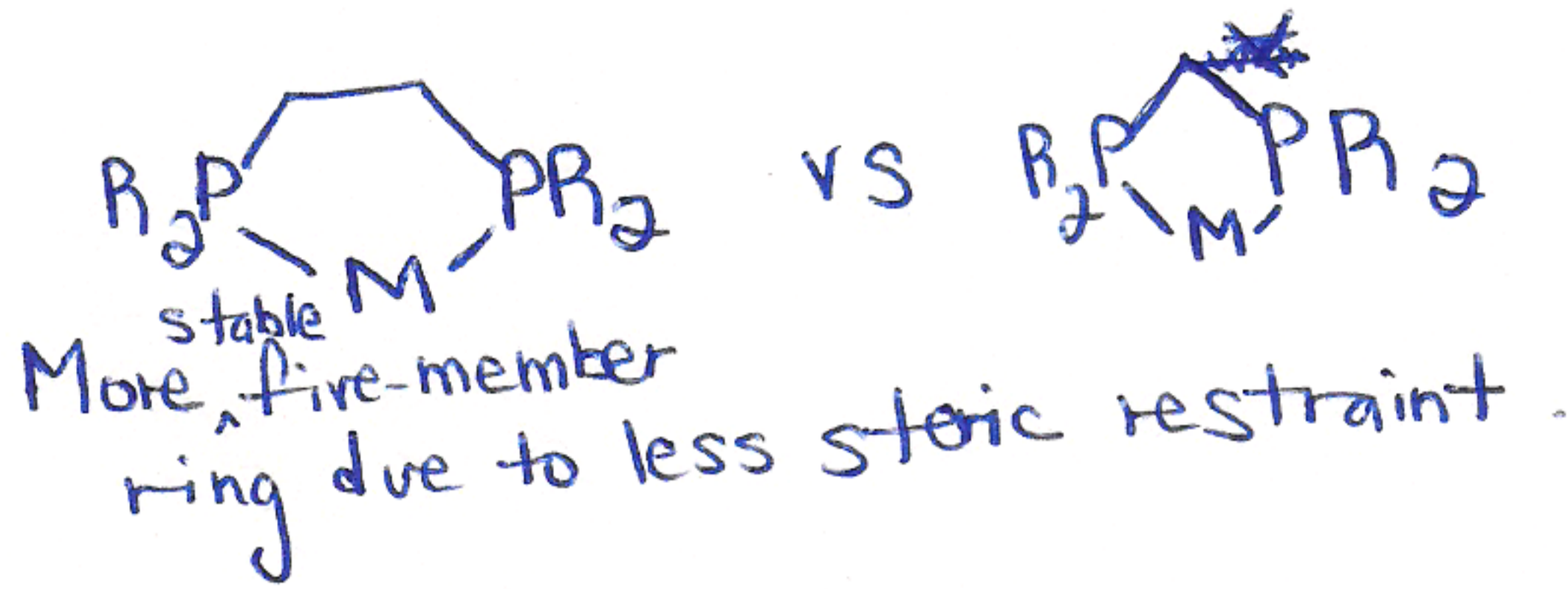


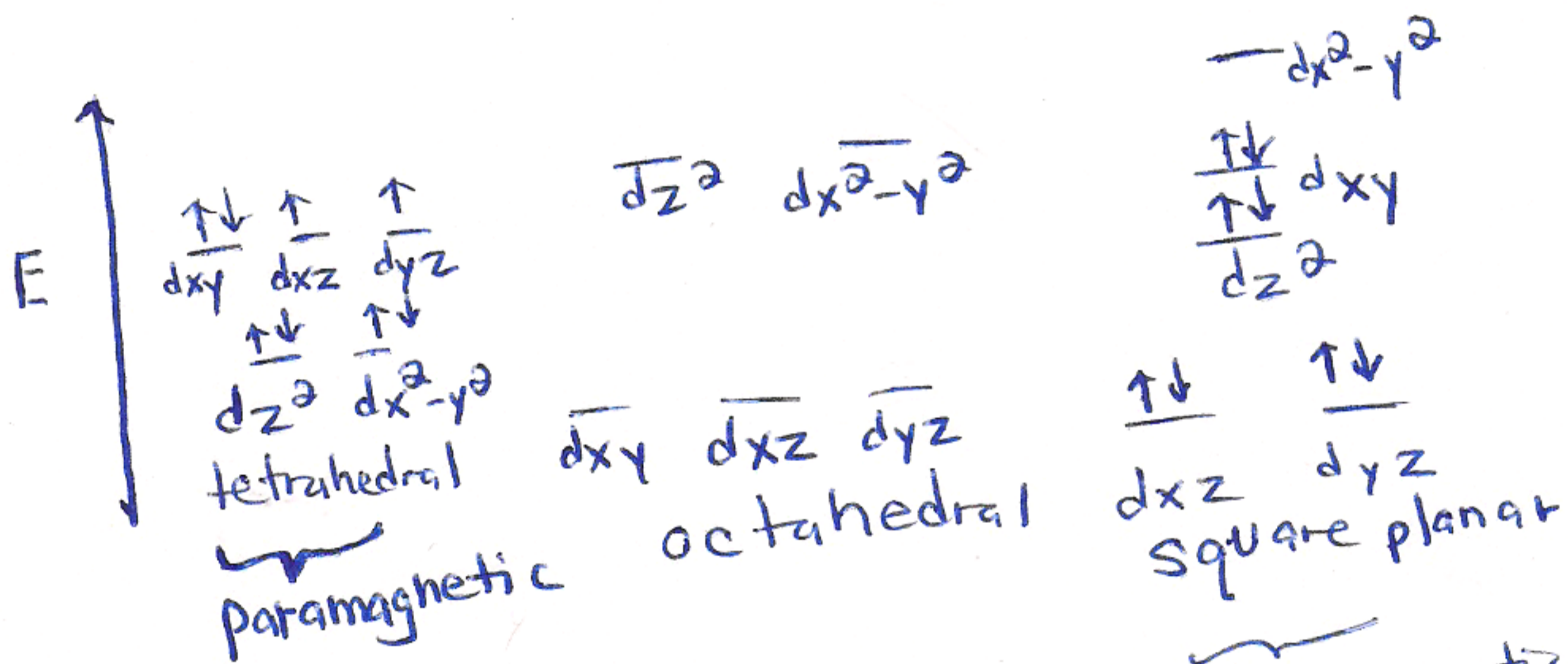
Crabtree Chapter 1

1.3. a.



