by Hartree's method. The fact that the radial probability for all orbitals with the same value of n have maxima very near one another suggests that the electrons can be viewed in "shells" made up of these orbitals.

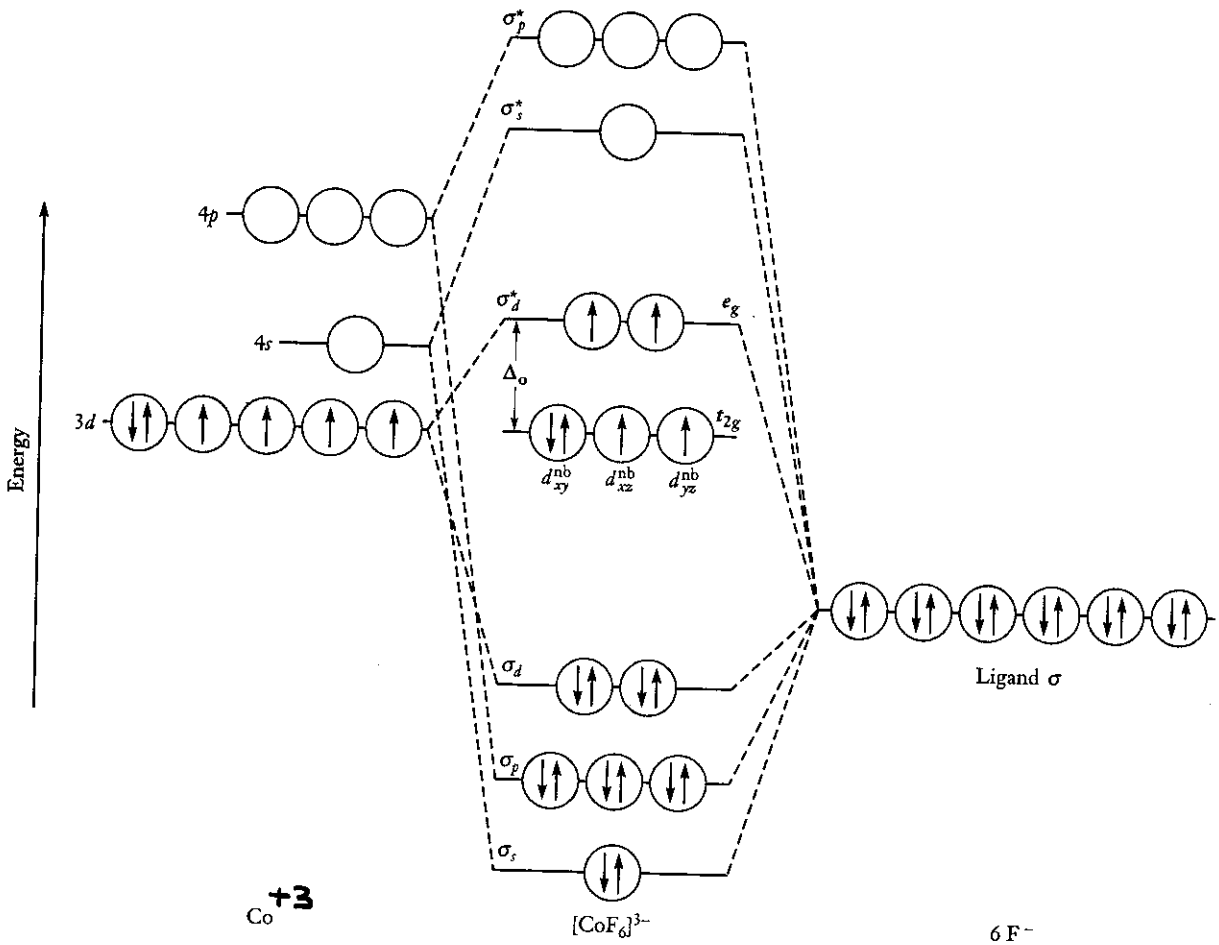


FIGURE 18.22 Orbital correlation diagram for an octahedral ligand field, showing the energy-level filling for a $[CoF_6]^{3-}$ ion.

FOR I^- Br^- Cl^- F^- OH^-

THE NON BONDING d ORBITALS INTERACT W/ Cl^- IN P ORBITALS ⊥ TO THE METAL - LIGAND AXIS

d_{xy} AND P_y $\Rightarrow$ d_{xy} d_{xz} d_{yz} ↑

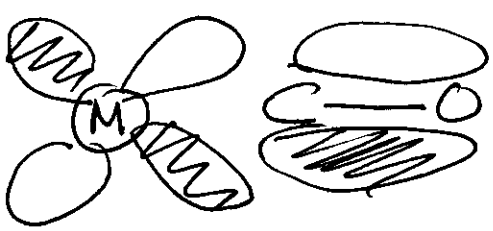
$\Rightarrow$ WEAK-FIELD LIGANDS

FOR CN^- AND CO

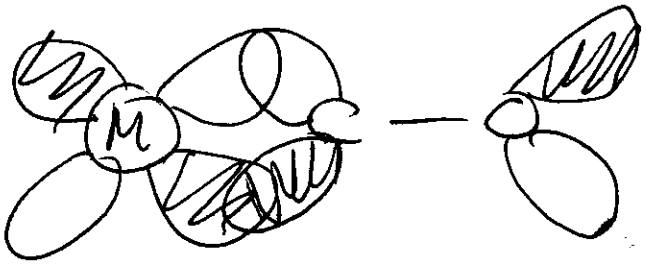
THE ANTIBONDING LIGAND OVERLAPS W/ t_{2g}

