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| **Brueckner Lab-Specific Standard Operating Procedure (LSOP)**  **HYDROGEN SULFIDE GAS** | |
| **Principal Investigator(PI):** Christian Brückner | |
| **Building:** Chemistry | **Lab(s) Covered by LSOP:** R413/R415 |
| **Department:** Chemistry | **Lab Phone Number(s):** 6-6596/6-6598 |
| **SECTION 1 – HAZARDOUS CHEMICAL(S) or PROCESS(ES) and HAZARDS INVOLVED** | |
| Hydrogen sulfide gas used in quenching an osmium tetroxide-mediated dihydroxylation.   * Flammable gas * Acute toxicity upon inhalation * Acute and chronic aquatic toxicity * Explodes while under pressure | |
| **SECTION 2 – ADMINISTRATIVE CONTROLS** | |
| * Anyone using the chemicals and procedures described herein needs to have undergone the annual EH&S Chemical Hygiene Training * Anyone using the chemicals and procedures described herein need to be aware of the applicable safety data sheets (MSDS)? Link, if appropriate * [Working Alone](http://policy.uconn.edu/2012/07/30/working-alone-policy/) is not permitted when using chemicals or processes described in the LSOP. | |
| **SECTION 3 – ENGINEERING CONTROLS** | |
| All research with H2S must be conducted in a chemical fume hood with the sash at the lowest working height and with sliding sash panels (if applicable) aligned to form a barrier between the researcher and the experiment.  Chemical fume hoods must have been tested by EHS within the last year. If the hood is not working properly, contact Facilities (486-3113) to repair the hood or EHS to retest (486-3613). | |
| **SECTION 4 – WORK PRACTICES** | |
| * If gas is present, the space should be ventilated. * P.E.L. for H2S is 10 ppm (P.E.L. = Permissible Exposure Limit Defined as the maximum air concentration you can be exposed to in an 8-hour period, 40 Hour Week, without respiratory protection). The system is equipped with a vacuum compressor that integrated with the system of purification of water scrubber. | |
| **SECTION 5 – PERSONAL PROTECTIVE EQUIPMENT (PPE)** | |
| * At a minimum, a lab coat, closed-toed footwear and chemical safety splash goggles that meet ANSI standard Z-87.1 must be worn. * Nitrile gloves indicated in the safety data sheet (SDS) must be worn and no skin should be exposed. | |
| **SECTION 6 – STORAGE** | |
| * H2S gas is stored in a small gas tank located in R415 equipped with vacuum compressor that integrated with the system of purification of water scrubber * Always handle with adequate ventilation, as in a fume hood. * Make sure the tap is turned off after use. | |
| **SECTION 7 – SPILL AND ACCIDENT PROCEDURES** | |
| In case of any leaks,   * Do not rely totally on sense of smell to warn of the presence of the gas * Evacuate the laboratory * Close door(s) to lab and post a “**NO ENTRY**” sign(s) or other warning information on the door, detailing the type of hazard inside * Activate the fire alarm and call 911, detailing the type of emergency   Do not re-enter area until instructed to do so by UCFD or other emergency personnel. Report accident to Dr. Brückner and EHS. | |
| **SECTION 8 – FIRST AID PROCEDURES** | |
| **Inhalation**  Because hydrogen sulfide can cause the nose to stop perceiving its presence, rescue workers must be properly protected. A rescuer could be very easily overcome at levels above 200 ppm. Collapse, coma and death can occur within seconds after only a few inhalations. Ensuring your own safety, move victim to safe area and seek immediate medical attention.  **Eye contact**  For eye contact, flush the eye with copious quantity of water for at least 15 minutes. Call for medical help.  **Skin contact**  For skin contact wash with plenty of soap and water. Remove all contaminated clothing while flushing with water. If the skin reddens or appears damaged, get medical attention.  **Ingestion**  If swallowed, do not induce vomiting. Rinse out the mouth of a conscious victim. Give large quantity of water to a conscious victim. Immediately call for medical help. | |
| **SECTION 9 – WASTE MANAGEMENT** | |