- b. H_3N : one lone pair that engages in a σ bond
 H_2O : The second lone pair has the capacity to π donate.

1.6.

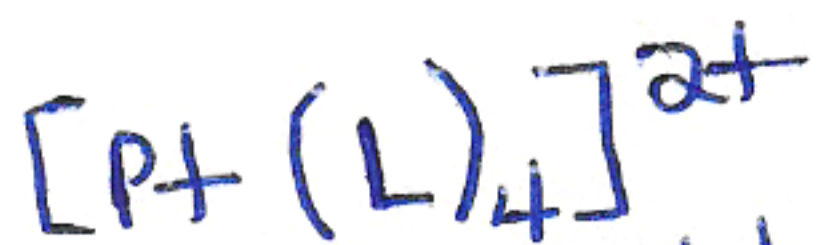
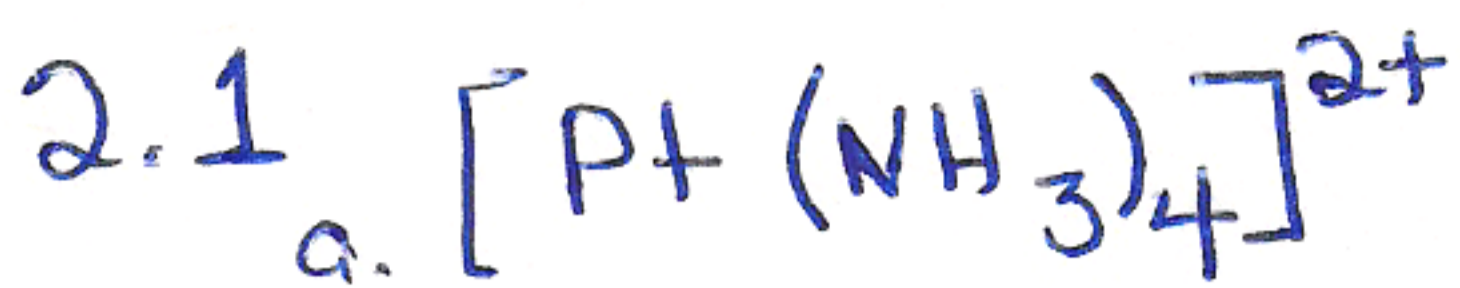
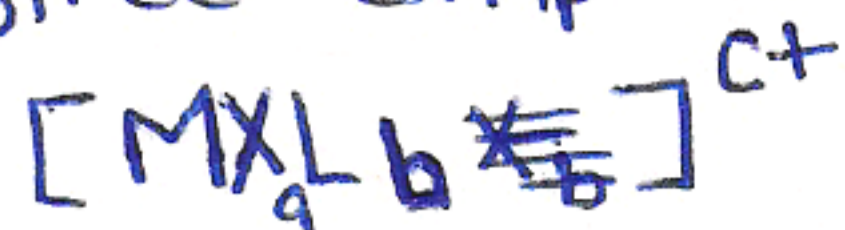


Measure the magnetic moment of the Ni(II) complex.

1.8. The d orbitals are stabilized by the higher nuclear charge, and so back donation (required to form a strong M-CO bond) is reduced. Cu(I) rather than Cu(II) would be best because it would be a stronger π donor.

1.9 Reduced complexes will easily lose electrons to O_2 in an oxidation reaction but will not tend to bind a π donor such as H_2O .

Crabtree Chapter 2



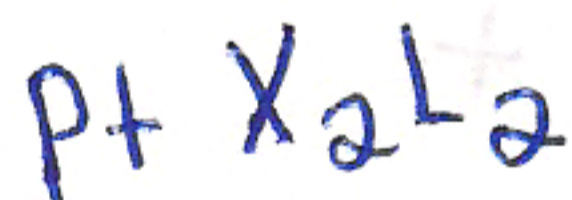
covalent model for e^- count: $N + a + 2b - c$

$10 + 4(2) - 2 = 16e^-$

oxidation state count

O.S. = $c + a = 2$

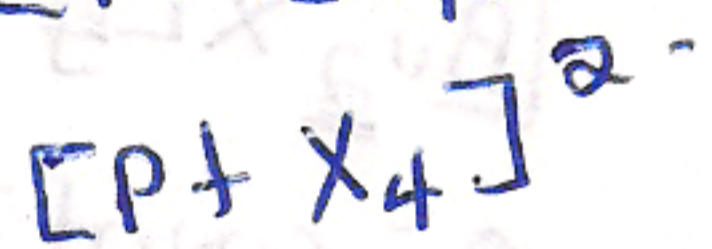
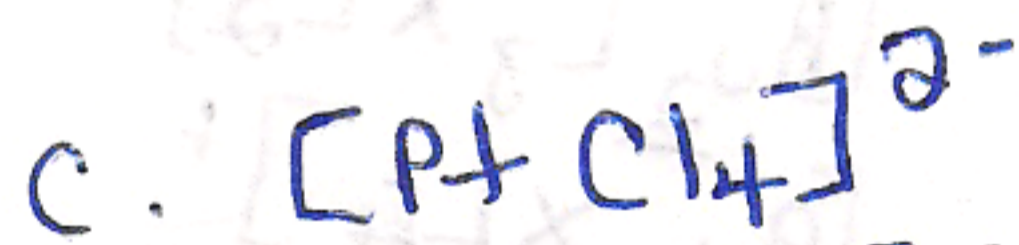
$d^n = d^{N - c - a} = d^{10 - 2} = d^8$



