Ch112
In class exercise
Nov. 15, 2016

Consider $Mn(OAc)_2$, $KMnO_4$, and $TiCl_3$.

1. For all three compounds, provide the oxidation state, d-electron count, and the term symbol of the free ion ground state.

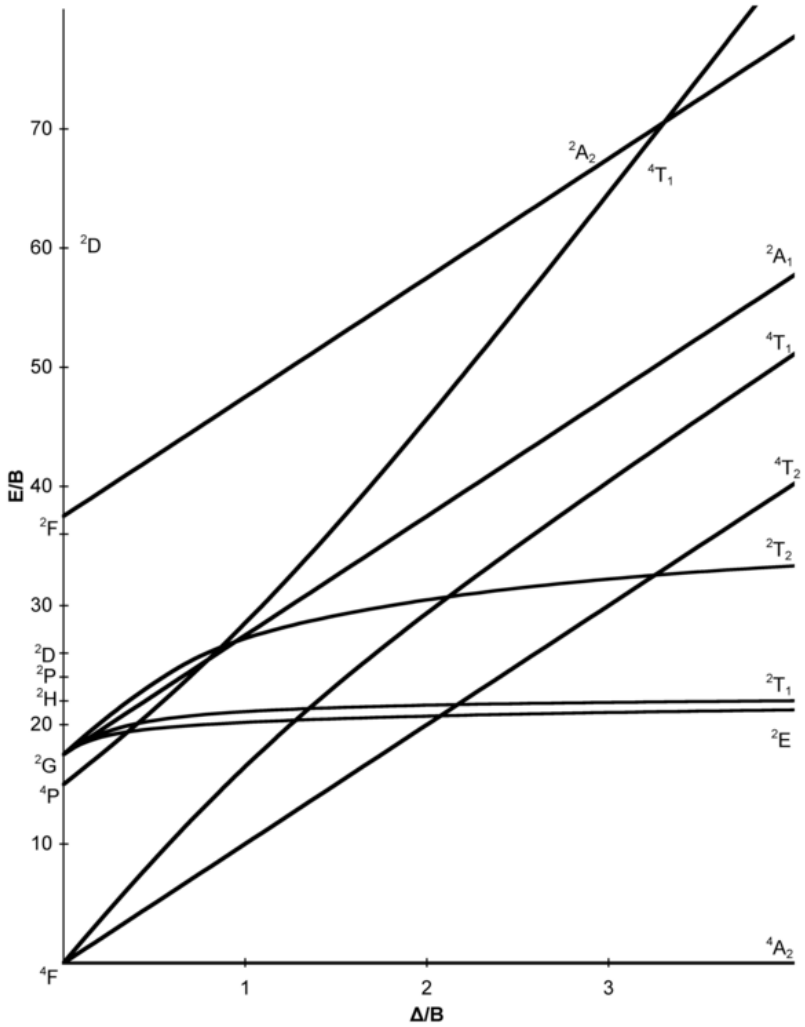
$Mn(OAc)_2$: Mn(II), d^5, ^6S
$KMnO_4$: Mn(VII), d^0, ^1S
$TiCl_3$: Ti(III), d^1, ^2D

2. Identify the flask containing the respective compounds. Explain.

$Mn(OAc)_2$: Nearly colorless. Transitions are both spin and Laporte forbidden.
$KMnO_4$: Deep purple. Fully allowed.
$TiCl_3$: Faint red. Transition is spin allowed but Laporte forbidden.

3. For which transition metal complexes is the correlation diagram shown below appropriate for spectroscopic analysis? How many spin-allowed transitions would you expect? For the appropriate complexes, draw these transitions on the diagram. 3

Cr(acac)3	$[NiCl_4]^{2-}$	$[Co(NH_3)_6]^{3+}$	$[CoCl_4]^{2-}$
$[FeBr_4]^-$	WCl_6	$[Fe(CN)_6]^{4-}$	$[V(H_2O)_6]^{3+}$



4. Which of the correlation diagrams shown below or above is appropriate for the spectroscopic analysis of an O_h complex of Co^{III} that was found to have no unpaired electrons?