

Transfer of chemicals using syringes

The use of syringes is the most frequent method for transferring liquid chemicals or solvents in the organic laboratory. It is surprising how many mistakes can be done for such a simple technique!

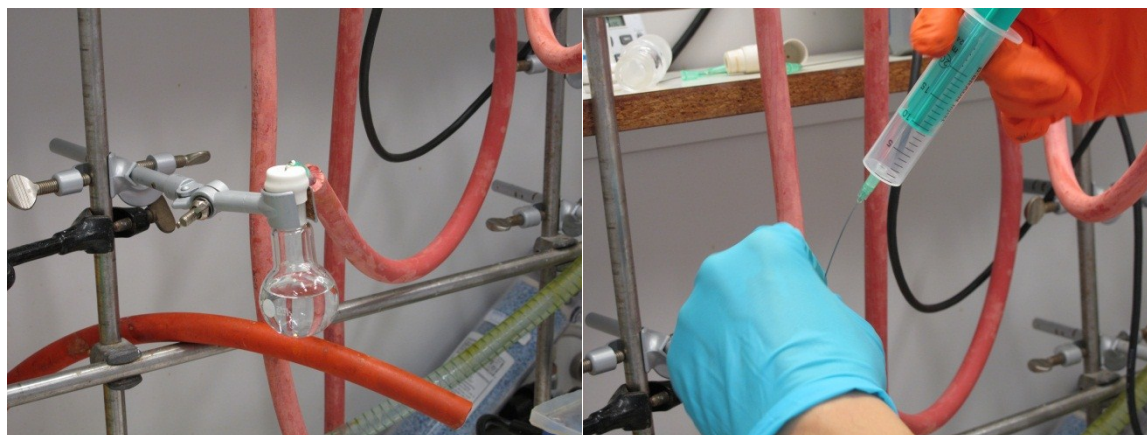
Step 1: Preparing the syringe

Put the needle on the syringe. Use both your hands and push hard to have the two parts fit together. Many accidents happen because people did not take the time to tighten their syringe well!



Step 2: Flushing the syringe

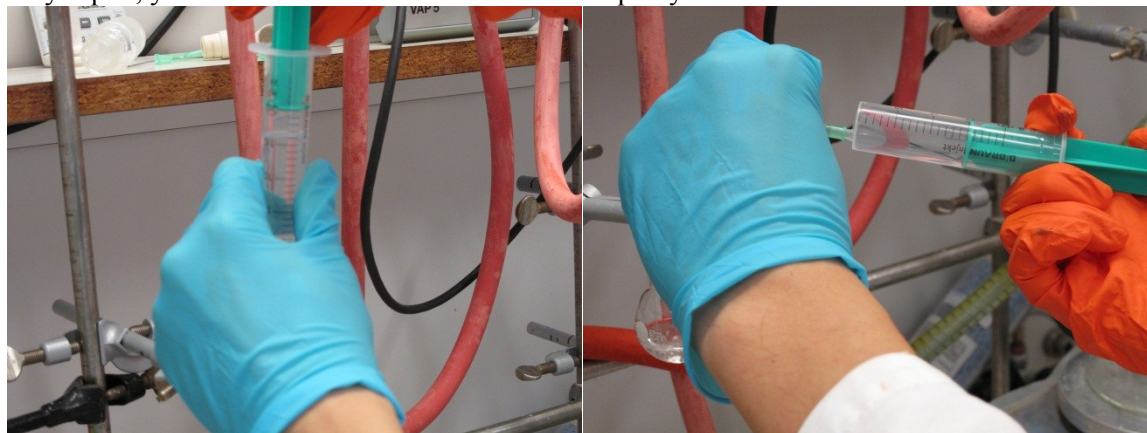
Go to the flask under inert gas and flush your syringe **three times** with inert gas. If you use a flask with a septum and a tube connected via a needle to the line, like in the picture, make it slowly: the needle is very thin, if you go too fast, air could enter the syringe! You don't need to go to the top of the syringe when you do that, as it is the entrance only which you need to flush. Obviously, remove the syringe from the flask before emptying it!