e^- count = $10 + 2 + 2(2) = 16e^-$

O.S. = $2 +$

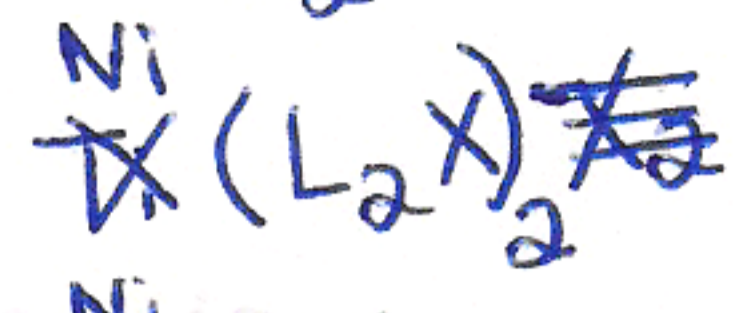
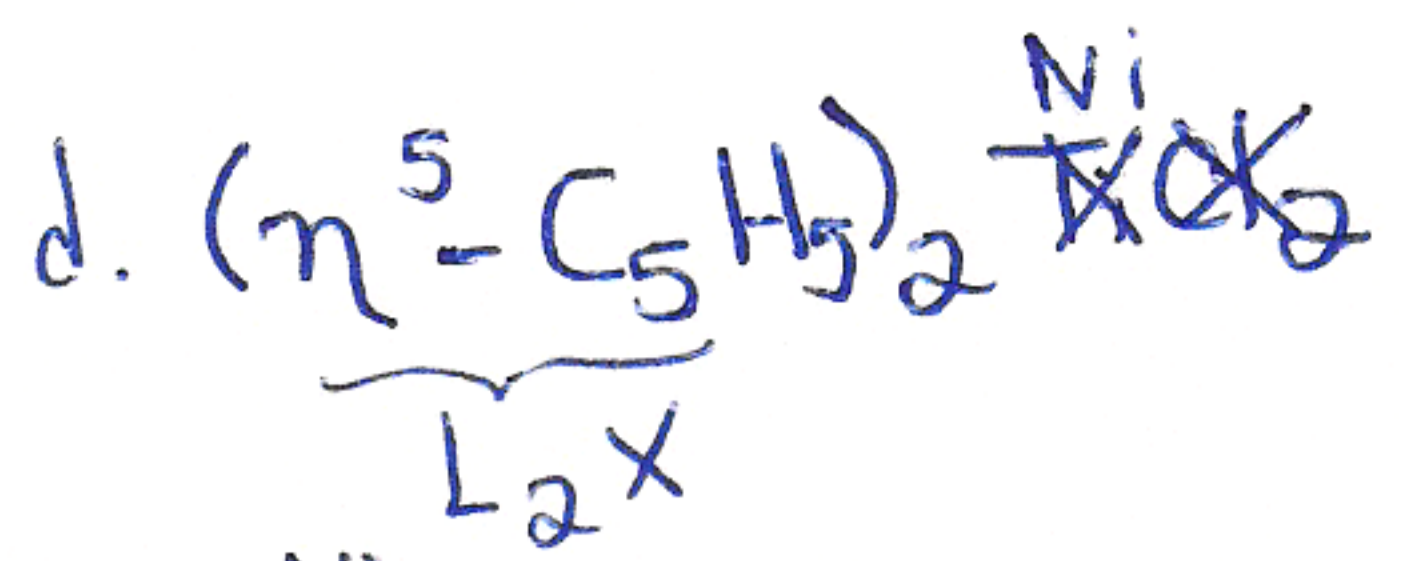
$d^n = d^8$



