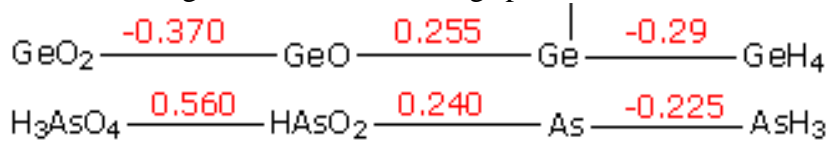
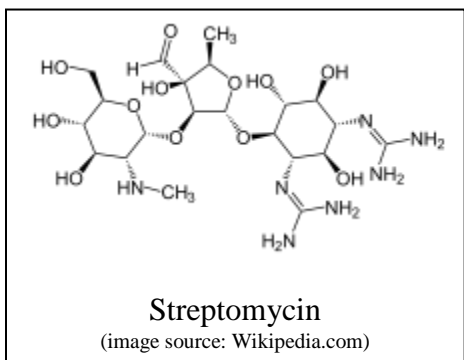


1. Construct redox predominance diagrams for the following species:



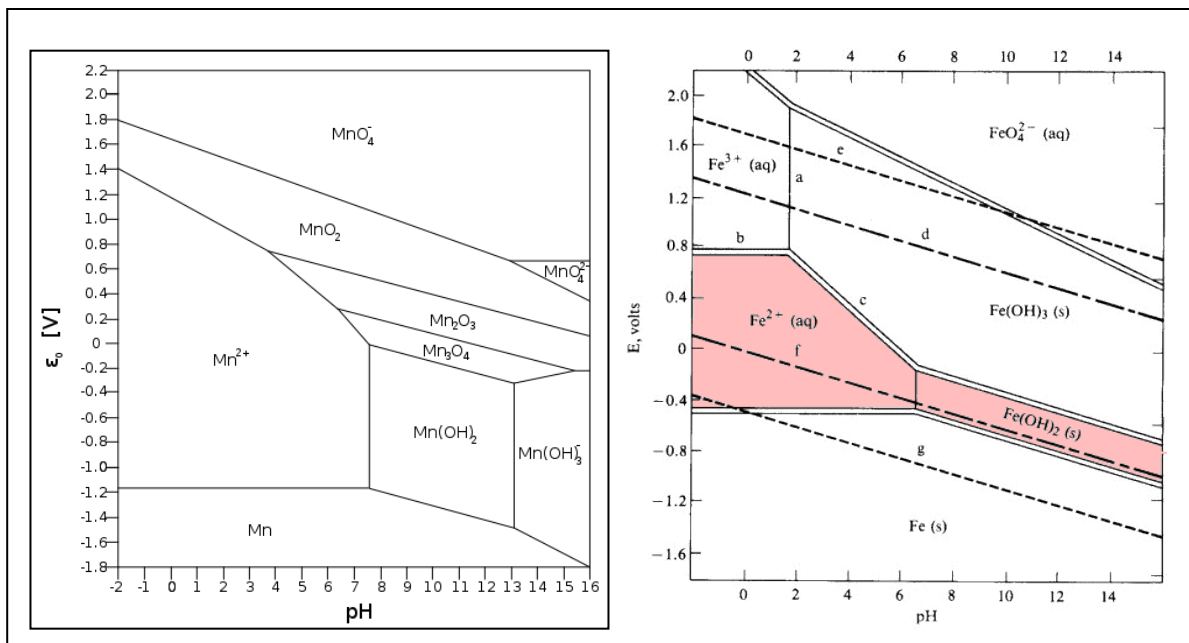
If AsH_3 and GeO_2 are combined, what products would you expect to form? Write a balanced equation for the expected redox reaction.

2. You have an aqueous mixture of Hg^+ , Ti^{4+} , Na^+ , and Pb^{4+} that you would like to separate. If you combine this mixture with a solution containing F^- , CH_3SH , ethylenediamine, and CH_3CO_2^- , what complexes would you expect to form? Explain your choices.



3. Streptomycin is an antibiotic with the structure shown. If streptomycin is taken with metal ions such as Mg^{2+} or Fe^{3+} , its bioavailability can be severely decreased by formation of a very stable and insoluble precipitate. Explain why streptomycin forms a very stable and insoluble precipitate with Mg^{2+} , but not with Pd^{2+} . When streptomycin and Mg^{2+} form a precipitate, how does the entropy of the system change? Explain.

4. You have accidentally dropped a piece of iron solid in a bucket containing MnO_4^- ions in acidic aqueous solution at $\text{pH}=0$. As they react, you notice a black solid forming. Explain why a reaction occurs, identify the black solid, and write a correctly balanced equation for the reaction that occurs. What would change if the reaction were to take place at $\text{pH}=10$? Describe any changes and provide a balanced equation.



MnO_4^-	FeO_4^{2-}
+1.70V	+2.20V
MnO_2	Fe^{3+}
+1.23V	+0.77V
Mn^{2+}	Fe^{2+}
-1.18V	-0.44V
Mn	Fe

5. Silver(I) forms precipitates with all of the halides. Predict the crystal lattice that would form for each AgX(s) formula with $\text{X} = \text{F}, \text{Cl}, \text{Br}, \text{and I}$. Describe the occupancy of the lattice. (There are # silver ions on the corners/edges/faces, etc) Silver(I) chloride is extremely insoluble in water while lead(II) chloride is relatively soluble in hot water. Explain. How do you expect the solubility of silver(I) fluoride to compare to silver(I) chloride?