In photosynthesis, electrons are transferred from one heme-containing cytochrome (cyt) to another. If the redox potential of a protein called cyt b3 is -600 mV and the redox potential of a protein called cyt f is -300 mV, which of the following is true:

1. Cyt b3 is a better reducing agent than cyt f
2. Cyt b3 is a better oxidizing agent than cyt f
3. The transport of electrons from cyt b3 to cyt f should be spontaneous
4. (1) and (3) are true
5. (2) and (3) are true

In photosynthesis, electrons are transferred from one heme-containing cytochrome (cyt) to another. If the redox potential of a protein called cyt b3 is -600 mV and the redox potential of a protein called cyt f is -300 mV, which of the following is true:

13% 1. Cyt b3 is a better reducing agent than cyt f

15% 2. Cyt b3 is a better oxidizing agent than cyt f

1% 3. The transport of electrons from cyt b3 to cyt f should be spontaneous

64% ✓ 4. (1) and (3) are true

7% 5. (2) and (3) are true

Determine the oxidation number and d-count for $[Fe(H_2O)_6]^{3+}$ and $[Fe(CN)_6]^{3-}$

(Hint: Fe is in group 8 of the periodic table.)

1. $[Fe(H_2O)_6]^{3+}$ oxidation number = +3, d-count: 5
   $[Fe(CN)_6]^{3-}$ oxidation number = -3, d-count: 11
2. $[Fe(H_2O)_6]^{3+}$ oxidation number = +3, d-count: 3
   $[Fe(CN)_6]^{3-}$ oxidation number = -3, d-count: -3
3. $[Fe(H_2O)_6]^{3+}$ oxidation number = +3, d-count: 5
   $[Fe(CN)_6]^{3-}$ oxidation number = +3, d-count: 5

Determine the oxidation number and d-count for $[Fe(H_2O)_6]^{3+}$ and $[Fe(CN)_6]^{3-}$

(Hint: Fe is in group 8 of the periodic table.)

37%

1. $[Fe(H_2O)_6]^{3+}$ oxidation number = +3, d-count: 5
   $[Fe(CN)_6]^{3-}$ oxidation number = -3, d-count: 11

10%

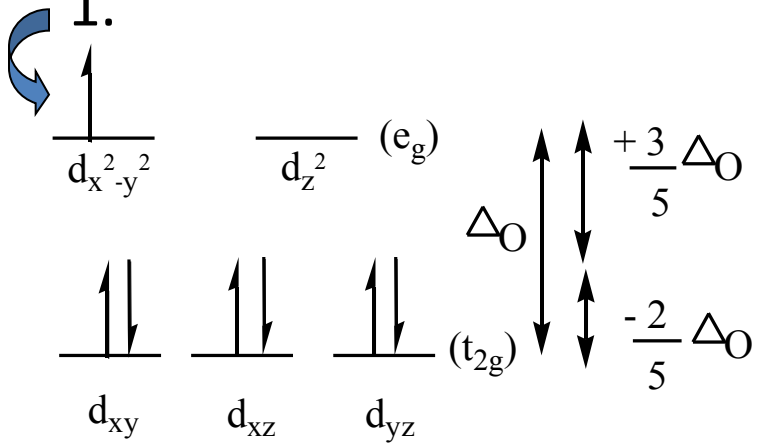
2. $[Fe(H_2O)_6]^{3+}$ oxidation number = +3, d-count: 3
   $[Fe(CN)_6]^{3-}$ oxidation number = -3, d-count: -3

52%

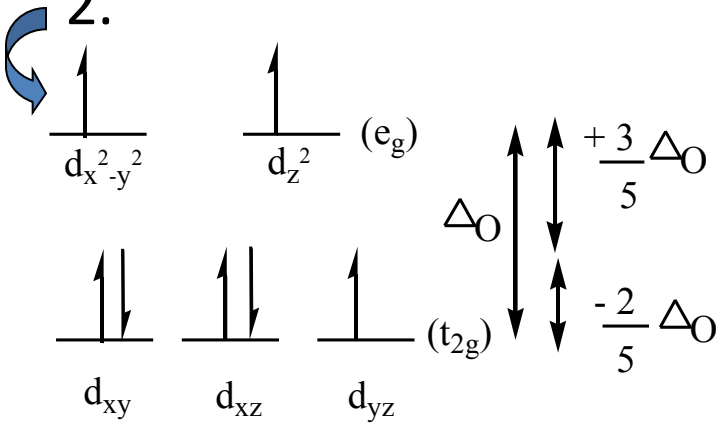
3. $[Fe(H_2O)_6]^{3+}$ oxidation number = +3, d-count: 5
   $[Fe(CN)_6]^{3-}$ oxidation number = +3, d-count: 5

Select the correct **WEAK FIELD** octahedral crystal field splitting diagram for Co^{2+} (**d^7**)

1.



2.