e^- count = $10 + 4 + 2 = 16e^-$

O.S. = $-2 + 4 = 2 +$

$d^n = d^8$



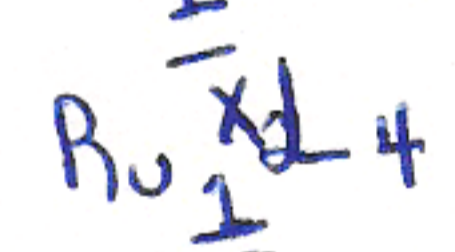
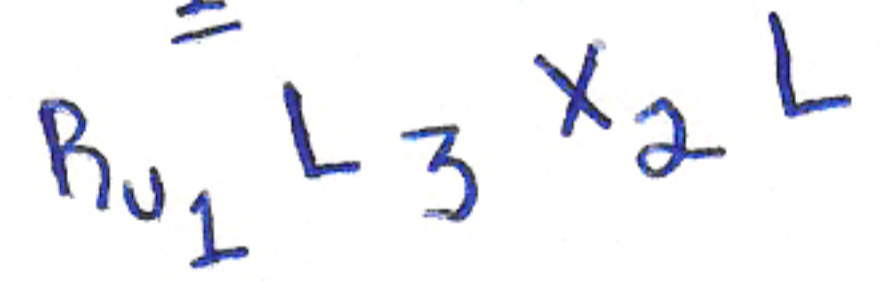
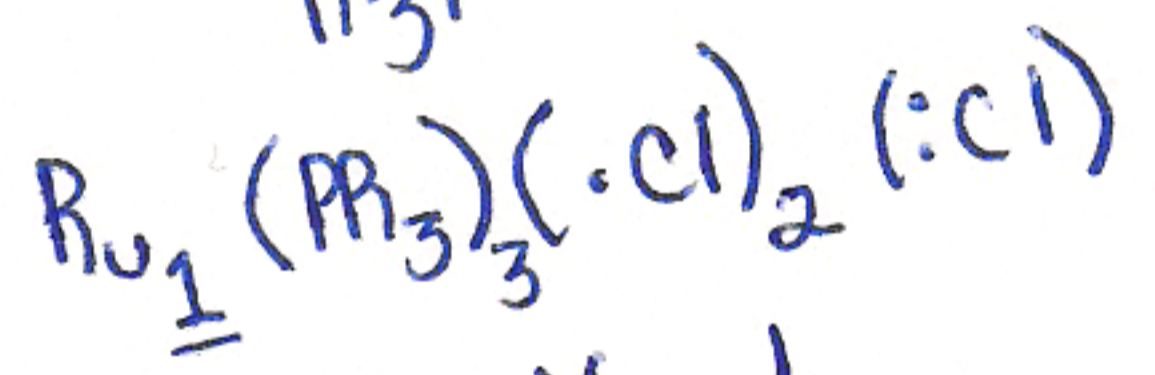
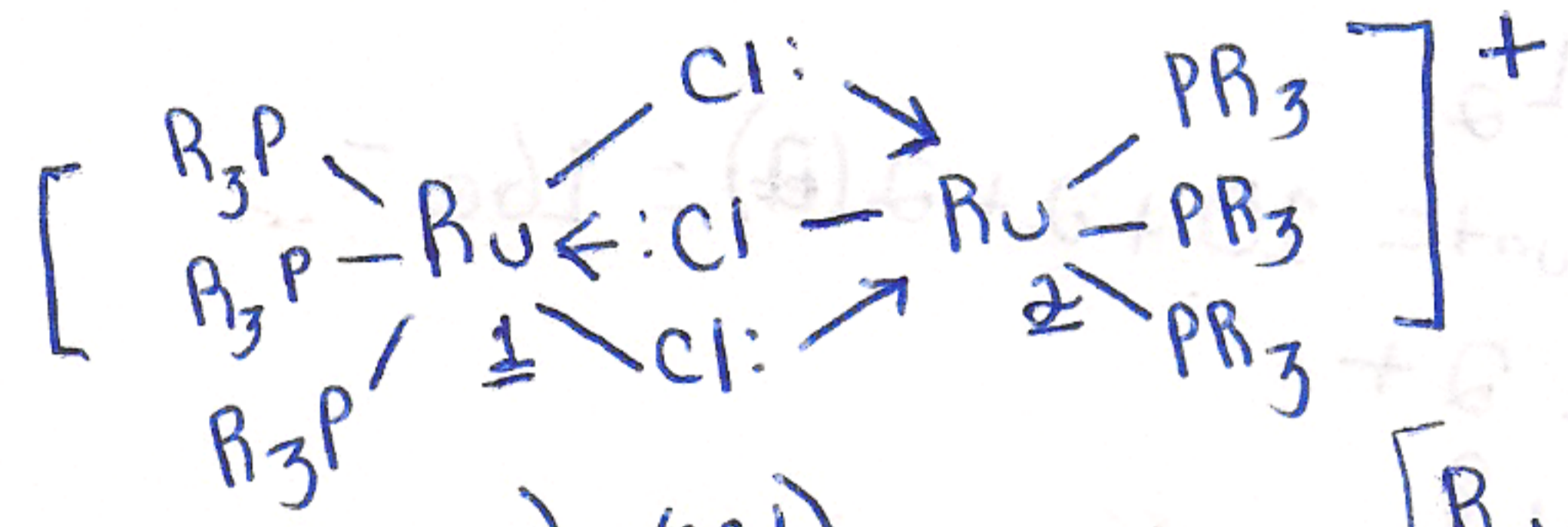
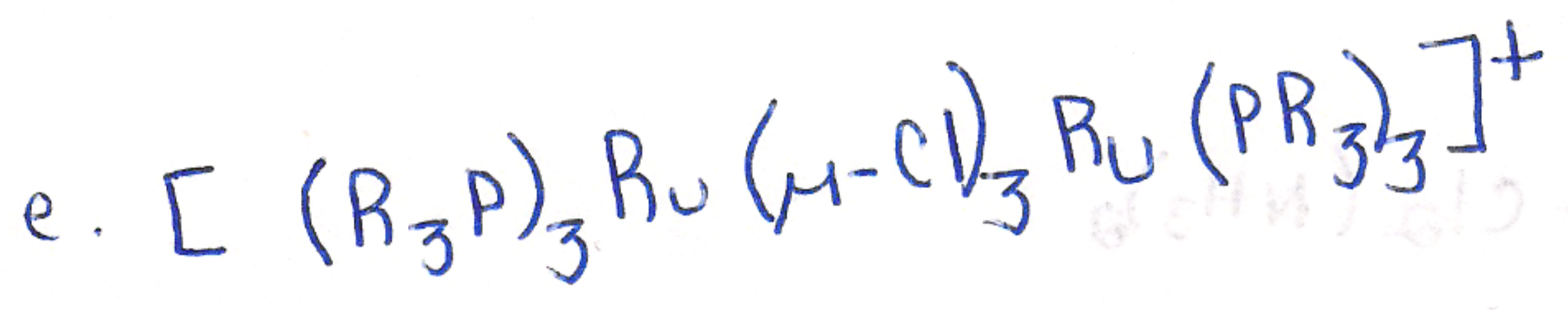
~~$e^- \text{ count} = 10 + 4 + 2(2) = 18$~~



$e^- \text{ count} = 10 + 2 + 2(4) = 20 e^-$

O.S. = 2+

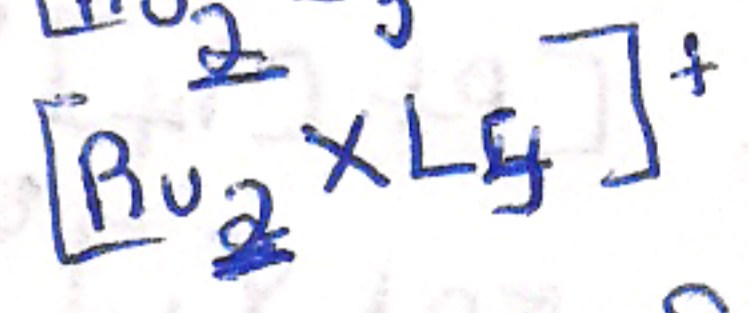
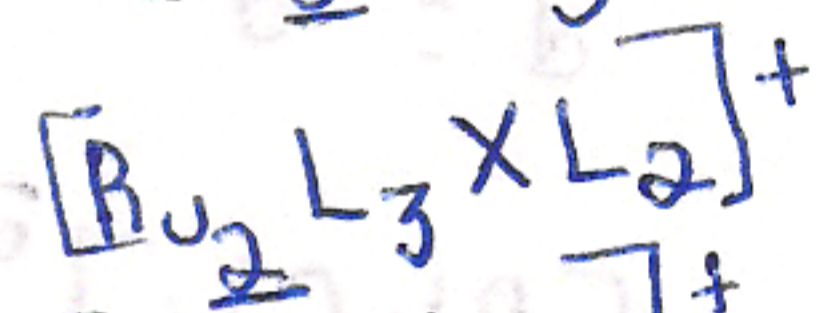
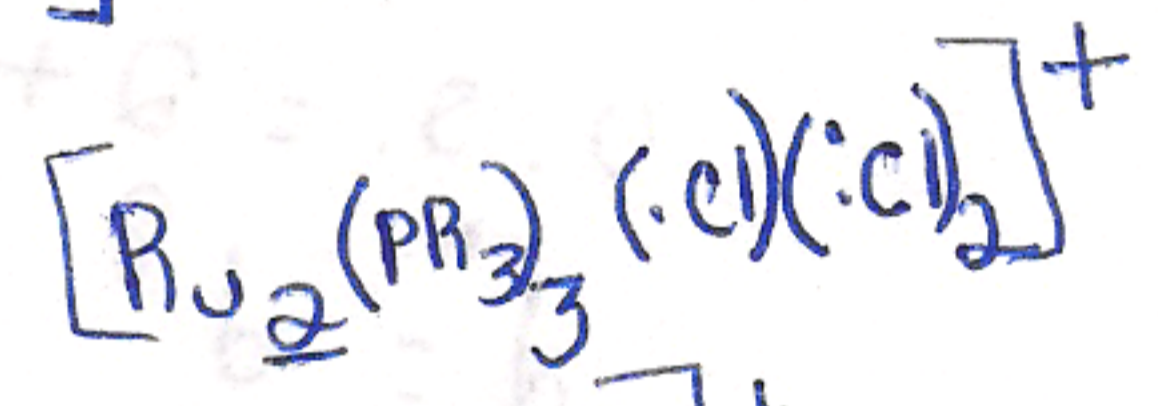
$d^n = d^8$



