Build a Better Battery

Lab Prep Instructions

***GENERAL INFORMATION***

Experiment Day/Date:

Instructions: Write any calculations in the space provided, and check with the lab instructor if you have any questions. Check off each item as you prepare it.

Quantity: Amounts indicated are for all sections unless indicated (amounts have been over-estimated to guarantee extra is available). Assume 4 groups for each solution that says “per group”.

***SOLUTIONS***

Solvent for all solutions: **Milli-Q water (**especially non-chlorinated compounds)

* 250 mL of 1 M KNO3 (potassium nitrate)



 -**please round volume of 1 M KNO3 needed to match the nearest volumetric flask volume** available (i.e. to the nearest 500mL or 1L). Amount of 1 M KNO­3 to prepare:\_\_\_\_\_\_\_\_L KNO3



* 10 mL of 0.10 M FeCl3 (iron (III) chloride)

-include 1 mL micropipet & tips and small beaker for student dispensing

-acidify with HNO3



-**please round volume of 0.10 M FeCl3 needed to match the nearest volumetric flask volume** available (i.e. to the nearest 500mL or 1L). Amount of 0.10 M FeCl3 to prepare:\_\_\_\_\_\_\_\_L FeCl3



* 10 mL of 18 M H2SO4 (sulfuric acid)

-include 1 mL pipet & pump and small beaker for student dispensing

-Since this is concentrated H2SO4, the acid should be dispensed in the hood.



-**please round volume of 18 M H2SO4 needed to match the nearest volumetric flask volume** available (i.e. to the nearest 500mL or 1L). Amount of 18 M H2SO4 to prepare:\_\_\_\_\_\_\_\_L H2SO4

* 10 mL of 0.1 M HNO3 (nitric acid)

-include 1 mL micropipet & tips and small beaker for student dispensing



 -**please round volume of 0.1 M HNO3 needed to match the nearest volumetric flask volume** available (i.e. to the nearest 500mL or 1L). Amount of 0.1 M HNO3 to prepare:\_\_\_\_\_\_\_\_L HNO3



* 50 mL of 1.0 M HNO3 (nitric acid)

-This amount should be enough for **ONE GROUP**

-If you are diluting from concentrated HNO3 perform this dilution in the hood in an ice bath. It is helpful if this reaction is performed in a large Erlenmeyer flask, with the acid added to the water, and then transferred to the volumetric and filled to the line when it has cooled to room temperature. Be sure you add less water to the Erlenmeyer than the total amount needed to fill the volumetric.



 -**please round volume of 1.0 M HNO3 needed to match the nearest volumetric flask volume** available (i.e. to the nearest 500mL or 1L). Amount of 1.0 M HNO3 to prepare:\_\_\_\_\_\_\_\_L HNO3



* 50 mL of 0.1 M (NH4)2Fe(SO4)2 (ammonium iron(II) sulfate)

-This amount should be enough for **ONE GROUP**

-acidify with H2SO4

 -**please round volume of 0.1 M (NH4)2Fe(SO4)2 needed to match the nearest volumetric flask volume** available (i.e. to the nearest 500mL or 1L). Amount of 0.1 M (NH4)2Fe(SO4)2 to prepare:\_\_\_\_\_\_\_\_L (NH4)2Fe(SO4)2



* 50 mL of 1.0 M Cu(NO3)2 (copper (II) nitrate)

-This amount should be enough for **ONE GROUP**



**-please round volume of 1.0 M Cu(NO3)2 needed to match the nearest volumetric flask volume** available (i.e. to the nearest 500mL or 1L). Amount of 1.0 M Cu(NO3)2 to prepare:\_\_\_\_\_\_\_\_L Cu(NO3)2



* 50 mL of 0.1 M AgNO3 (silver nitrate)

-This amount should be enough for **ONE GROUP**

-caution: avoid direct contact, as it will stain skin brown

-put in a **dark**, sealed, bottle with label

 -**please round volume of 0.1M AgNO3 needed to match the nearest volumetric flask volume** available (i.e. to the nearest 500mL or 1L). Amount of 0.1M AgNO3 to prepare:\_\_\_\_\_\_\_\_L AgNO3



***CHEMICALS***

* Solid quinhydrone (small amount in vial)

***EQUIPMENT & GLASSWARE***

**In Lab Bins**: (total of 8 bins needed) String for salt bridge (1)

* 100-mL volumetric flasks (2)
* 25-ml volumetric flask (1)
* 250 mL beaker (2)
* Micropipetes
* Stirring rod
* 100 ml beaker (2)

**In Dana 201:**

□ pH meters in mV mode(6)

□ cable connectors and reference electrodes for each meter

□ MilliQ water at each station

□ pipette tips at each station

* Ag wire (2)
* Cu wire (2)
* Graphite rod (3)

***WASTE DISPOSAL CONTAINERS***

Building: Dana

Room #: 201

Waste Accumulation Start Date: xx/xx/12

Date Container Filled: leave blank

Date moved to MAA: leave blank

Physical State(s): liquid

Chemical Waste Composition: potassium nitrate, iron (III) chloride, sulfuric acid, nitric acid, ammonium iron(II) sulfate, copper (II) nitrate, silver nitrate, quinhydrone (<1%), water (~99%)

Hazards: toxic, corrosive, oxidizer

***SPECIAL INSTRUCTIONS***