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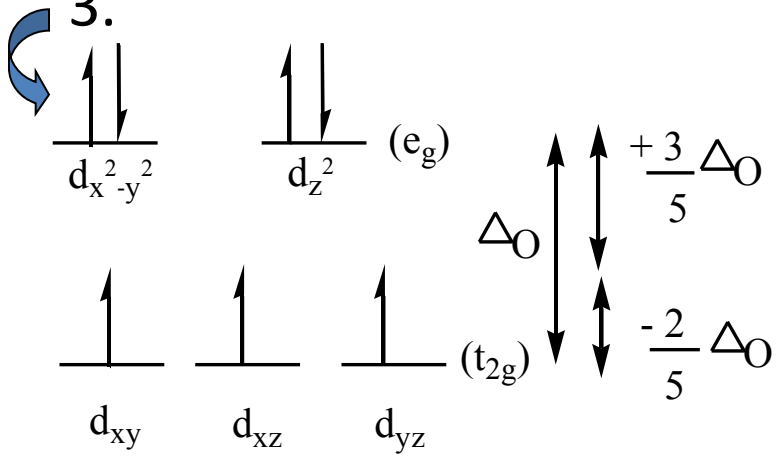

Select the correct **WEAK FIELD** octahedral crystal field splitting diagram for Co^{2+} (**d^7**)

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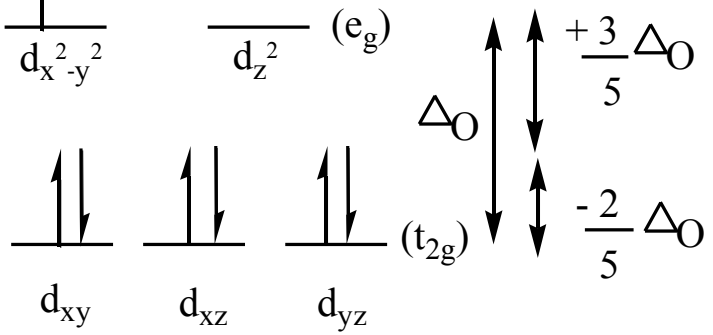

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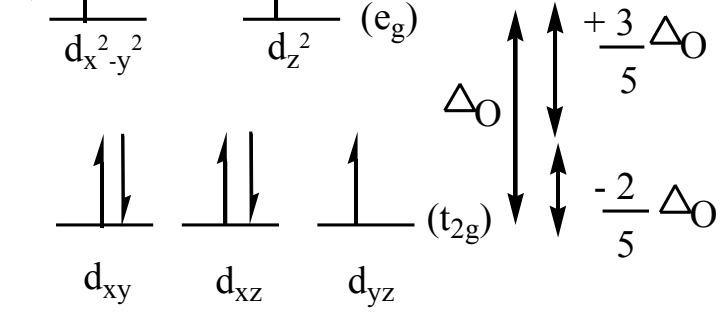
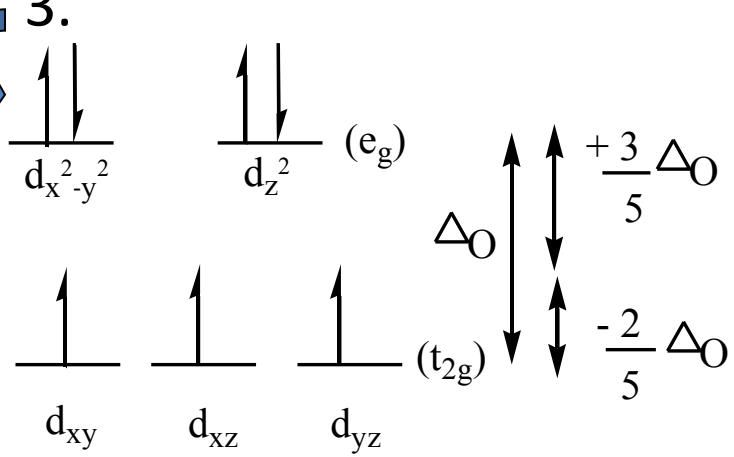
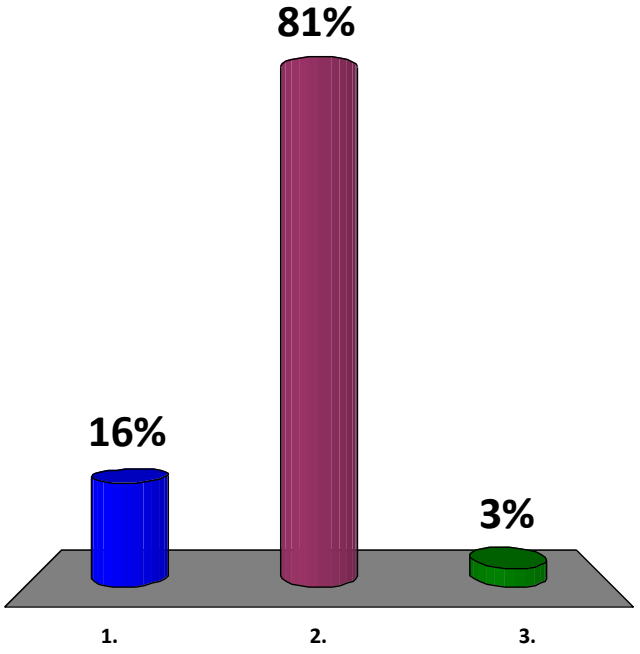