$e^- \text{ count} = 8 + 2 + 4(2) = 18 e^-$

O.S. = 2+

$d^n = d^6$

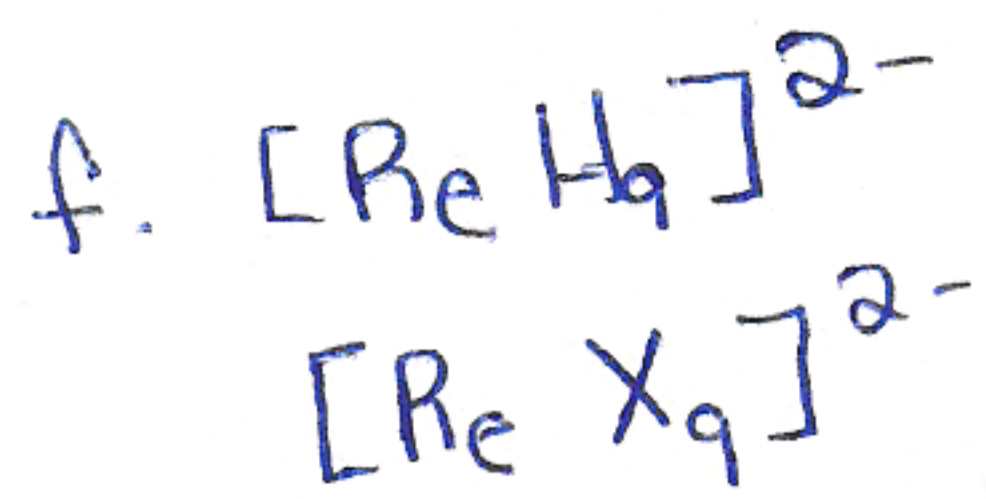


$e^- \text{ count} = 8 + 1 + 5(2) - 1 = 18 e^-$

$= 18 e^-$

O.S. = 2+

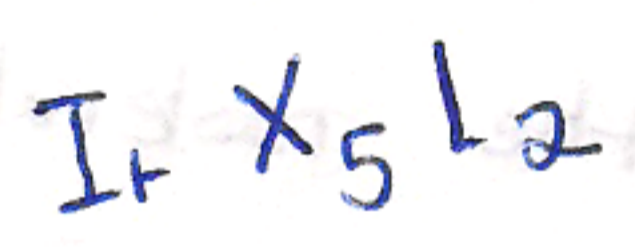
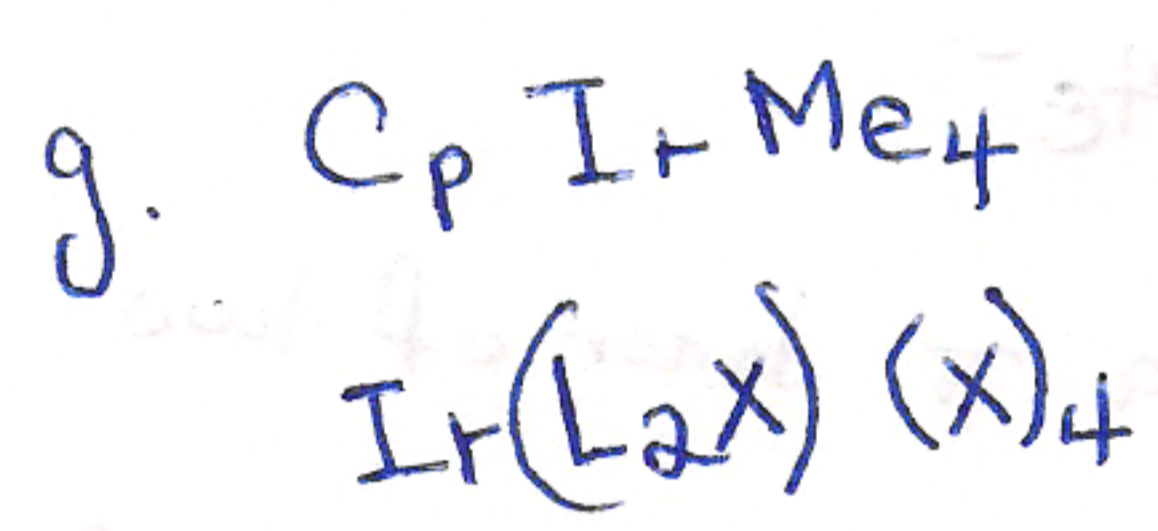
$d^n = d^6$



