spex® certiprep

Information Brief

Syringes

There are multiple types of syringes that can be used in the laboratory. Each syringe has a different purpose based on what is being performed in the lab as well as different care and cleaning techniques. A microliter syringe can be used only when using liquids. They are ideal for homogeneous samples that are not prone to precipitation or bonding with the glass walls of the syringe. A heterogeneous solution may be used but the syringe must be cleaned diligently after each use. In some cases, that is not enough to keep the syringe clean which will result in the tight tolerance between the glass and the plunger. The plunger cannot be interchanged or replaced with a microliter syringe so a gastight syringe is the best option for a heterogeneous syringe.

The gastight syringe is ideal for dispensing liquids and gases. The precision-machined PTFE plunger tip creates a leak-free seal and keeps the barrel free of the sample. This is especially useful with heterogeneous samples as it reduces the chance that deposits will build up and cause the plunger to freeze.

Another type of syringe that may be used in the lab is a digital syringe. This syringe eliminates parallax errors by providing a digital readout on an LCD screen on the side of the syringe. An adjustable plunger-stop guarantees reproducible plunger placement. Although being accurate, not all syringes are available as a digital syringe. One type of syringe that is not offered with a digital option is a manual HPLC syringe. This syringe is specifically designed for manual or automatic injection into high pressure ports. The selection of the appropriate syringe for HPLC applications takes three aspects into account: the type of injection valve, the sample properties, and the injection volume. The volume of the syringe should be selected based on the volume and type of injection. The GC Autosampler syringe is also used to inject a sample but unlike the manual HPLC syringe, a GC Autosampler is used with a gas chromatograph. Automatic injection has become common as it improves reproducibility and speed. The syringe has a point style which is specifically designed to withstand repeated penetration through the GC septa.

When a syringe is being used for the first time of the day, it should be examined to check fo cracks or dried residue from previous experiments. After being inspected, fully inspect the syringe by aspirating and dispensing a sample solvent to remove trapped air which can cause inaccuracies. The sample should then be dispensed into an appropriately labeled waste receptacle to avoid contamination. If there is trapped air in the syringe, there are a few steps that can be taken to remove the air. One method is to completely prime the syringe with the sample. Immerse the needle point 2 to 3 mm into the sample solution and then draw the dispense sample into the solution until bubbles are no longer visible in the syringe barrel. Alternatively, remove air bubbles by turning the barrel upright and allowing the air bubbles to rise to the needle exit. Then dispense both the air bubbles and a very small amount of the sample. The user can then draw more of the sample to reach the desired measurements. The needle tip should then be wiped with a KimWipe.

Another important step in syringe care is making sure there is no sample carryover when using multiple samples with the same syringe. Sample carryover can compromise the quality or data obtained so it is important that all precautions are taken. In some cases, it is a minor inconvenience, while in other scenarios, unacceptable sample carryover levels can reduce laboratory productivity by requiring retesting of samples. The syringe should first be rinsed 5 to 10 times with a solvent. The first 2 to 3 solvent samples should be discarded into the waste receptacle to also avoid contamination. If the needle at some point becomes partially clogged, flush the syringe with an appropriate solvent to stabilize the clog. For a completely clogged needle, do not attempt to clean by forcing liquid or compressed air through the syringe. Excessive pressure will split the glass barrel. Use a cleaning wire to dislodge any foreign material then flush with a cleaning solution to further dissolve the clog. Once the clog is removed, rinse the syringe and needle thoroughly with deionized water. Another method to clear a clog is to remove the plunger, if possible, and fill the barrel with solvent using another syringe. The plunger is then inserted again and used to push the solvent out. Wipe the exterior surfaces of the syringe barrel and needle dry with a KimWipe and then make sure that there is no residual cleaning agent in the syringe before using it again or storing it.

To sterilize the syringe, an applicable sterilizing agent, such as ethylene oxide, can be used or an autoclave can be used. Syringes may be autoclaved at a temperature of up to 115°C, however, repeated autoclaving will shorten syringe life. When autoclaving, cemented needle syringes are not recommended as glass and metal expands at different rates which would compromise the glued connection. It is important to remember to let the syringe cool off after autoclaving and to also not contaminate it again by touching it after being sterilized.

The last parts of the syringe that may require special care is the needle and the plunger. If the plunger ha become frozen, do not force the plunger to move. Too much pressure can irretrievably bend the plunger or crack the syringe glass barrel. Plungers for a microliter syringe are not replaceable but the gastight syringe plungers are. Avoid touching the plunger with your fingers because oil due to handling the plunger may interfere with proper operation. The needle must be handled with extreme caution as well. It can bend easily and is prone to contamination or accidental personal injury.

For additional information, contact Spex CertiPrep at +1.732.549.7144 or via email at spexsales@spex.com.

Citations

Hossain, T.F. Bakir, M.E. Mandani; Correspondence, Journal of Tropical Pediatrics, Volume 34, Issue 5, 1 October 1988, Pages 262-263, https://doi.org/10.1093/tropej/34.5.262

Hamilton References Guide: Syringes and Needles. (n.d.). Retrieved October 25, 2018, from https://www.hamiltoncompany.com

Hamilton Syringe Care and Use Guide. (n.d.). Retrieved October 25, 2018, from https://www.hamiltoncompany.com

Syringe Care. (n.d.). Retrieved October, 29, 2018 from https://www.sigmaaldrich.com/analytical-chromatography/syringes/learning-center/general-syringe-care.html

Waters Alliance HPLC System: Reduced Carryover. (n.d.). Retrieved October 29, 2018, from http://www.waters.com/webassets/cms/library/docs/wpp224.pdf