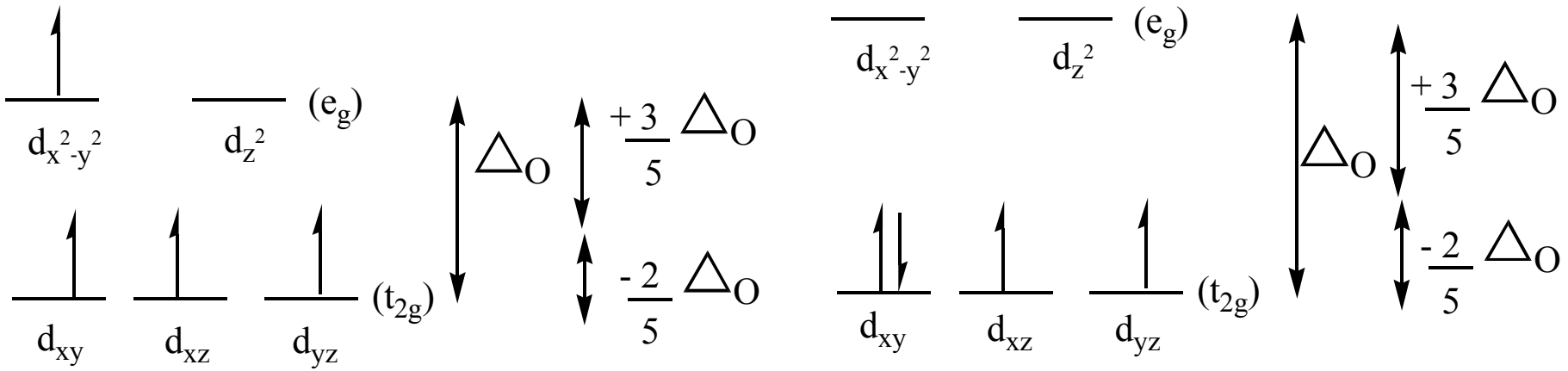
3.





Predict Crystal Field Stabilization Energy (CFSE)
For **High spin** Mn^{3+} d^4

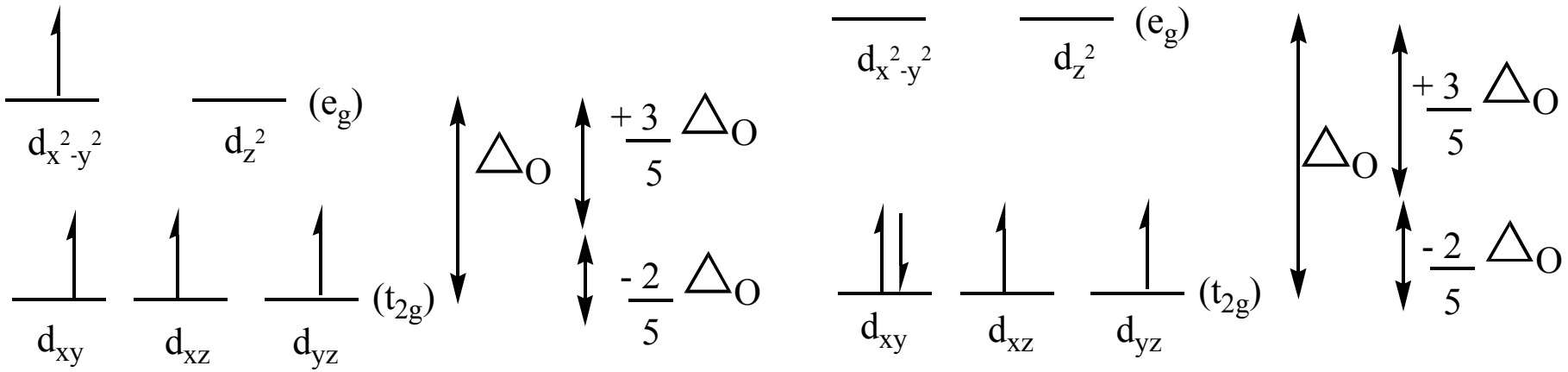
Mn^{3+} d^4



1. (-3/5)
2. $(-8/5)\Delta_o$
3. $(-3/5)\Delta_o$
4. $-2\Delta_o$
5. $(9/5)\Delta_o$

Predict Crystal Field Stabilization Energy (CFSE)
For **High spin** Mn^{3+} d^4

Mn^{3+} d^4



10% 1. (-3/5)

17% 2. $(-8/5)\Delta_o$

69% ✓ 3. $(-3/5)\Delta_o$

3% 4. $-2\Delta_o$

1% 5. $(9/5)\Delta_o$

5.111 Principles of Chemical Science
Fall 2014