1.0 SOP Introduction

This SOP will discuss how to perform proper waste disposal for a variety of UTCV chemicals and also how to properly clean up your workstation and equipment after the lab. Please review this document before EOD clean-up to be familiar with what needs to be done at the end of your experimental sessions. If you do not know where the waste needs to be disposed of, ask a lead!

Never Assume Where to Discard Waste! Ask a Lab Supervisor For Clarity!

2.0 PPE Requirements

This section outlines the necessary PPE that must be worn when performing waste disposal or clean-up.

1. Nitrile Gloves
2. Lab Coat
3. Goggles
4. Hair Tie For Long Hair
5. Close Toed Shoes
6. Pants Covering the Ankles

3.0 General Waste Collection Considerations - Liquid Waste

This section outlines some key waste collection considerations when collecting and disposing of waste.

1. A maximum of 80% of the waste beaker capacity shall be used (i.e. 800 mL for a 1L waste beaker or 480 mL for a 600 mL waste beaker). If you reach the maximum liquid level, notify a lab supervisor to properly dispose of the waste
2. **Do not reuse any liquid or solid waste material!** Otherwise, you will contaminate your solutions.
3. **Please double-check which container you dispose of your liquid waste in. Not all waste is compatible. Ask a lab supervisor if not sure.**
4. Please be conservative with your chemicals. Do not waste your chemicals and be mindful of your liquid use when cleaning glassware.
5. Keep your wash bottle full and refill as necessary. You need it for every aspect of the lab, including waste disposal.
6. **CHAMELEON REACTION ONLY: Do not use the same waste beaker for the power chemicals waste, keep them separate from the chameleon waste!**

4.0 Proper Waste Disposal - Solid Waste

This waste disposal procedure pertains to solid waste produced during the experimental sessions. This includes items such as:

- Nitrile Gloves
- Paper Towels
- Weighing Boats
- **Solid chemicals (Dextrose, KMnO4) - Ask a lab supervisor first**
- Any **plastic** tubes (falcon tubes, test tubes, serological pipettes)
- Power Cathodes and Anodes (**Let them cool down first!**)
- Scrap cardboard, separator, excess metal bits, etc

Procedure:

Figure 1: Green Solid Waste Disposal Bin

1. Take the solid waste to one of the two waste disposal stations and dispose of it in a **green bin**. Only use the green bins you are told to use. DO NOT use any green bin that you were not told to use. Ask a lab supervisor if not sure.
2. Do not throw any waste from a distance and do not place any liquids into the bin.
3. If the bin is full, do NOT push down the waste and call a lab supervisor. You never know if someone accidentally placed sharps into the bin. Use another bin to dispose of your waste.
4. Do not dump any solid waste into the grey bin shown below. This bin should only be used for paper towels you use to dry your hands.

Figure 2: Grey General Waste Bin

5. POWER ONLY - Do not put the cathodes and anodes immediately after use into the bin. They can be quite hot after the reaction so please let them cool down first.
6. REACTIONS ONLY - Do not dispose of the dextrose powder and $KMnO_4$ powder directly in the green bin. Please place these chemicals into separate waste beakers provided at the scales.

5.0 Proper Waste Disposal - Liquid Waste

This waste disposal procedure pertains to all liquid waste produced during the experimental sessions. This includes all aqueous chemicals and solutions you have made and will not be using anymore. At the end of the lab, please dispose of anything in a beaker, Erlenmeyer flask and any glassware that cannot be capped. Volumetric solutions and other vessels such as falcon tubes etc may be allowed to be kept overnight as long as the glassware is clearly labelled with a workplace label. Ask a lab supervisor before tossing chemicals out to clarify where they need to be disposed of and if they can be kept overnight. Only use the liquid waste containers at the waste disposal station. Do not use any containers on the lab benches as these are not ours.

Figure 3: Liquid Waste Containers

Procedure

1. Identify the proper waste disposal container. There will be two differently marked containers, one for methylene blue and power's electrolyte solution and one for the chameleon reaction. **PLEASE DO NOT MIX THESE TWO UP.** The waste is incompatible and our team does not want any adverse reactions to occur for safety reasons.
    a. Blue Tape is For Methylene Blue/Power Waste
    b. Red Tape is For Chameleon
2. Open the container and place the funnel into the container.

3. Gently tilt the waste beaker into the funnel and slowly drain the beaker. **Do not exceed the dark black line mark for the maximum fill line.** Tilt the beaker only where the spout is and not on the edge, else you will spill your waste.
4. If the container has been filled to the maximum line, please inform a lab supervisor to replace the filled container with a new one.
5. Close the container and reuse the container until it has reached the maximum fill line.

5.1 Proper Waste Disposal - Organic Solvent Waste

1. An organic solvent (Acetone) can be requested to be applied to clean methylene blue contaminated apparatus such as glassware and pipettes.
2. Usage of the acetone shall only take place in a fume hood under the supervision of a lab supervisor.
3. Aceton has to be disposed of in a DEDICATED metal waste container. Acetone shall NOT be mixed with any other aqueous waste and shall never be stored in a plastic container.

6.0 Proper Clean-up - Glassware

This section outlines how to properly clean glassware. This applies to all glassware, even those holding solids such as dextrose. Remember your beaker cleanliness depends on how many times and hold long you clean it, not on how much water or cleaning solution you use.