$e^- \text{ count} = 7 + 9 + 2$
 $= 18e^-$

O.S. = $-2 + 9 = +7$

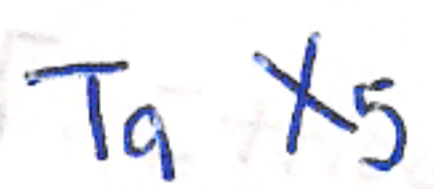
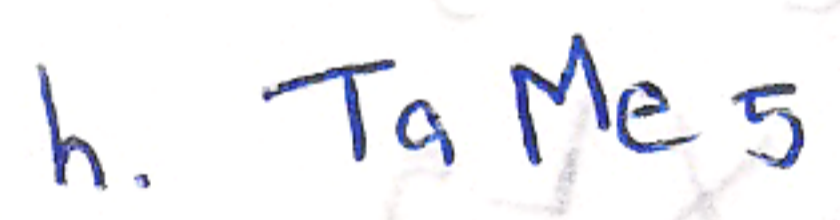
$d^n = d^0$



$e^- \text{ count} = 9 + 5 + 2(2) = 18e^-$

O.S. = $5 + 4$

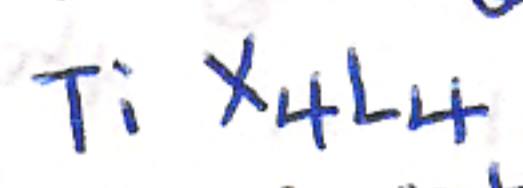
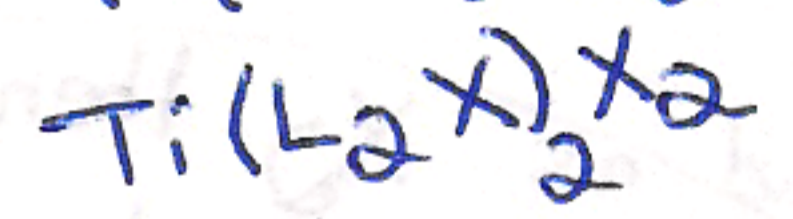
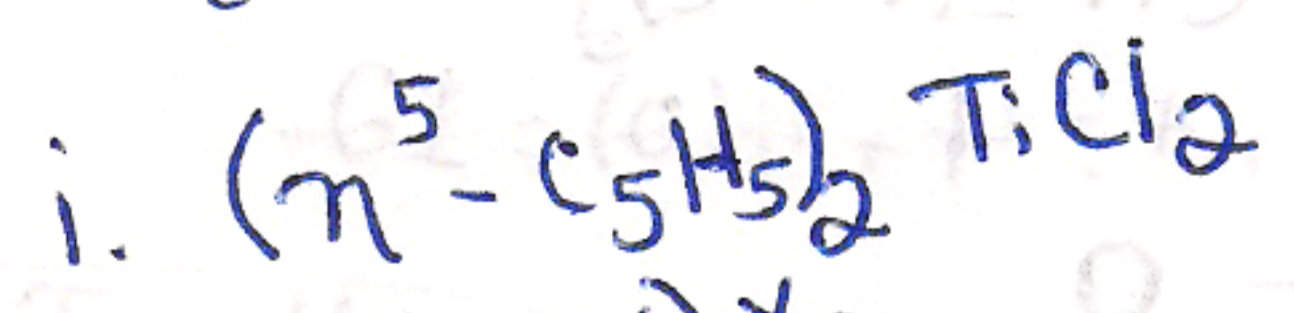
$d^n = d^4$



