

Application Information:

Aqueous Cleaning of Petroleum Compounds from Laboratory Glassware

Petroleum compounds, such as refined hydrocarbon distillates, are generally a difficult-to-clean, oily, molasses-like substance. Traditionally, these compounds are cleaned using hydrocarbon solvents such as diesel fuel; however, this process can be hazardous to personnel and can create environmental disposal problems. In addition, some solvents are illegal due to ozone depleting effects -- and flammable solvents can only be used in a Class I, Division II explosion-proof area. Converting to an aqueous-based method can eliminate all of these concerns and will be less costly. The question is: Will an aqueous system clean as effectively as a solvent-based system? And the answer is yes. Effective aqueous cleaning is based on a balanced interaction of four important factors:

Temperature:

In general, hotter water provides better cleaning and rinsing. For this reason Miele washers can heat wash and DI water up to 95°C. Additionally, wash and DI water temperatures are independently adjustable on Miele systems for maximum flexibility. For cleaning of petroleum based compounds a wash temperature of 95°C is normally recommended, followed by a DI rinse with acid neutralizer, then one or two DI Rinses heated to 95°C.

Mechanical Action:

It is often assumed that high pressure must be used to provide good cleaning results. The problem is, higher pressure also means a greater chance of breaking delicate glassware. Miele's high turnover rate (circulation) of water at a low discharge pressure provides the best results without risk of glassware breakage. How often the water and detergent contact the surface to be cleaned is actually more important than how hard it hits. Using only 3.8 gallons of water per fill, the Miele

PG 8536 glassware washer circulates at a rate of 156 gallons per minute. This compares with 25 gpm for typical household dishwashers and 60 gpm for typical lab washers. Miele's high circulation rate ensures analytically clean results, reduces the wash time required, aids in energy efficiency and allows for lower detergent usage.

Additionally, the Miele lower spray arm features special spray nozzles which angle and feather the jet spray for maximum coverage and impingement. Most other washer manufactures provide drill holes in the spray arm, which do not direct the water in this way.

Time:

Increasing the time of a wash cycle will improve the cleaning results. Yet most labs cannot afford to spend time waiting for a washer to complete long cycles. Because Miele systems feature high circulation rates and extremely hot water, shorter cycle times can be accomplished without sacrificing cleaning results.

For cleaning of petroleum compounds, the PG 8536 has a program - "Oil" - designed specifically for cleaning petroleum products. Additionally, the wash time on the Miele PG 8536 is programmable, making it flexible for customized washing protocols.

Detergent:

Selecting the proper detergent is an important step in achieving critically clean glassware. Miele offers an extensive line of powder and liquid detergents, and acid neutralizers. For petroleum compound applications, liquid detergent, neodisher® FLA has proven effective in combination with an acid neutralizer, and neodisher EM emulsifier- to aid in suspending hydrophobic hydrocarbons in solution.

Direct Injection Baskets

If you are cleaning narrow-necked items such as volumetric or Erlenmeyer flasks, Miele direct injection baskets provide remarkably clean results for hard-to-reach interiors. These baskets utilize a unique radical design where water reaches the end of each injector with equal pressure. This assures that all items are cleaned with the same outstanding results. Some manufactures use a grid type injector design, where water pressure may be inadequate on injectors which are farthest from the feed tube. Furthermore, Miele injector tubes are available in a variety diameters and lengths for various glassware sizes. These individual tubes can easily be arranged for custom basket configuration.

Other Considerations

Because of the nature of petroleum compounds, the door and sump pump seal are likely to deteriorate quickly, causing leaking. For this reason Miele utilizes grease resistant NBR polymer gaskets which are more chemically resistant to petroleum compounds for these applications. In addition, the thick nature of these compounds can cause the sump filters to become clogged. Miele's triple filter system is easily removed for cleaning -- which is recommended on a regular basis. In some instances, Miele's wash protocol includes an extra wash cycle simply to "de-gunk" the washer.

Conclusion

All Miele laboratory glassware washers can be utilized for effective cleaning of petroleum compounds from glassware if equipped with the appropriate direct injection baskets.

For further information contact Miele @ 1-800-843-7231 and proinfo@mieleusa.com