

SOP FOR STENCH CHEMICALS

CREATED IN PARTNERSHIP WITH PROFESSOR JON OWEN'S LABORATORY, DEPT. OF CHEMISTRY

Stench chemicals refer to a class of organic compounds that are malodorous in very small quantities. The most well-known group of stench chemicals are thiols, as they are the additive in natural gas used to detect leaks. In considering this overlap between research and daily operation, it is important to manage these compounds thoughtfully and have a clear standard operating procedure for spill management.

EXAMPLES OF STENCH CHEMICALS

In addition to the groups listed below, any chemicals exhibiting a strong foul-smelling odor are included.

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|---|---|
|  Thiols (mercaptans) |  Phosphines |
|  Sulfides |  Isonitriles (isocyanides) |
|  Selenides |  Butyric acid |
|  Amines |  Valeric acid |

STORAGE & TRANSPORTATION

Where possible, store stench chemicals in their original bottles from the manufacturer. For all other cases, store in a sealed flask under air or inert gas. Make sure stench chemicals are segregated from other chemicals and materials. A best practice is to use a dedicated fume hood cabinet that vents into the chemical fume hood and/or a desiccator within the cabinet. Please see more information about storage under Administrative Controls.

For transporting stench chemicals, make sure the chemical container is labeled and the cap fully secured. If the container has an odor, best practice is to transport it inside a tightly sealed secondary container.

RUNNING REACTIONS

Research with stench chemicals must be conducted inside a certified chemical fume hood to protect the laboratory environment. In addition, extra care should be taken, such as the use of a cold trap, to prevent odors from exhausting out of the building and distributing more widely.

PERSONAL PROTECTIVE EQUIPMENT

Standard laboratory attire of long pants and closed-foot shoes must be worn in addition to the standard PPE: laboratory coat, safety glasses or goggles, and nitrile gloves. Safety glasses or goggles are required if a Schlenk line is in use. Thermal gloves are required when acquiring liquid nitrogen, if a cold trap is being used. Please see Engineering Controls for a description of a Schlenk line and cold trap. For additional PPE information and PPE requirements at Columbia, please see our webpage: <http://ehs.columbia.edu/ppe.html>.

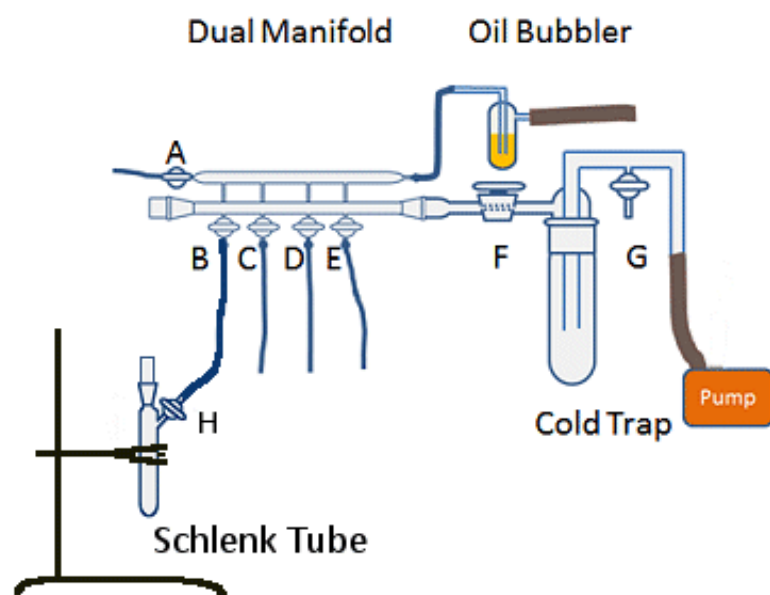
ADMINISTRATIVE CONTROLS

Inventory control is imperative for successful work with stench chemicals. Order the minimum amount of the stench chemical necessary for the experiment, and be sure to consume or quench the full amount taken from the stock bottle.

ENGINEERING CONTROLS

Thiols (mercaptans) and sulfides can be oxidized to non-malodorous sulfonic acid by using sodium hypochlorite. Setting up a bleach trap with a Büchner flask/vacuum flask is one way to achieve this. A 5.25% solution of sodium hypochlorite is equivalent to consumer bleach solution with 25 grams of active chlorine per liter. This will quench approximately 7mL of stench chemical (NRC 1995, 2011).

Another way chemists work with stench chemicals is using a Schlenk line, shown below. Schlenk lines are an air-free apparatus that utilize a vacuum pump to operate under inert gas. While they are typically used for air-sensitive compounds, they are useful for running reactions with stench chemicals to contain the odor.



* Note that in this set-up there is no bleach trap. This is because a Schlenk line must be kept air- and water-free. A bleach bath should be ready and available in a crystallizing dish or beaker in the hood.

A Inert Gas Supply

- Typically Argon or Nitrogen, connected through a regulator.
- The gas exits through an oil bubbler

B - E Sample Hook-ups

- The stench chemical along with any reagents needed in the experiment are hooked into these lines.

F Connection to Cold Trap

- This flask sits in a small dewar of liquid nitrogen, not shown

G Connection to Vacuum

- Check the pressure at the regulator

H Schlenk Flask

- Contains the stench chemical, hooked into the B line

HAZARDOUS WASTE DISPOSAL & CLEAN-UP

For glassware and instruments that come in contact with any of the following: thiols (mercaptans), sulfides, phosphines, disulfides, selenides and isonitriles; oxidize them with bleach solution in the chemical fume hood to deodorize. Disposable materials such as gloves and paper towels should be sealed in a plastic bag, placed in a solid waste container and disposed of as hazardous waste. Liquid contents of the cold trap should be added to a cooled bleach solution, consolidated into a liquid waste container in the fume hood and disposed as hazardous waste.

All hazardous waste must be labeled with the full chemical name, and this is even more important when it comes to a stench chemical. Request hazardous waste containers and pick-up service by using the university request form: <http://vesta.cumc.columbia.edu/ehs/wastepickup/>.

SPILL MANAGEMENT

In the event of a stench chemical spill, report it immediately to Public Safety and EH&S. It's important to contact both departments due to the odor similarity to natural gas.

Small spills can be absorbed by paper towels and wiped with bleach, following disposal guidelines above. For large spills, call EH&S for assistance and contain the area if possible by closing the fume hood and/or laboratory door.

	Morningside Campus	CUMC Campus
Public Safety	(212) 854-5555	(212) 305-7979
EH&S	(212) 854-8749	(212) 305-6780

REFERENCES

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