

Safety, Hazard Containment & Sterilising Equipment



Why failing to decontaminate your glassware could be devastating for your research

Nadine Bellamy-Thomas, National Account Manager for decontamination and medical, Miele, miele.co.uk.

No matter what your area of research is, contamination is a daily threat which your laboratory must take seriously.

Contamination comes from a wide variety of sources, including the people working in the lab, the water source and even the air itself. But one major risk factor comes from improper cleaning and disinfection of the laboratory glassware and equipment being used in testing and research.

Clean laboratory glassware is essential to any successful laboratory and, in many lab environments, it must be completely free of any residue, grease or impurities to ensure results are accurate and uncompromised. This level of clean is extremely difficult and time-consuming to achieve through handwashing, so using a laboratory-standard glasswasher or washer-disinfector can help you achieve consistent and reliable cleaning results.

Cleaning at high temperatures will remove contaminants including viruses, spores, fungi and harmful bacteria. If equipment is needed to be sterile, an autoclave will be required.

Having a written policy for all team members using your laboratory will help make sure that all cleaning, disinfection and sterilising processes are properly adhered to. It is also important to establish a routine where thorough cleaning and disinfection is carried out at the start and end of every day. Documenting the cleaning status of every item of equipment in a logbook will help make sure procedures are followed and nothing is missed.

Improper technique is responsible for much of the contamination which occurs in laboratories, so identifying and addressing any bad habits in the team is an important part of maintaining a clean and contamination-free environment.

Thoroughly cleaning and decontaminating your laboratory will also ensure any regulations are adhered to and avoid any potential legal ramifications as you will be able to prove that all necessary precautions have been taken.

Improper cleaning can lead to errors in results

If cleaning is not carried out properly, this could potentially cause errors or inaccuracies in your results and even the creation of unwanted products. Even microscopic traces of foreign materials could affect results, which could have an impact on your overall research. It can also potentially put members of your team at risk if they are handling glassware which is not free from contaminants.



Failure to decontaminate equipment properly will also lower the overall hygiene levels in the workplace and mean that your team has less control over which substances are present in the laboratory environment.

Contamination in the laboratory can belong to three broad categories – biological, physical and chemical. When it comes to biological contamination, the contaminants most likely to cause a potential problem are bacteria, moulds, yeasts, viruses, mycoplasma and cross-contamination from other cell lines in the same lab.

Laboratory personnel themselves are a major source of contamination and physical contaminants can include hair, flakes of skin and bodily fluids. Contamination can also come from objects within the laboratory and could include materials like flakes of paint, broken glass or dust particles, as well as traces of detergent which might be left behind from cleaning processes.

Chemicals being used within the laboratory also pose a serious contamination risk and it is vital to ensure even the smallest traces of substances are removed before the equipment or glassware is used for another purpose.

Chemical contamination is classed as any non-living substance which might have an undesirable impact and can include impurities found in gases, water, metal ions and detergents.

For researchers who work with microbial cultures, contamination is one of the biggest risks and can result in false-positive results and the loss of valuable laboratory strains, which could cause significant delays to research and be time-consuming and expensive to replace.

Most contamination occurs through human error and problems with technique or procedures. While laboratory glassware and equipment are only one source of potential contamination, ensuring robust cleaning, disinfection and sterilisation takes place in your laboratory whenever it is needed is essential to minimise the risk.

It is common for laboratories to put a lot of thought and planning into avoiding any potential cross-contamination of samples. However, making sure glassware and equipment is cleaned effectively can sometimes be neglected in comparison with team members focusing greater attention on other areas of laboratory safety and cleanliness.

Cleaning is essential part of good laboratory techniques

Good laboratory technique demands that all glassware must be both physically and chemically clean. Depending on what it is being used for, it may also need to be sterile.

Although some lab workers may prefer the traditional method of cleaning their equipment by hand, this is highly likely to leave residual contaminants on the glassware and other items, even if they appear completely clean to the human eye. Hand cleaning can also pose a potential safety risk to staff as accidental breakage can cause injury.

Common contaminants found on glassware used in a laboratory environment include traces of chemicals used in previous experiments, residue from detergents used in cleaning, microbes, bacteria and grease. Grease is particularly likely if the glassware has been handled at any point by someone who wasn't wearing gloves. Food particles, including fats and proteins, may also remain on equipment after sample analysis has taken place.

In medical laboratories which deal with cell cultures, microbiological contamination is a real threat and it is not uncommon for mycoplasma to infect cell lines. This is because the bacteria can spread through the air and anything which is not completely sterile poses a risk.

Even new laboratory glassware must be carefully treated before it can be used. Unused glass is slightly alkaline but laboratory glassware must be completely neutral so it does not have an impact on any precision results. This means it must be treated with acid (usually several hours in a 1% solution of hydrochloric or nitric acid) and then cleaned thoroughly before it is used for the first time.

Making sure it is free from any grease is vital as grease will prevent the surface of the glass being uniformly wetted by distilled water. If your glassware is used to accurately measure precise volumes of liquid, it is particularly important that no traces of grease are present on the surface of the glass.

If they are, the volume of liquid delivered will be affected as the contaminants will prevent the glass from being wetted uniformly, changing the way the liquid is within the container. Even the smallest amounts of impurities will have an impact on the meniscus and make it difficult for laboratory workers to make the correct calculations and adjustments. This applies also to watermarks, among other impurities, which can be removed and prevented with deionised water.

Cleaning solutions, soaps and detergents can also have a negative impact so it is possible that even the act of cleaning glassware can contaminate it if it is not rinsed thoroughly so all residues are removed. Traces of detergents can pose a particular risk if your laboratory deals with biological testing as they can interfere with both serological and cultural reactions.

Keeping your lab safe and optimise research processes

Using laboratory glassware washers, like those from Miele Professional, is a way of ensuring your cleaning and reprocessing is carried out quickly and efficiently to



consistently high and reliable standards. This will save your team members time, meaning they are free to focus on other tasks within the laboratory.

Our machines are also designed to use water and chemicals efficiently to keep running costs down and lessen the environmental impact.

It is important to consider the drying process to ensure this doesn't add contaminants to the glassware. Choosing a product which includes a HEPA filter will ensure that all particles which may be present in the air used for drying are removed and don't end up having an impact on your equipment.

The design of glassware washers is also important as any crevices, nooks and crannies within the machine can hold contaminants like blood, soil and other materials. Choosing a product with a smooth internal finish and no heater elements within the chamber itself will minimise the risk of products accumulating within the appliance and remove a potential source of contamination. This is something the designers at Miele took into consideration when working on our range of glassware washers and washer disinfectors.

Laboratory sinks, incubators, benches and other furniture within the laboratory are also potential sources of contamination, along with the water source itself. All unnecessary equipment should be removed from workspaces and decontaminated as quickly as possible after use before being stored appropriately to reduce this risk.

If it is impossible to properly clean glassware straight after use, it should be put in water until thorough cleaning can take place. This is because residues become more difficult to remove the longer they are left and they are more likely to stick to glassware if it is left standing around on a work surface.