$\Rightarrow$ ↓ ENERGY $\Rightarrow$ HIGH STRONG-FIELD LIGANDS

d_{xy}

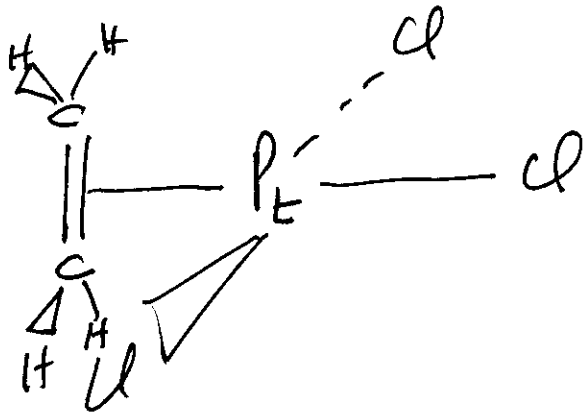


π^*

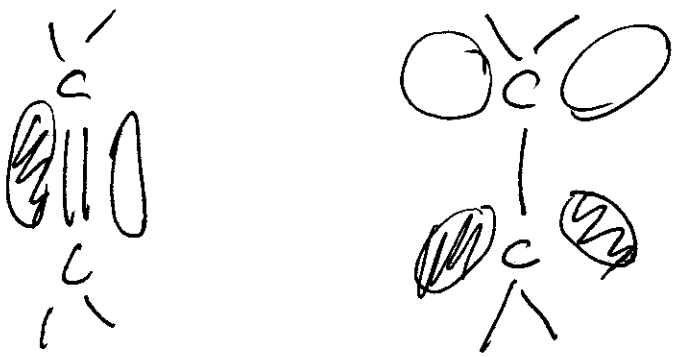


π^*

ORGANOMETALLIC II COMPLEXES



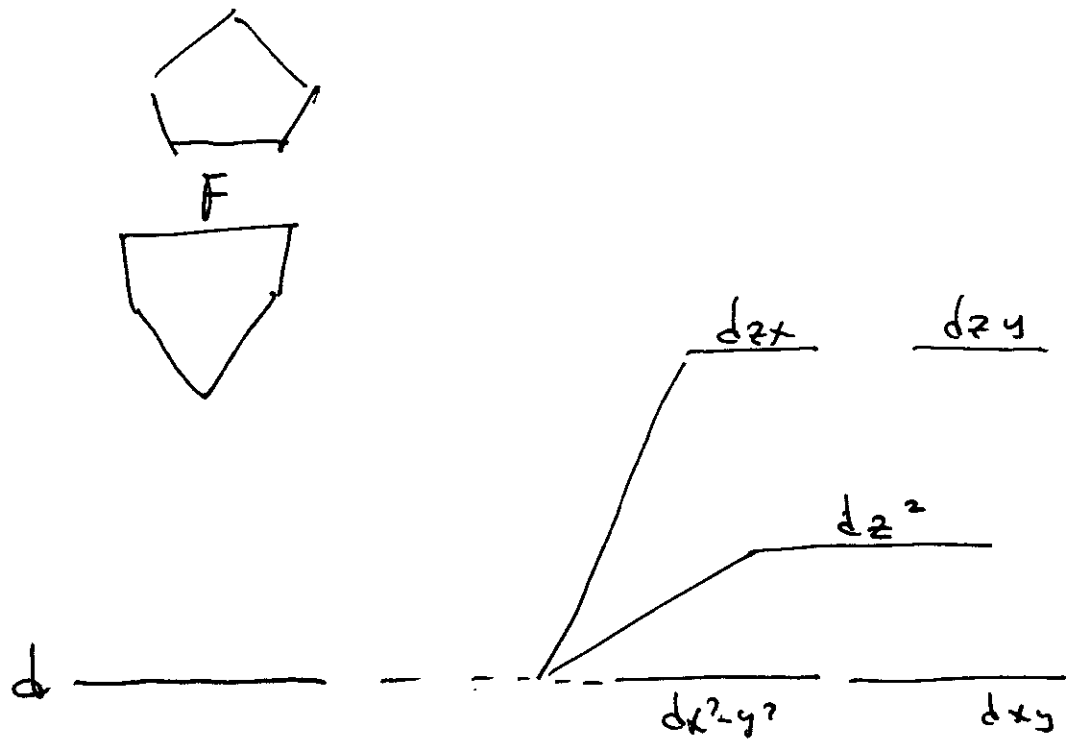
1827



π^b π^*

σ bond w Pt metal e^- → π^*

FERROCENE $(C_5H_5)_2Fe$



PORPHYRINS TETRADENTATE

Mg^{2+} Fe^{2+} Fe^{3+} Zn^{2+} Ni^{2+}

Fe^{2+}, Fe^{3+} → HEME

Mg^{2+} → CHLOROPHYLL