$e^- \text{ count} = 5 + 5 = 10e^-$

O.S. = $5 + 4$

$d^n = d^0$

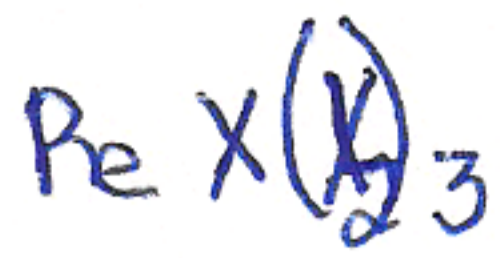


$e^- \text{ count} = 4 + 4 + 4(2) = 16e^-$

O.S. = $4 + 4$

$d^n = d^0$





e⁻ count = 7 + 1 + 3(2) = 14e⁻

O.S. = 7+

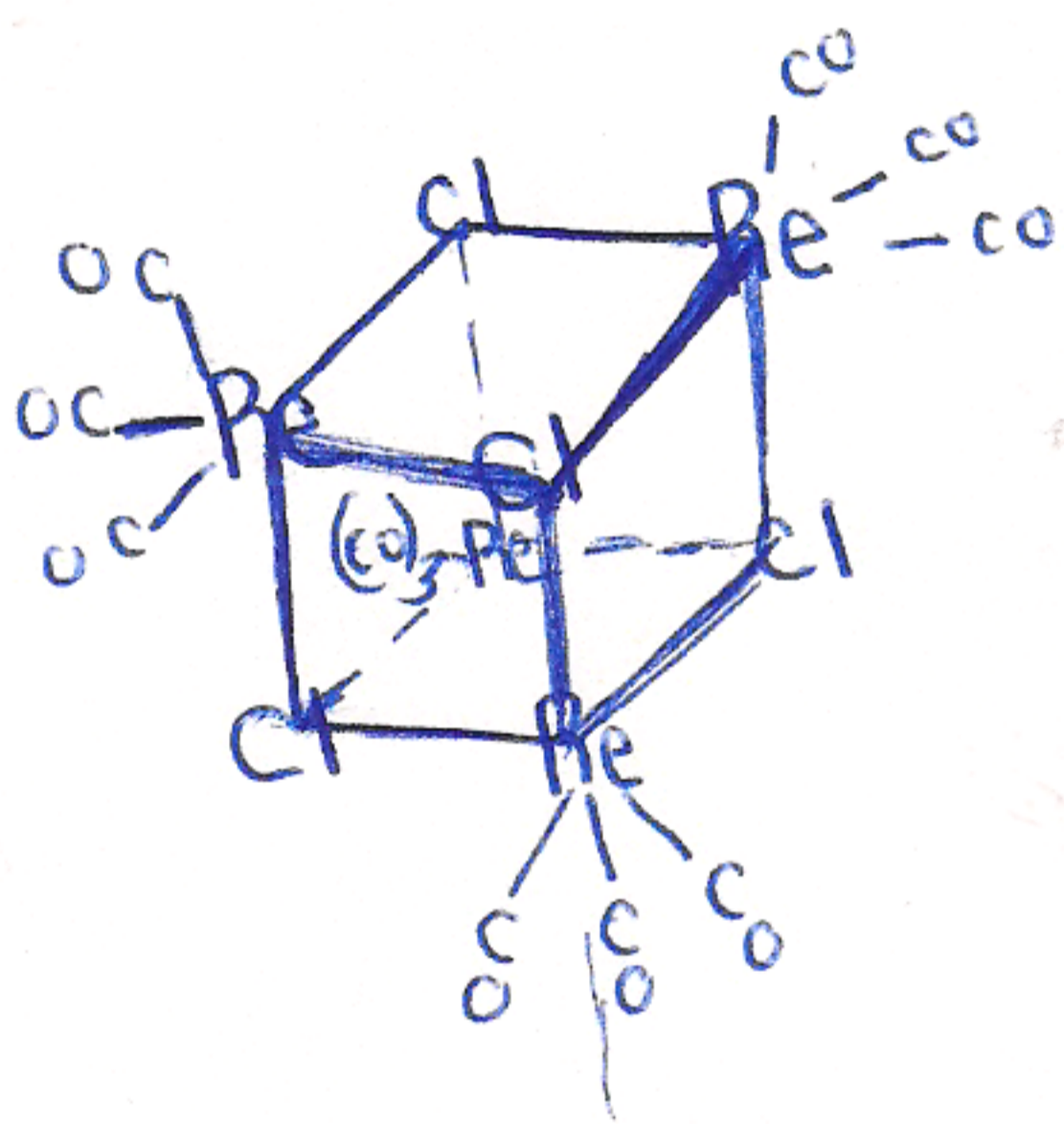
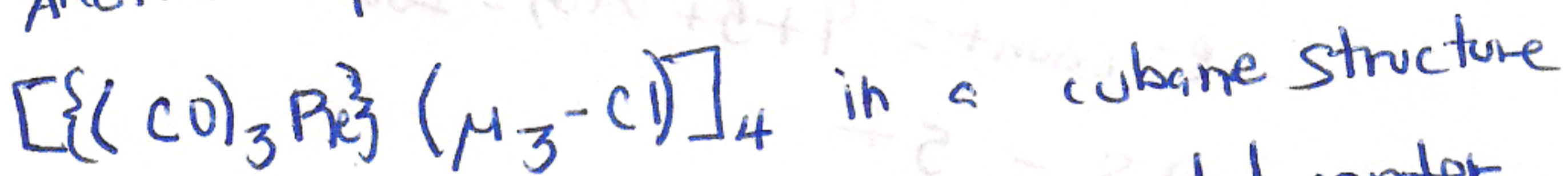
dⁿ = d⁰



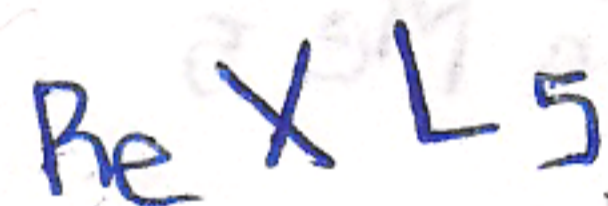
e⁻ count = 7 + 1 + 3(2) = 14e⁻

Cl could serve as a π donor of two additional lone pairs:

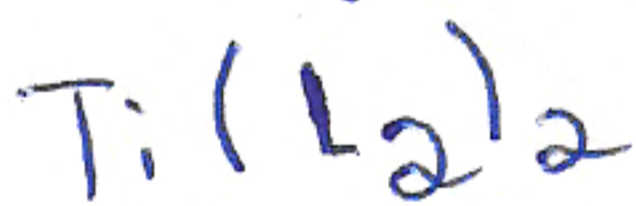
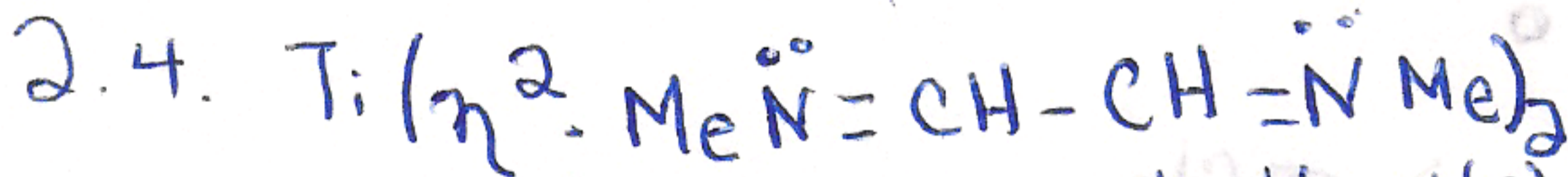
Another possibility is the molecular formula:



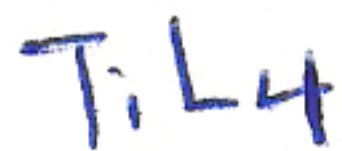
Each metal center
Re(CO)₃(Cl)(:Cl)₂



e⁻ count = 7 + 1 + 5(2) = 18



e⁻ count = 4 + 4(2) = 12



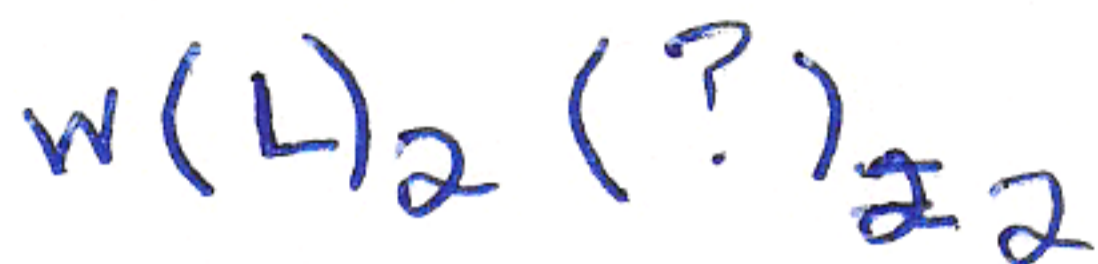
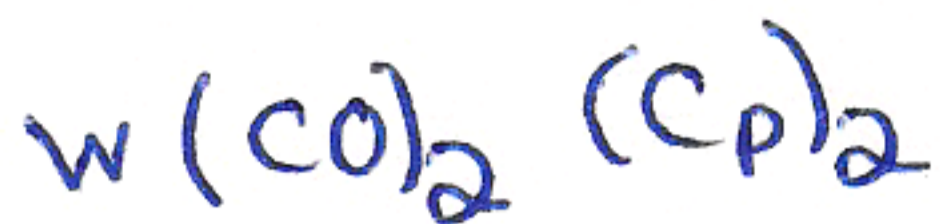
O.S. = 0

If we treat one ligand as X then Ti(II)
" " " both ligands " " then Ti(IV).

