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| **Brueckner Lab-Specific Standard Operating Procedure (LSOP)** **High Vacuum Manifold** |
| **Principal Investigator(PI):** Christian Brueckner |
| **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** |
| Vacuum and pressure can build up or decrease sharply and unexpectedly. Be aware of any action done to the manifold and the likely consequences. Pressurized glassware can implode/explode or cause a stopcock or septum to pop, causing injury if the user is not behind the fume hood sash. |
| **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 setup/procedures described herein need to be aware of the applicable safety data sheets (primarily for the chemicals involved to be subjected to the vacuum)?
* [Working Alone](http://policy.uconn.edu/2012/07/30/working-alone-policy/) is not permitted when using the vacuum line.
* Lab-specific safety training must be provided by the principal investigator (PI) or other qualified personnel to all researchers working with manifold. Documentation of training is required.
* NEVERhave air running through the vacuum line for any extended period of time when the traps are still up and filled with liquid nitrogen. Thiscould condense oxygen in the traps and result in an explosion.
* Make sure that N2 source is closed when no N2 stream is needed.
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| **SECTION 3- ENGINEERING CONTROLS** |
| Use the double manifold in the fume hood only, with the sash lowered as much as possible.  |
| **SECTION 4 – WORK PRACTICES** |
| * Make sure that all Teflon stopcocks are closed and that all vessels are tightly attached/sealed.
* Turn on the vacuum pump using the switch on the bench located underneath the traps. Listen for any abnormal noises, this includes loud gurgling or hissing, this could indicate opened stopcocks or breaks in the vacuum line.
* Make sure the vacuum pump was well maintained (fresh oil, intact power cords, etc.)
* The hood sash must be pulled down when the manifold is unattended
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| **SECTION 5 – PERSONAL PROTECTIVE EQUIPMENT (PPE)** |
| * At a minimum, a lab coat, closed-toed footwear and chemical safety glasses that meet ANSI standard Z-87.1 must be worn.
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| **SECTION 6 – STORAGE** |
| N/A |
| **SECTION 7 – SPILL AND ACCIDENT PROCEDURES** |
| N/A |
| **SECTION 8 – FIRST AID PROCEDURES** |
| N/A  |
| **SECTION 9 – WASTE MANAGEMENT** |
| Dispose of solvents in the appropriate waste container. |
| **SECTION 10 – DECONTAMINATION PROCEDURES** |
| * The manifold should be kept clean and free from any contaminants caused by experiments.
* Should any contaminant enter the line it must be cleaned ASAP.
* The joints of the line must be kept well-greased and an appropriate level of oil in the bubbler maintained.
* The pump should be serviced as described in its manufacturer's manual.
* If the maintenance is beyond the knowledge of the users a technician should be contracted.
* Periodic cleaning with degreasing solvent (hexane or CH2Cl2), acetone, water, and then *i*-PrOH and/or a base bath is recommended. You should clean it as needed.
* If once-reliable but sensitive chemistry suddenly stops working, clean the manifold.
* Breakages and problems with the manifold can be repaired by a glass blower. Before being repaired all grease must be removed from the joints by washing thoroughly with acetone.
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| **SECTION 11 – SPECIFIC PROCEDURE** |
| * Make sure that all Teflon stopcocks are closed and that all vessels are tightly attached/sealed.
* Turn on the vacuum pump using the switch on the bench located underneath the traps Listen for any abnormal noises, this includes loud gurgling or hissing, this could indicate opened stopcocks or breaks in the vacuum line.
* Raise up the empty Dewar and fill it with liquid nitrogen. Check the gauge to make sure the pressure is dropping. You will need to monitor the levels of liquid nitrogen every few hours and refill as necessary.
* Open desired stopcock to the vacuum line and check that the gauge drops back down to an appropriate pressure. If the gauge does not drop back down or down as far, then the reaction vessel may not be attached or sealed correctly causing it to not hold a proper vacuum. Accumulated solvents in the vacuum pump line could also cause poor vacuum hold.
* In order to use the gas line, the vacuum line cannotbe open simultaneously to that vessel. Close the desired stopcock to the vacuum line.
* Turn on the gas source and check the oil-bubbler to make sure you have a steady flow of gas.
* Open the desired stopcock to the gas line.
* Turn off gas source and close all stopcocks.
* Turn off the vacuum pump and open one of the stopcocks to allow air to vent the system.
* Allow the manifold to thaw at room temperature before removing the traps and disposing of any collected solvents.
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| **SECTION 12A. APPROVAL** |
| I have reviewed, understand and agree to follow this lab-specific standard operating procedure (LSOP)*.* 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.)
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| **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:** |