



science safety

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## Lab Washers vs Traditional Dishwashers

Many secondary school science departments have a traditional dishwasher purchased at a local appliance store and installed in the prep area or chemical storeroom. Many schools use these stainless-steel lined dishwashers for common glassware, and wide mouth vessels like beakers but may not clean narrow stemmed glassware such as a test tubes, volumetric flasks or other specialty glassware. Science Safety will help you understand the pros and cons to the decision surrounding which type of dishwasher is ideal for your laboratory needs by using this simple decision tree to assist in making your choice. Please note that there is no legislation that mandates what type of dishwasher to use in your science department but there are some preferences based on the types of chemicals being handled and the type of biological hazards being used.

Let us be clear from the onset. Without a doubt, a household dishwasher is a less expensive alternative to a laboratory glassware washer initially but may not have the advanced features needed for laboratory work. You should also understand that typically the warranty on a domestic dishwasher is void when installed in a location other than a home setting. So if a repair is required, since it is installed in a school building, the warranty would be void and could be costly for maintenance.

Since many residential dishwashers have interiors with components not resistant to commonly used laboratory chemicals, they may not withstand heavy use, and without a valid warranty, not economically repairable. Residential washers feature open racks with pins to fit plates, glasses and ceramic or plastic cups with washing baskets to hold knives, forks and spoons. These racks may or may not be able to easily accommodate the glassware, utensils and tools found in a lab environment. Typically, the wash temperatures are lower on a domestic dishwasher, these use gravity drying, vs. hot air drying, pure water rinses are not an option, and racks do not have the water spraying injector spindles. But they do cost significantly less than a specialized commercial lab washer.

Lab washers are by far superior to the residential dishwasher for many reasons. The lab washer typically has injection spindles that can truly spray and clean the inside of the smaller narrow glassware and can even provide deionized water rinse as a feature on certain models. Labconco has put together a great reference that will help you decide on the type of dishwasher or lab washer to use in your department. <https://www.labconco.com/articles/5-reasons-for-a-glassware-washer>

Running and maintaining a lab can be extremely costly; however, deciding to move forward with a home dishwasher just to save initial upfront costs is a mistake. Here are six reasons why a home dishwasher is not sufficient for a science lab. When involved with the planning of a new laboratory or a renovation, science departments should consider the benefits of a proper lab washer for their science and STEM glassware. Clean and non-contaminated

glassware is often the cornerstone of many activities and experiments and the chemical interactions should not be influenced by possible unclean glassware.

#### 1. Increased risk for cross contamination

Generally, home dishwashers only use a single pump for circulating water. This means that clean and dirty water pass through the same pump. Simply put, the incoming clean water traveling through the pump could have residual contaminants from dirty wash water. A true laboratory quality glassware washer should employ separate wash and drain pumps, greatly reducing the potential for cross contamination. Most lab washers have at least two independent pumps.

#### 2. Maximum heating temperature

Kitchen dishwashers are not calibrated for lab sanitization. The standard operating temperature for residential dishwasher is between 130° F and 170° F (55° C – 75° C). While that is hot, a higher temperature is needed to properly clean your labware. Laboratory glassware washers can reach a maximum internal temperature of 199° F (93° C). At that temperature, coupled with appropriately measured time, glassware can be considered sanitized. It's also important to remember that when heating to higher internal temperature, laboratory glassware washers must be constructed of components and materials that can accommodate higher temperatures.

#### 3. No direct spindle injection washing/drying

Washing narrow neck labware can be a challenge. Having direct injection spindles for washing and drying are essential if you're using any volume of Erlenmeyer, volumetric, or even distilling flasks. Having the ability to directly inject water and/or detergent through the spindle into the labware perched on top of the spindle allows for thorough and consistent washing, rinsing, and drying of labware. FlaskScrubber Glassware Washers are designed specifically for this type of application.

#### 4. Inferior materials of construction

A residential washer's warranty may not even cover laboratory conditions at all, even for a single day. Comparatively speaking, they are less expensive than laboratory glassware washers. That's because residential dishwashers do not have to meet the harsh demands to properly clean labware. Lower grade steel alloys and increased dependency on molded plastic parts might lower the cost, but those parts will not be able to withstand the common solvents and chemicals used in the laboratory. Laboratory glassware washers constructed of type 304 stainless steel will resist the rigors of a harsh laboratory environment and stand the test of time.

#### 5. No purified water rinses

Residential washers only come with one inlet for the water source. When washing bowls and cups, that makes perfect sense; however, laboratory glassware used for analytical methods require a higher level of cleanliness. Applying multiple pure water rinses ensures labware is free of residual contaminants remaining from the wash cycle.

#### 6. Specialized features

Often a laboratory must meet unique requirements. These can range from HEPA filter forced air chamber drying, to conductivity monitoring, to extensive data collection and export. A

residential dishwasher will most likely not come with these features, thus limiting your laboratory's compliance to standard operating procedures. FlaskScrubber Vantage Glassware Washers include specialized features to accommodate these types of controlled conditions.

