**In-Class Activity Utilizing the PDB and HSAB Theory to Understand Metal Specificity in Trafficking Proteins**

The following proteins are discussed in the O’Halloran review article (DOI:10.1002/9781119951438.eibc2107): CusF (2VB2), CueR (1Q05, Cu 301), ZntR (1Q08, Zn 401 and 402) Locate each protein on the PDB and answer the following questions for each protein.

1. Sketch the coordination geometry around the metal(s) and specify the ligands bound (for amino acids include the sequence number –for example Cys155). Compare the structures in Figure 3 with what you see in the PDB for CusF and CueR. If there is a difference, suggest why.

2. Hard soft acid base theory (HSAB) is based on a series of empirical observations

regarding metal-ligand preferences. Categorize the metals and ligands as hard or soft acids and bases. Do the coordination environments around the metals in the sites mentioned above make sense in terms of HSAB theory?

3. Utilizing the heteroatoms in the crystal structure design a macrocyclic chelate that would preferentially bind to Zn(II) over Cu(I) assuming no redox chemistry occurs.