But not clear how these could be X type ligands

2.10. a. Cp₂W(CO)₂

If 18e⁻ rule then



e⁻ count = 18e⁻ = 6 + 2(2) + ~~2~~(?)

" = 6 + 4 + ~~2~~(?)

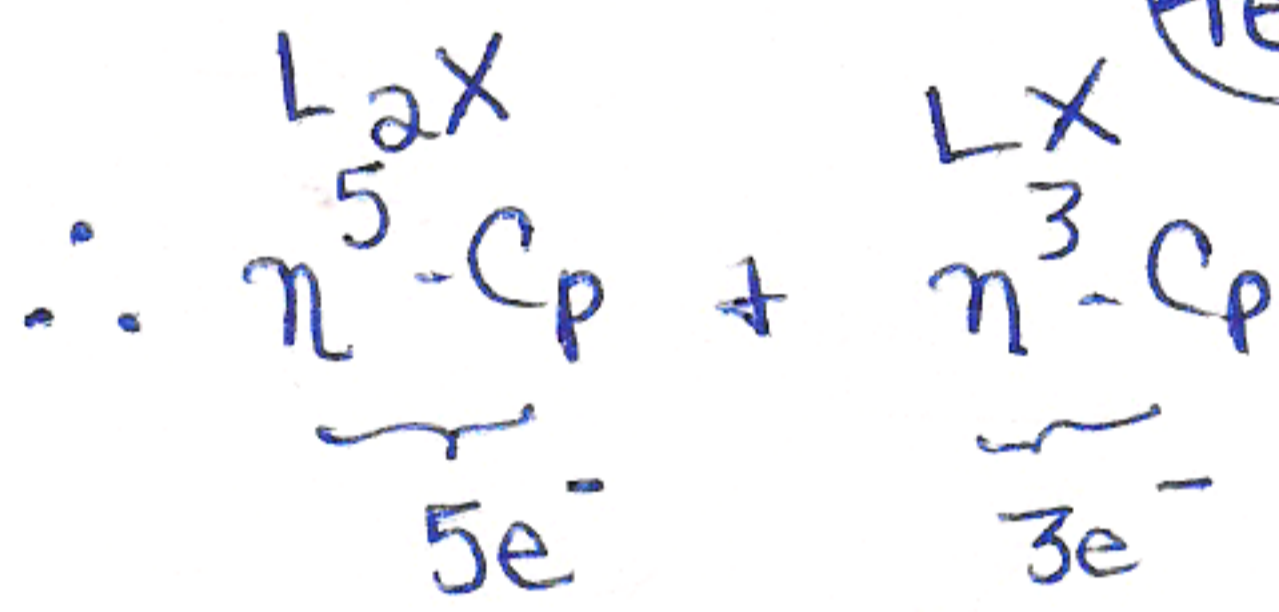
" = $\frac{10}{2}$ + ~~2~~(?)

8e⁻ = ~~2~~(?)

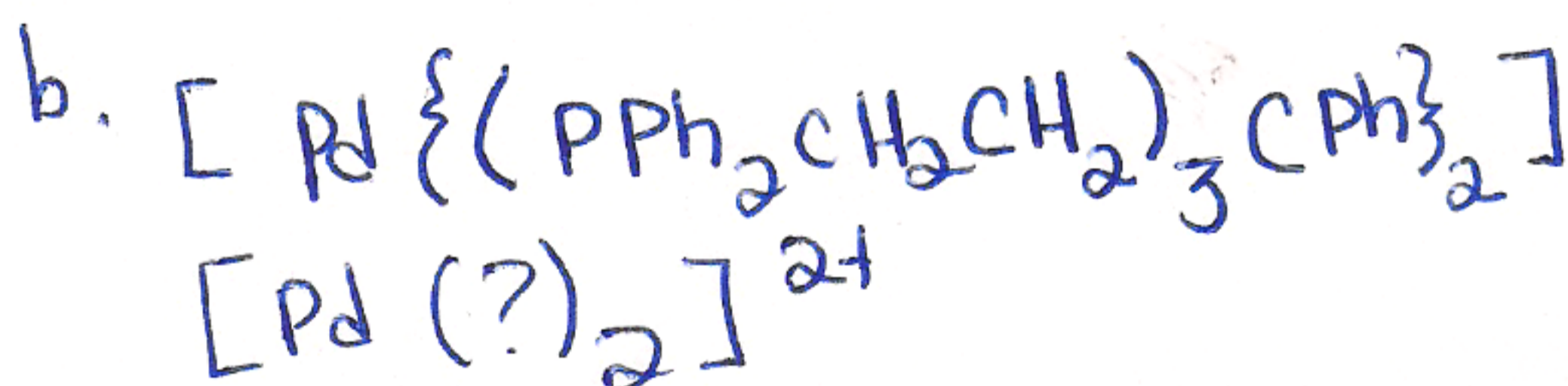
8e⁻ = 2?

4e⁻ = ?

Avg. Cp e⁻ count contribution



Avg. of 4e⁻



e⁻ count

If 16e⁻ = 10 - 2 + 2(?)

16e⁻ = 8 + 2(?)

8 = 2(?)

Avg of 4e⁻ = ?

If η², then L₂ ligand.

Each P: has a lone pair.

If 18e⁻ = 10 - 2 + 2(?)

10e⁻ = 2(?)

Avg of 5e⁻ = ?

Then one ligand is η², the other η³



Avg. of 5e⁻ each