Environmental Health & Safety Policy Manual		
Issue Date: 10/6/2017	Updated: 06/27/2024	Policy # EHS-300.07
Biological Material Vacuum Aspiration Assembly, Use, and Maintenance Procedures		

1.0 PURPOSE

Wide varieties of biohazardous materials are used throughout the LSU Health Sciences Center and are commonly manipulated or transferred using vacuum systems. Vacuum aspiration inactivates biologically hazardous liquid materials. Aspiration of liquids generates aerosols inside the aspiration flask that could contaminate the house vacuum line. These procedures serve as general guidance for safely using these systems and protecting the house vacuum systems from contamination.

2.0 SCOPE

These procedures address the proper assembly, use, and maintenance of all vacuum systems with biological materials.

3.0 RESPONSIBILITIES:

3.1 Principal Investigators/Supervisors shall:

- Develop and maintain workplace-specific procedures for aspiration of biohazardous or infectious materials.
- Use the proper aspiration setup as detailed in this policy.
- Report any vacuum incidents involving biohazardous materials immediately to Environmental Health and Safety (EH&S). Follow incident/accident reporting procedures outlined in EHS - 400.06, Incident/Accident Reporting and Investigation Policy.
- Train laboratory personnel utilizing a vacuum aspiration system on this policy.

3.2 Employees shall:

- Be trained on the proper use, handling, and spill response procedures regarding aspiration of biohazardous materials per EHS – 300.2, Biological Spill Response Procedures.
- Wear Personal Protective Equipment and use spill control equipment in the proper manner.
- Report all biohazardous releases to their supervisor.

3.3 Environmental Health & Safety (EH&S) shall:

- Provide technical assistance and product selection guidance for safe and proper use of house vacuum systems and local vacuum pumps.
- Inspect aspiration apparatuses during routine laboratory inspections.

4.0 EQUIPMENT AND MATERIALS:

The following equipment and materials are needed to support proper assembly of a vacuum aspiration system (See Figure 1):

- Biological Safety Cabinet (BSC) – For BSL2 or higher
- House Vacuum Line or Pump
- Inline, Hydrophobic HEPA Filter (See Appendix A)
- Disinfectant (Bleach is recommended)
- Vacuum Flask (Use plastic flasks as they minimize potential for breakage)
    - **Note:** If overflow is a problem, put two flasks in a series.
- Rubber Stoppers
- Tubing (use tubing of sufficient strength that will not become kinked or cause vacuum pressure to build)
- Plastic Aspiration Pipettes
- Secondary Container – For aspiration setups in BSL2 labs outside of the BSC
- Biological Hazard Sticker

5.0 PROCEDURES

5.1 Assembly

Vacuum-assisted devices can present implosion hazards under pressure and risk of infectious aerosol generation. The CDC/NIH Biosafety in Microbiology and Biomedical Laboratory (BMBL) recommends using the system shown in Figure 1 for BSL-2 laboratories and above. When vacuum suction is applied, the media flows from the source container to the first flask (A). The first flask contains disinfectant. The second flask (B) is optional and is used as an overflow to protect the vacuum system. An inline HEPA filter (C) is placed just before the vacuum source to stop contaminated liquid from entering the vacuum system.

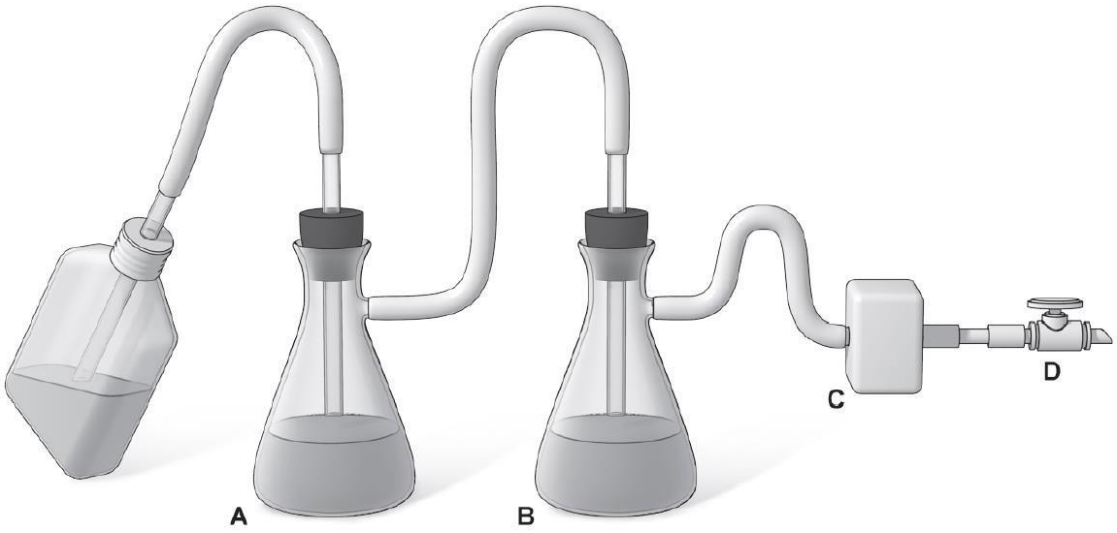


Figure 1. One method to protect a house vacuum system during aspiration of infectious fluids. Recommended vacuum aspiration set-up for biohazardous materials. The left suction flask (A) is used to collect the contaminated fluids into a suitable decontamination solution; the right flask (B) serves as a fluid overflow collection vessel. An in-line, hydrophobic HEPA filter (C, see Appendix A) is used to protect the vacuum system (D) from aerosolized microorganisms.