6.1 Beakers and Erlenmeyer Flasks

Figure 4: Beaker and Erlenmeyer Flask

1. Empty the beaker with the chemical in it into the waste beaker.
2. Use your wash bottle, and put a few mL of distilled water into the glassware.
3. Gently swirl the water in the glassware and discard it into the waste beaker.
4. Repeat the process a total of 3 times and then transport the glassware to the sink.
5. Rinse the glassware 2-3 times in the sink (inside and outside) with tap water.
6. Rinse the glassware 2-3 times in the sink (inside and outside) with distilled water.
7. Place the glassware on paper towels away from the table edge to dry. If you need it immediately, dry it with Kimtech® Kimwipes (located in the yellow bin on each bench).

1.4 Waste disposal and cleaning procedure

6.2 Volumetric Flasks

Figure 5: Volumetric Glassware

1. Empty the flask with the chemical in it.
2. Use your wash bottle, and put a few mL of distilled water into the flask.
3. Gently swirl the water in the glassware and discard it into the waste beaker. You can rotate the flask and please ensure to clean the neck of the flask. Do not shake or rotate vigorously, as this can lead to you accidentally dropping the flask.
4. Repeat the process a total of 3 times and then transport the glassware to the sink.
5. Rinse the glassware 2-3 times in the sink (inside and outside) with tap water.
6. Rinse the glassware 2-3 times in the sink (inside and outside) with distilled water.
7. Place the glassware on paper towels away from the table edge to dry.
8. Please clean the cap of the flask in the sink with tap water

6.3 Glass Pipettes

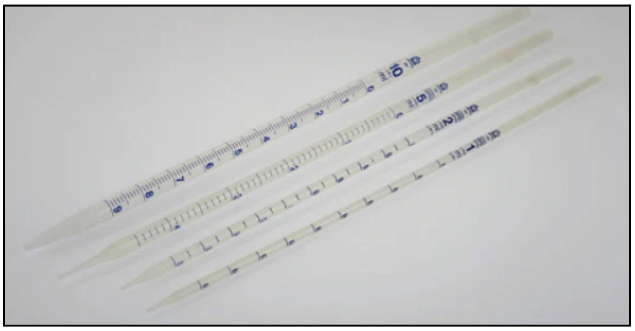

Figure 6: Glass Pipettes

1. Release any chemical inside the pipette into the waste beaker. **Do not blow the chemical down the pipette with the bulb, it is okay that there is some in the tip before cleaning!**
2. Prepare around ~20 mL of water and bring up water until it reaches the center of the main holding chamber. **Do not go to the volume mark! Keep the bulb on the pipette.**

1.4 Waste disposal and cleaning procedure

Figure 6: Main Liquid Holding Chamber

3. Place your thumb over the tip of the pipette and gently rotate the pipette, letting the water go over the walls of the pipette's interior surface.
4. Release the liquid into the waste beaker.
5. Repeat the process 2-3 times until the cleaning water coming out is clear.
6. Take the pipette to the sink and clean the outside of the pipette with tap water.

7.0 Proper Clean-up - Miscellaneous

This section outlines how to clean non-glassware equipment such as spatulas, rods, bulbs, etc. Note you must wash the falcon tubes and test tubes before discarding them.

7.1 Falcon Tubes and Test Tubes

Figure 7: Falcon Tubes

1. Falcon tubes are generally disposable and shall be disposed of after usage.

7.2 Spatula and Glass Rod

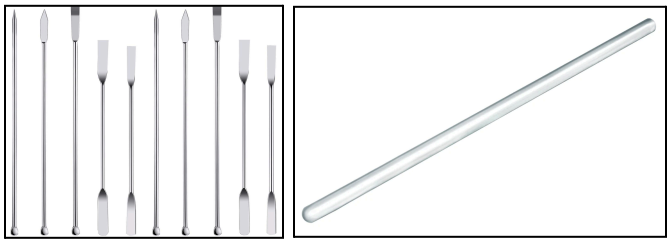

Figure 8: Spatulas and Glass Rod

1.4 Waste disposal and cleaning procedure

1. Gently rinse with the wash bottle into the waste beaker until no solids are present on them.
2. Take the tools to the sink and wash them with tap water.

8.0 Proper Clean up - Lab Bench

1. Clean all glassware and place them in one location on the bench away from the surface used for experiments. DO NOT use a paper towel to dry them.
2. Use the WypAll® Teri X60 wipes (located next to the yellow bin on each station) to wipe the table and then dry the table.
3. Any solids should be swept with a dustpan and discarded into the solid waste container.
4. **Notify a lab supervisor to sign you out and check the lab bench's cleanliness.**

9.0 Proper Clean-up - Scales

1. Use the dustpan to sweep any solids on the bench or on the scale itself into the solid waste container.
2. KOH STATIONS ONLY: If any KOH has been minorly spilled on the bench (a drop), use your wash bottle to dilute it a little first before wiping it with a paper towel. If any has been spilled on the scale, spray water on the paper towel and gently wipe the surface of the spill.
3. Wipe the lab benches with distilled water and dry them with a paper towel.

10.0 Storing Chemicals

1. All chemicals that need to be stored overnight have to be approved by the lab supervisor.
2. Chemicals can only be stored in media bottles, Falcon tubes and volumetric flasks. No chemicals shall be stored in any open containers, such as beakers and weighing boats
3. Solutions containing KOH can only be stored in plastic containers and shall not have a concentration higher than 6 M. KOH and Dextrose mixture are not allowed to be stored overnight.