Step 3: Filling the syringe.

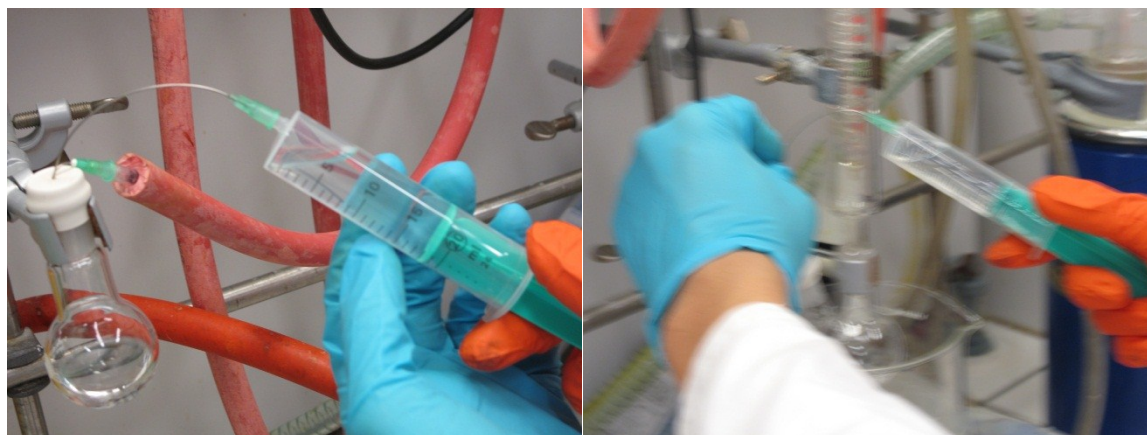
Take your solvent or chemical. Always held the two parts of the syringe together with one hand, especially if the liquid is viscous. Again, you should go slowly, so that only a little bit of gas is entering at the same time as the liquid. The chemist on the picture was a little bit too impatient. Never fill syringes over the maximum.

When you have enough solvent, bent the needle and put the extra gas back to the flask. Once you have only liquid, you can measure the exact amount of liquid you want.



Step 4: Transfer of the chemical

Before transferring the chemical, bent the needle more and put some inert gas on the top of the syringe to protect the chemicals during transfer. This is very important for pyrophoric materials. If you forget to do it for *tert*-BuLi, it will take fire! Ideally, the second end should still hold the top part of the syringe (not ideal on the picture). Transfer now the chemicals rapidly, using one hand to keep the needle bent and go through the septum of your reaction flask. Always aim for the center of the septum.



Step 5: Addition of the chemicals:

Add the chemical. It is now absolutely essential to hold the needle with the second hand, as you are using pressure. If you need to make a controlled dropwise addition, the best position is shown on the right picture below: Put your thumb on the back on the syringe and push regularly using your index to get perfect control (orange hand). The other hand is still holding the needle. Please be aware that the volume indicated on the syringe has been calibrated taking into account the dead volume: you should consequently not try to empty the front of the syringe! If you have a very precious chemical and want to transfer everything, then you should use the balance: weight the exact amount of chemical in the syringe than wash it three times with solvent to transfer everything. In any case, if you are working on small scale, the volume is not precise: you should weight your syringe before and after injection to know the exact amount of chemical you have injected.

**Step 6: Discarding the syringe:**

The last step is very important. Usually, it is not advised to put back the cap on the needle (many accidents occur like that). If the syringe only contains an inert solvent, it can be discarded directly in the adequate waste container. If you are transferring a toxic (or stinky) chemical, you should first dilute it with a solvent and put all in a dedicated special waste container. Wash your syringe three times before discarding it. If you are transferring a very reactive reagent, first dilute it by taking a little bit of inert solvent under nitrogen in our syringe, then inject it in a flask with water. Finally fill up your syringe with water before discarding it.