1. Assemble the apparatus (See Figure 1).
2. Label flask(s) with a biohazard label.
3. Prepare vacuum flask(s) with disinfectant (recommend 10% bleach by volume).
    - Add sufficient disinfectant to the container (A) for the desired final concentration.
    - OPTIONAL: Use a secondary container (trap) (B) with disinfectant between the collection container and filter to ensure fluids do not enter the filter or vacuum line.
    - **Note:** The efficacy of bleach continuously diminishes over time. Adding fresh bleach is recommended.
4. Store the collection and overflow flasks inside the cabinet if there is enough space.
    - If collection flasks must be stored outside the cabinet on the floor, place the flask in secondary plastic containment out of the way of foot traffic.
    - Consider replacing glassware with appropriate plastic vessels.
5. In the BSC, install the HEPA filter just before the vacuum port (D). Orient the filter so the inlet is on the fluid side and the outlet is on the vacuum side.
6. In the BSC, attach tubing to the vacuum port (D) and to the HEPA filter (C).
7. Attach a second tube to the other side of the filter and to the vacuum container.

- Position hoses so that they are secured and will not knock over glassware.

8. Cap the container(s).
9. Use a third tube to connect the inlet to an aspirating pipette.

5.1 Operating the Aspirator

1. Affix a fresh sterile pipet tip to the plastic aspiration pipet. This helps maintain sterility.
2. Monitor fluid levels and stop the process **before** liquid reaches the end of pipet to prevent overflow of fluid leaking into the HEPA filter.
3. When complete and before disassembling, aspirate a small amount of disinfectant through the tubing to help inactive any materials within the tubing.
4. Ensure contact time is appropriate for the disinfectant chosen and material being inactivated. For bleach and cell cultures, allow at least 30 minutes.

- Volatile or flammable chemicals shall **not** be aspirated into the house system. Contact EH&S immediately if any infectious fluids are aspirated into the house system.

5.2 Maintenance and Disposal

1. An appropriate amount of fresh bleach or other disinfectant shall be kept in the collection and overflow vessels to disinfect collected infectious fluids. Discard the collection vessel preferably after every use, but at minimum when it is ¾ full of liquid.
2. Inspect the system regularly and replace any chipped or damaged glassware immediately.
3. HEPA filters must be replaced every six months, or as blockages occur. Dispose of expired filters into the regulated medical waste receptable.
4. Drain disposal is not allowed if the media contains a radiological constituent or chemical constituent other than the disinfectant. Contact EH&S for disposal assistance.

5.3 Laboratory Vacuum Pumps

- Stand-alone or local vacuum pumps may be necessary for rooms that do not have access to house vacuum supplies. Choose the proper vacuum pumps for the planned experiments and set up the fluid aspiration traps as in Figure 1.
- Local vacuum pumps may need to be used for special chemical procedures. If special vacuums are used for volatile chemical procedures, these must be vented to a chemical fume hood.
- Submit a work request using http://bob.lsuhsc.edu/ to have vacuum oil disposed of by EH&S.

6.0 TRAINING

All persons working with vacuum flask aspirations should be trained on this

policy as a part of their laboratory-specific training.

7.0 REFERENCES

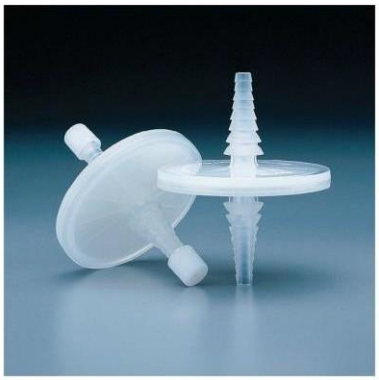
- Centers for Disease Control and Prevention – BMBL 6th Edition
- Biological Safety, Practices and Principles, 5th Edition

8.0 APPENDICES

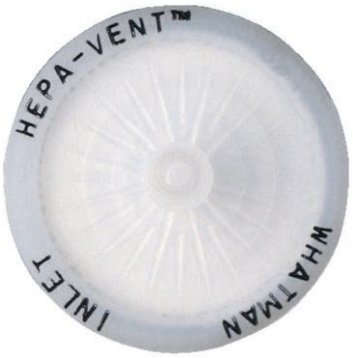
Appendix A - Vacuum Line HEPA Filter Examples

Vacuum Line HEPA Filter Examples

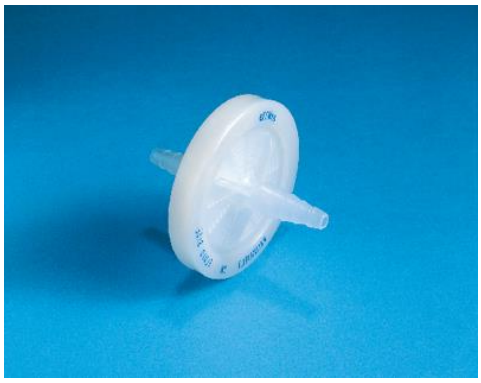
Millex-FG, 0.20 µm, hydrophobic PTFE, 50 mm–– Part # SLFG75010



Whatman™ HEPA-Vent Filter – Part # 6723-5000



Vacushield™ Vent Device – Part # 4402



APPENDIX A