Let's explore the decision tree to help you choose the proper washer for your needs:

Criteria	Domestic Dishwasher	Professional Lab Washer	
Price	\$750-1500	\$4000-10,000	
Specialty Glassware	No	Yes	
Large Glassware	Yes	Yes	
Narrow Glassware	No	Yes	
Injection Spindles	No	Yes	
Concentrated chemicals	No	Yes	
Concentrated chemicals	No	Yes	
High Temperature	No	Yes	
Sterilization cycle	No	Yes	
Specialty Rinse Features	No	Yes	
Energy Efficiency	Yes	Yes	
Stainless Steel Lining	Yes*	Yes	
Warranty	No	Yes	

Once you and your department have reviewed this decision tree and explored the availability of both styles of dishwasher and a professional lab washer, your colleagues can determine which is the better option for the department. Be mindful that the domestic or residential dishwashers were not designed for laboratory use and that the glassware must be emptied of chemicals and residue prior to being put into either version. The lab washer was specifically designed and built for laboratory purposes and has a warranty in case of any issues but has a higher initial price point. Commercial, industrial, clinical laboratories, and medical facilities use a lab washer because of the chemicals and biologicals handled. Knowing what chemicals are in your school inventory as well as the typical concentrations used in your Science and STEM programs will assist you in making the right choice for either a dishwasher or a lab washer.

If you require any assistance in making your decision regarding to purchase and installation of either a residential dishwasher or a commercial lab washer, please contact the Science Safety team for a personal consultation based on your unique school needs and programs. Over 90% of traditional secondary schools continue to use a domestic dishwasher in their science departments knowing that they are only using dilute chemicals and that they cannot use it for test tubes and thin stem glassware items since there are no water injection spindles, due to convenience and costs.

Please note that in order to provide a thorough cleaning in either a laboratory washer or in a domestic dishwasher used in your school science department, you must use a specialty detergent such as Alconox or a specialized detergent based on the usage and needs of your cleaning and sanitation controls. Use the table below to make your selection based on the unique needs of your science and STEM department.

**DETERGENT SELECTION GUIDE FOR LABWARE MACHINE WASHERS**

	Alconox, Inc. Phosphate Free Cleaners			Alconox, Inc. General Purpose Cleaners			Trace Metal
	TERGAJET® Alkaline Powder	SOLUJET® Alkaline Liquid	CITRAJET® Acid/Rinse Liquid	ALCOJET® Alkaline Powder	DETOJET® Alkaline Liquid	CITRAJET® Acid/Rinse Liquid	
<b>Type of Lab</b>							
Environmental trace analysis (2)	•	•	•				
Microbiology	•	•	•				
Wastewater (2)	•	•	•				
Water and Drinking Water (2)	•	•	•				
Biochemistry/Biology				•	•	•	•
Chemistry, Analytical				•	•	•	•
Food				•	•	•	•
Forensics				•	•	•	•
Genetics				•	•	•	•
Hospital/Medical Laboratory				•	•	•	•
Materials Testing				•	•	•	•
Microbiology				•	•	•	•
Nuclear (radioisotopes)				•	•	•	•
Pathology(1)				•	•	•	•
Petrochemicals				•	•	•	•
Pharmaceuticals				•	•	•	•
Pharmacology				•	•	•	•
QA/QC				•	•	•	•
Toxicology				•	•	•	•

(1) Requires College of American Pathology (CAP) residue detection method questionnaire from [www.alconox.com](http://www.alconox.com)

(2) Requires inhibitory residue test data to comply with state and NELAC standards from COA and inhibitory residue test at [www.alconox.com](http://www.alconox.com)

**If your industry  
requires validating  
your residue  
detection method,  
all of the Alconox,  
Inc. products listed  
here have methods  
for detection.**

Application Key Concerns	What Are You Cleaning?	Recommended Powder Detergent	Recommended Liquid Detergent
<b>Healthcare/Veterinary</b> — Effective preparation for sterilization; longer instrument life.	Surgical, anesthetics and examining instruments.	ALCOJET®	DETOJET®
<b>Pharmaceutical/Medical Device/ Biotechnology</b> — Pass cleaning validation for FDA good manufacturing practices. Stainless steel, glass, plastic, elastomer cleaning.	Titanium dioxide, petrolatum, oils, ointments, carbopols, lacquer, zinc oxides, proteins, steroids, and Eudragit® polymers, coatings, amines.	ALCOJET®	SOLUJET®
	Inorganic residues, salts, metallics, pigments, Eudragit® polymers, amphoteric, coating amines, ethers, starches.		CITRAJET®
<b>Laboratory/Environmental</b> — Reproducible results; no interfering residues. Keep laboratory accreditation. Lab safety.	Glass, metal, plastic labware, ceramics, tissue culture, porcelain.	ALCOJET® TERGAJET® (phosphate free)	DETOJET® SOLUJET® (phosphate free)
<b>Metalworking, Precision Manufacturing, and Optics</b> — Clean parts; avoid volatile solvents, strong acids and other hazardous chemicals.	Delicate substrates.		LUMINOX®
<b>Electronics</b> — Avoid conductive residues; avoid CFC; pass cleaning criteria.	Circuit boards, conductive residues, fluxes.		DETERGENT 8®