1FLO: Species distribution diagrams of iron complexes of catechols

A minireview published paper by Butler and Maier, Siderophores and mussel foot proteins: the role of catechol, cations, and metal coordination in surface adhesion. *J. Biol. Inorg. Chem*, **2017**, *22*, 739-749, describes how catechol cations and metal ion coordination affect surface adhesion by mussels. Shown below is a figure showing a species distribution diagram of the siderophore, chrysobactin. Please use this information to answer the questions below.

Please insert Table 1 and Figure 3 in DOI 10.1007/s00775-017-1451-6.

Instructions: Answer the questions as completely as you can based on the figures above.

1. Write the sequential deprotonation of H3PO4 in water.
2. Please draw a speciation diagram for H3PO4 by plotting percent fraction vs. pH indicating important features of the diagram. pKa1 = 2.15 , pKa2 = 7.2, pKa3 = 12.35

1. The pKa’s of the siderophores and selected catechol are shown in Table1. Please account for the ~3 unit pKa difference between the siderophores and catechols.

1. Figure 3 shows the speciation of complexes of Fe(III) with chrysobactin. What would happen to these complexation trends if you were to add a nitro group?