

Section 5.9 Title: Handling Needles and Syringes
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Revision Date: 11/01/19
P.I.: Prof. John F. Berry

Prior Approval: This procedure is NOT considered hazardous enough that prior approval is needed from the Principal Investigator.

Involves Use of Particularly Hazardous Substance (PHS)? No
 Carcinogen Reproductive Toxin High Acute Toxicity
Does this procedure require medical surveillance? No
Does this require use of a fit-tested respirator? No

Brief Description of Procedure:

Overview and procedures for selecting, using, and cleaning needles and syringes to transfer liquid solvents and reagents.

Location: *List the locations (buildings/rooms) where this procedure may be performed. For use of a PHS indicate a more precise location within the room, if appropriate, as a designated area.*

Daniels Chemistry - All Berry group labs

Chemicals Involved:

Chemical	Physical or Health Hazard (e.g. carcinogen, corrosive)
Dependent on chemistry	Consult relevant SDSs for more details

Other Hazards: *Include hazards, other than chemical, that may be present during operation of the procedure.*

Sharps (needles)

Exposure Controls: *(Check all that apply)*

PPE: Safety Glasses Face Shield Chemical Splash Goggles
 Chemical Apron Gloves (Nitrile) Lab Coat
 Respirator (type) Other:

Engineering Controls:

Fume Hood Biosafety Cabinet Glove box
 Vented gas cabinet Other:

Administrative Controls: *List any specific work practices needed to perform this procedure (e.g., cannot be performed alone, must notify other staff members before beginning, etc.).*

Notify other lab members when transporting uncapped sharps.

Task Hazard Control Table: *For procedures involving numerous steps, it may be convenient to indicate specific requirements for individual tasks in the table below:*

N/A

Waste Disposal: *Describe any chemical waste generated and the disposal method used.*

Dispose of the reagents involved as appropriate. Consult SDSs for more details.

Accidental Spills: *Describe the procedure for handling small chemical spills that may occur during this procedure. Note that for large spills it may be appropriate to call 911.*

Small spills may be cleaned with an absorbing material. The material should be placed in a fume hood to dry after the spill has been cleaned.

Decontamination Procedures (required for PHS use): *Describe the procedure for decontamination of personnel and equipment.*

N/A

Training: *Describe any training needed prior to performing this procedure. Include training performed in-lab and any required demonstrations of competency.*

Training is required. Training is performed by a group CHO or another lab member they have approved. The procedure will be demonstrated at least once and new members will be supervised their first time.

Principle Investigator Approval: I have reviewed this procedure and approved it for use. Note: Modifications to the procedure may require update to this form.

Name: John F. Berry

Signature: _____

Date: _____

Handling Needles and Syringes

General Notes:

Syringes with needles are commonly employed in transferring air-free and air-sensitive solvents and solutions. There are many types of needles and syringe, and there are pros and cons to every option that one should consider before use.

Glass-barrel syringes: These syringes are standard fare in many synthetic labs. They feature Luer lock fittings for securing needles and can be dried in an oven to ensure no water remains on the surface. Because they are glass, they are fragile and will break if dropped. Because they are not ground glass, they do not inherently make an air-tight seal. The seal is made when a small amount of solvent seeps between the plunger and the barrel. For this reason, they should be wetted with the appropriate solvent before transferring very air-sensitive or pyrophoric solutions. It is also important to keep the barrels and syringe bodies together, as they are not generally interchangeable.



10 mL syringes. From left to right: glass-barrel, gas-tight, and disposable. Note the metal Luer lock fittings on the glass-barrel and gas-tight syringes.

Disposable plastic syringes: These syringes are also very common for transferring liquids. They are very convenient and available in a wide variety of sizes. Because they are disposable, they are always clean and never need to be cleaned before use. Because they are plastic, they do not break and water does not adsorb to the surface. However, many organic solvents can degrade the syringe body, so they may not last for many repeated transfers. They also do not have Luer lock fittings and needles may fall off if not held in place. The choice between glass-barrel and plastic syringes is largely a matter of preference.

Gas-tight syringes: Syringes such as Hamilton brand syringes are designed for very accurate measurements and strict air-free transfers. These syringes have a glass body but have PTFE and other materials in the tip, and therefore must not be heated in an oven. Because of this, they should be rinsed with a small portion of solvent to remove surface water before use. They are also very fragile and much more expensive than other syringes. Gas-tight syringes should be used whenever precise volume measurements or very strict air-free conditions are necessary. Because the plungers use PTFE to form a seal, the plungers and barrels can be swapped as long as they are the correct size.

Reusable steel needles: Often much longer than disposable needles, reusable needles are often necessary in some scenarios, such as withdrawing solvent from a still or large solvent bottle. Because they are reusable, they require cleaning between use, especially when they are used for more than just solvent transfer. These needles can also become kinked or blunted over time, requiring disposal and replacement. Because they are entirely made of metal, they can be heated in an oven to remove any surface moisture. While generally less sharp than disposable needles, reusable needles are still quite sharp and should be handled and disposed of as chemically-contaminated sharps.

