**CH 412 LA: INORGANIC CHEMISTRY LABORATORY (Spring 2021)**

**Title:** Iron abstraction from used cans

1. **Purpose: (1 point)**

**The purpose is to isolate iron from used cans through the preparation of ferrous sulfate hydrates and their ammonia complexes.**

1. **Drawing of structure of the main compound or balanced chemical equation if synthesis is performed: (1 point)**

**3. Reagents and the major product (up to 5 points)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Name** | **M.W.**  (0.5 pts) | **Density**  (0.5 pts) | **Amount (grams/mL)**  (0.5 pts) | **Moles**  (0.5 pts) | **Hazards/Precautions**  **(MSDS data) and melting point or boiling point** (2 pts) | **Role of the reagent** (1 pts)\* |
| Iron | 55.85 | 7.86 g/cm3 | N/A | N/A | May irritate eyes, skin, or respiratory tract.  MP: 1535°C  BP: 3000°C | Reactant |
| Sulfuric acid | 98.07 | 1.83 g/cm3 | 40 mL 3.0 M | 0.12 | Causes eye and skin burns. Causes digestive and respiratory tract burns. Strong inorganic acid. Corrosive.  MP: 10°C  BP: 290-338°C | Reactant |
| Ammonium sulfate | 132.13 | 1.760 g/cm3 | N/A | N/A | Causes eye, skin, and respiratory tract irritation.  MP: 280°C | Reactant |
| Iron(II) sulfate heptahydrate | 278.01 | 1.898 g/cm3 | N/A | N/A | Harmful if swallowed. Causes eye and skin irritation.  MP: 64°C  BP: 300°C | Product |
| Ammonium iron(II) sulfate hexahydrate | 392.13 | 1.865 g/cm3 | N/A | N/A | Causes eye, skin, and respiratory tract irritation.  MP:100°C | Product |

**\*** Mention role as either reactant, solvent, catalyst or product

**4. Calculations: (1 point) (ignore it)**

Show each calculation for moles of reagents and for theoretical and actual yield. Fill in the box with the limiting reagent and theoretical yield:

Iron

The limiting reagent is

N/A

The theoretical yield is

**5. Procedure (up to 2 points)**

|  |  |
| --- | --- |
| **Procedure** | **Observations and Lab Data** |
| A summary of the procedure done with bullet points) | Color changes, exothermic or endothermic reactions, gas generation, etc.; tare weights for flasks, etc. |
| * Cut a ~5g piece of metal from used cans and put into 50 mL beaker. * Place beaker in fume hood and add 10 mL 3.0M H2SO4. Observe hydrogen release and color change. When hydrogen release stops, extensively wash all remaining metal with water. Weigh leftover iron after drying. * Put leftover iron into conical flask containing 3.0 mL 3.0M H2SO4. Place beaker on 80°C water bath and observe reaction. Keep adding water to flask to prevent FeSO4 precipitation. * Once hydrogen release stops, transfer solution into filter and perform vacuum filtration. Wash and weigh any unreacted iron. * Split solution into two small conical flasks. Heat one solution to 60°C with water bath until a crystal membrane forms on surface. Move solution out of water bath, recover crystal, weigh, and calculate yield. * Add saturated (NH4)2SO4 to second FeSO4 flask and place on a 60-80°C water bath. Remove container out of water bath once crystal forms on solution surface. Leave solution at room temperature for two hours. * Recover ammonium iron(II) sulfate hexahydrate crystal, weigh, and calculate yield. |  |

**6.** Results; include actual yield in grams and % yield.

**Results (need to get signed by instructor or TA):**