Activity Series of Metals (Cu, Fe, Sn, Zn, Mg) **Name** _____
Chem 150 – K. Marr **Section** _____ **Team No.** _____

1. Write the molecular and net ionic equation for the reaction of iron with 6 M hydrochloric acid—hint: it's a single displacement reaction and all the metals in the table below react with the acid to form 2+ ions, M^{2+}. Include the physical states of all reactants and products—i.e. (s), (aq), (l) or (g).

   Molecular equation:

   Net ionic equation:

2. Complete the table below. Take note that transition metals (e.g. Cu, Fe and Zn) lose their s-level electrons before their d-level electrons, while post-transition metals (e.g. Sn) lose their p-level electrons before losing their s-level electrons.

Metal	**Atomic Radius (nm)**	**1st and 2nd Ionization Energies (kJ/mol)**		**Sum of IE_1 & IE_2 (kJ/mol)**	**Condensed Electron Configurations**	
		1st IE	**2nd IE**		**Metal, M**	**Metallic Ion, M^{2+}**
Cu	0.128	746	1958	**2704**		
Fe	0.124	762	1562	**2324**		
Sn	0.141	708	1408	**2116**		
Zn	0.133	906	1733	**2639**		
Mg	0.160	738	1451	**2189**		

3. Based on the ionization energies and the electron configurations of each metal and their corresponding ions given in the table above, which metal would you predict to be the most reactive? _____ Least reactive? _____ *Explain your reasoning:*

4. Based on the data in the table above, rank the metals in order from most to least active.

   Most active ⟶ Least active

   _____ > _____ > _____ > _____

   Explain your reasoning.

5. Would using a different acid change the order in #4, above? *Briefly explain*.

6. Would using a different concentration of acid change the order in #4, above? *Briefly explain*.