Disposable needles: Like disposable syringes, the key advantage of disposable needles is convenience. They are always clean, sharp, and available in various lengths and gauges. Because the connector is plastic, they cannot be heated in an oven; however, they contain no glass and water will not adsorb significantly to the surface. Disposable needles are very sharp. Be sure to familiarize yourself with procedures for uncapping and recapping these needles before use.

General Procedure:

Uncapping needles: Do not pull the cap off directly. When the cap comes free, you reflexively push your hands back together, which often results in stabbing yourself with the needle. Instead:

1. Remove the needle from the packaging. Affix it firmly to the syringe. If the syringe has a Luer lock, twist the needle firmly or use pliers to secure the needle.
2. Hold the syringe with both hands. Place a thumb between the base of the needle and the cap. Use at least one finger below your thumb to brace the needle.
3. Press down and forward against the needle cap with your thumb. Because no part of your body is in front of the needle, you will not stab yourself when the cap comes loose.
4. If the cap is particularly difficult to remove, it may help to use your second hand to twist the needle cap. This can make it easier to remove with your thumb.

Note: Some people prefer to uncap needles by pulling firmly and quickly enough that they avoid the recoil reflex and remove the cap cleanly. While this may be quicker and easier, it is not recommended because error in technique can still result in a recoil stab.

Recapping needles: This is not advised. Do not recap needles without very good reason. It is very easy to poke your hand while recapping needles, and the needle being recapped is likely contaminated with hazardous chemicals. Recapping injuries can be very serious. If you must recap a needle, use the "one hand scoop" technique:

1. Place the needle cap on a flat surface. Hold the syringe with one hand. Keep the other hand clear of the work area.
2. Carefully lower the needle tip toward and into the needle cap.
3. When the needle is mostly in the cap, scoop upward to lift the needle cap onto the needle.
4. Once the needle cap is on the needle, use your second hand to secure the cap to the needle.

Disposing of needles:

When a reusable needle needs to be disposed of, it should be carefully placed tip-first into a sharps disposal container. If the container is too full to easily insert the

needle, Dispose of the old container and use a new one. There is no need to bend or otherwise modify the needle before disposal.

When disposing of a disposable needle on a disposable syringe, you can simply place the entire needle and syringe assembly in a sharps disposal container.

When disposing of a disposable needle without also disposing of the syringe, it is best to use pliers to hold the needle and twist/remove it from the syringe body. As soon as the needle is loose, it should be placed directly in a sharps disposal container.

Cleaning reusable needles and syringes:

Consult the SOP on cleaning labware for tips on cleaning reusable needles and syringes.

Transferring liquids with syringes and needles:

Note: sometimes needles and syringes are used without needing to be air-free. Several steps of this procedure can be omitted in such a case.

1. Decide what type of needle and syringe you need for your transfer.
2. Make sure both your source (still, reagent bottle, etc.) and receiving container are both under a positive pressure of inert gas and have septa in place.
3. Affix the needle to the syringe. Uncap the needle if necessary.
4. Pierce the septum on your source container carefully with the needle.
5. Slowly pull inert gas into the syringe body.
6. Remove the needle from the source container and push out the inert gas.
7. Repeat steps 4-6 at least three times to ensure the volume of the needle and syringe are free from air and moisture.
8. If using a glass or gastight syringe, pull up a small amount of solvent into the barrel of the syringe. Fill the rest of the syringe body with inert gas. Pull the needle out, swirl the solvent over the entire syringe body to remove adsorbed water, and empty the solvent and inert gas from the syringe.
When working in a glovebox, steps 4-8 are not necessary.
9. Insert the needle into the source container. Dip the needle below the liquid level.
10. Slowly and carefully begin drawing liquid into the syringe. Do not pull back the plunger quickly, as this can pull air into the syringe. Draw up slightly more solvent than you need.
11. If possible, do this step with the needle still in the source container. Tip the syringe so the needle is pointed upward and any gas bubbles rise to the surface. Depress the plunger to remove the inert gas and excess liquid. When you have the desired volume in the syringe, raw back in a small amount of inert gas to protect the liquid. Remove the syringe from the source container.
12. If you need to transport the needle and syringe, pierce the tip of the needle into a clean septum to cover the tip and protect the contents of the syringe. Pinching the tip of the needle carefully with your fingers is adequate for short distances.
13. Insert the needle into the receiving container. If possible, keep the syringe pointed upward with the needle bent so that any gas rises to the top.
14. Gently depress the plunger to dispense the liquid into the receiving container.

15. A small amount of liquid will be left when the plunger is fully depressed. This is normally and accounted for in the measured volume of the syringe. If you require precise stoichiometry, remove the needle and dispose of the remaining liquid appropriately. If adding a slight excess is not detrimental to your chemistry, you can tilt the syringe upside down, draw in inert gas from your receiving flask, and depress the plunger again to dispense the last bit of liquid before removing the needle from the receiving container.
16. Dispose of or clean the needle and syringe appropriately and carry on with your chemistry.