| * After quenching H2S, nitrogen gas is passed through the reaction to get rid of any excess gas. * All waste must be labeled with “Hazardous Waste” stickers or tags, use full chemical names to describe the waste (i.e., no chemical abbreviations or symbols), be stored in sturdy, glass containers with tight-fitting caps or lids, and be stored alone or with other compatible chemicals * Hazardous wastes must be stored at or near a green “Satellite Accumulation Area” sign prior to disposal by EHS   The [Chemical Waste Disposal Manual](http://ehs.uconn.edu/Chemical/ChemWasteDisp.pdf) must be used as a reference | |
| **SECTION 10 – DECONTAMINATION PROCEDURES** | |
| **Work Area**   * Removal - Equipment can be decontaminated through a water rinse using a pressurized or gravity flow * Inactivation – Chemical Detoxification, Sterilization * Dissolve solid contaminates so they may be rinsed * Use surfactants for reducing adhesion forces * Solidifying liquid or gel contaminants to enhance physical removal   **Personal Hygiene**   * Storage/Consumption of food or beverage is prohibited in all laboratory areas * Upon contamination, wash affected areas immediately * Close-toed shoes must be worn * Lab coat must be worn * Must confine long hair and loose clothes when working in the laboratory * Wear protective eyewear | |
| **SECTION 11 – SPECIFIC PROCEDURE** | |
| A typical procedure for using H2S can be found in Brueckner, C.; Rettig, S. J.; Dolphin, D., Formation of a meso-Tetraphenylsecochlorin and a Homoporphyrin with a Twist. *J. Org. Chem.* **1998,** *63* (7), 2094-2098.  **meso-Tetraphenyl-2,3-cis-dihydroxy-2,3-chlorin**  TPP (1.0 g, 1.63 × 10-3 mol) was dissolved/suspended in freshly distilled, ethanol-stabilized CHCl3/10% pyridine (200 mL) and was treated with OsO4 (540 mg, 1.3 equiv).  CAUTION: Fume hood and eye protection!)  The reaction flask was stoppered and stirred at ambient temperature for 4 days and was shielded from ambient light with aluminum foil. The reaction was then quenched by purging with gaseous H2S for 5 min  (CAUTION: Fume hood, trapping of excess H2S) (washing the organic reaction mixture with dilute base solutions to extract the H2S tends to form very stable emulsions). Following the addition of MeOH (20 mL), the precipitated black OsS was filtered off through Celite. The filtrate was evaporated to dryness by a stream of N2 or in vacuo. The resulting residue was loaded onto a silica gel column and eluted with CH2Cl2. The first fraction was starting material (400 mg, 40% recovery). MeOH/CH2Cl2 (1.5%) then eluted **1**. Slow evaporation from a MeOH/CH2Cl2 mixture gave **1** (520 mg, 8.02 × 10-4 mol, 49% yield) as a bright purple crystalline material: mp >300 °C dec; Rf (silica-CH2Cl2/1.5% MeOH) | |

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| **SECTION 12A. APPROVAL** | | |
| I have reviewed, understand and agree to follow this lab-specific standard operating procedure (LSOP) for H2S*.* Failure to follow this LSOP or lab-specific training guidelines is a violation of the [*University Health & Safety Policy*](http://policy.uconn.edu/2011/05/19/health-and-safety-policy/) and [*University Code of Conduct*](http://policy.uconn.edu/2011/05/17/employee-code-of-conduct/).  Further approval and/or review of this LSOP by the PI/Supervisor is required if any of the following events occur:   * A significant change in amount (i.e., doubling of the scale of reaction) or substitution of the chemicals in the procedure is planned * A major change in the agreed-upon experimental set-up is planned (heating instead of room temp, etc.) * Any signs of a failure in safety design or equipment are observed * Any signs or symptoms of a chemical exposure to any personnel are observed * Unexpected and/or potentially dangerous experimental results occur (e.g., fire, uncontrolled buildup of heat and/or pressure, etc.) | | |
| **Researcher Name/Signature** | **Trainer Name/Signature** | **Training Date** |
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| **SECTION 12B. PRINCIPAL INVESTIGATOR CERTIFICATION** | | |
| I approve the contents of the lab-specific standard operating procedure listed above. | | |
| **PI Signature:** | | **Date:** |
| **A HARD OR ELECTRONIC COPY (https://bruckner.research.uconn.edu/safety-resources/) OF EACH LAB-SPECIFIC STANDARD OPERATING PROCEDURE MUST BE READILY AVAILBALE IN THE LAB.** | | |