AP Chemistry Lab
Electrochemical Series

Pre-Lab Questions

1) What is a net ionic equation?

2) What is a spectator ion?

3) What is the difference between Cu and Cu^{2+}?

4) If you have a positive ion in solution do you also have to have a negative ion with it?

5) What is the difference between a halogen and a halide?

6) What is the difference between chlorine and chloride?

Procedure

Activity Series of Selected Metals

Set up a 4 x 4 analysis matrix in the 24 Well microscale plate by placing 1 mL (~15 - 20 drops) of each of the nitrate solutions according to the data table. Add a single piece of each of the metals to the appropriate wells as shown on the data tables.

	Cu^{2+}	**Pb^{2+}**	**Zn^{2+}**	**Mg^{2+}**
Cu	X			
Pb		X		
Zn			X	
Mg				X

Allow the plate to stand at least 5 minutes. Determine if a reaction has occurred in the wells by looking for a chemical deposit on the metal or a precipitate in the bottom of the well.

Activity Series of Selected Halogens

Make reference solutions (design your own data table for this section)

1) Halogens, Cl_2, Br_2 and I_2 are soluble in nonpolar solvents such as mineral oil. The presence of a halogen will be determined by the color it exhibits in mineral oil. To determine what this looks like, place 1 mL (~5 - 20 drops) of Chlorine water, Bromine water and Iodine water in 3 separate test tubes. Add 1 mL of mineral oil to each test tube stopper and shake for 15 seconds. Place the test tubes in a test tube rack and allow the mineral oil and water to separate. Record the color of the mineral oil layer (upper layer) for each halogen.

2) Determine if the halide ions impart color to mineral oil by repeating step 1 with 1 mL each of the solutions of NaCl, KI, and NaBr. Record your results.

3) Set up an analysis matrix according to the data table. Place 1 mL of the solution of NaCl into each of the two test tubes. DO the same for the solutions of KI and NaBr. To the NaCl test tubes add 1 mL of Bromine water in one and 1 mL of Iodine water in the other. To the KI test tubes add Chlorine water and Bromine water and to the NaBr test tubes add Iodine water and Chlorine water. Add 1 mL of mineral to each test tube, stopper all of the test tubes and shake for 15 seconds. Allow the layers to separate and record the colors for the mineral oil layer in each test tube.

	Cl_2 water	**Br_2 water**	**I_2 water**
NaCl	X		
NaBr		X	
KI			X

Post Lab Questions

1) In your lab report include balanced net ionic equations for all reactions that occurred with the metals. Do not write equations for reactions that didn't happen. (Six reactions total)

2) List the metals in decreasing ease of oxidation (activity series) and compare to an activity series found in your textbook. Are you in agreement with it?

3) Describe what occurs when halogen and halide ions are extracted by a nonpolar solvent such as mineral oil. What do they look like?

4) Write balanced net ionic equations for the reactions which occurred with the halogens. Do not write equations for reactions that didn't happen. (Three reactions total)

5) List the halogens in decreasing order of reactivity. Compare your list to an activity series in you textbook. Are you in agreement with it?