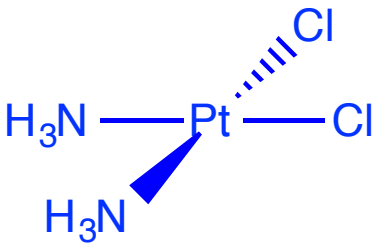
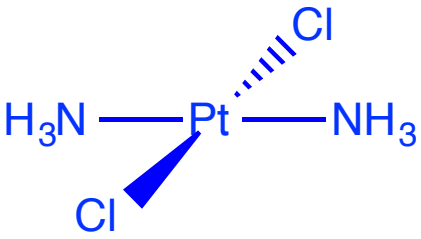
LECTURE 29

1. Cisplatinum [$Pt(NH_3)_2Cl_2$] is a potent anticancer drug. For lecture 27 practice problems, you drew the structure of cisplatinum and its isomer transplatinum, determined the expected bond angles, and determined the CN.
(a) Draw the crystal field energy-level diagram for cisplatinum, labeling the *d*-orbitals
(b) Predict whether cisplatinum is diamagnetic or paramagnetic. Explain your answer.

From lecture 27 problems:
Structures:



Cisplatinum

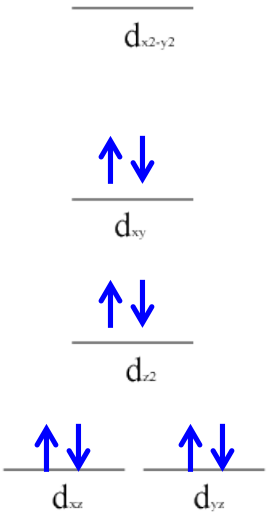


Transplatinum

Bond angles: 90°
CN: 4

a) d^8

Square planar crystal field



b) diamagnetic.

2. (i) Draw a crystal field splitting diagram to show the expected distribution of electrons in the 3d-orbitals of the central metal in each of the following complex ions.
(ii) Label as low-spin or high-spin state.

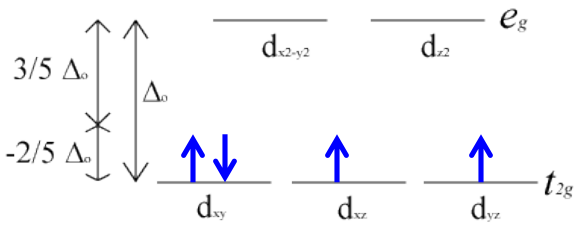
LECTURE 29

(iii) Indicate the number of unpaired electrons in each case.
(iv) Give the names of the d-orbitals, and label the appropriate orbital sets e_g and t_{2g} or e and t_2.
(v) Write the d^n electron configurations.

(a) octahedral $[Mn(CN)_6]^{3-}$
(b) tetrahedral $[NiCl_4]^{2-}$

(a) octahedral $[Mn(CN)_6]^{3-}$
d^4 low spin.

Octahedral weak field

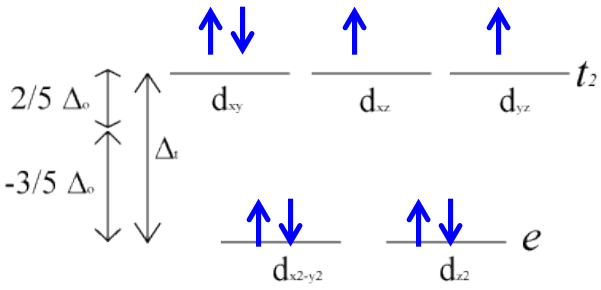


Low Spin

$(t_2g)^4$ two unpaired electrons.

(b) tetrahedral $[NiCl_4]^{2-}$
d^8 **high spin.**

Tetrahedral (usually weak field)



$(e)^4(t_2)^4$. two unpaired electrons

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