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Cleaning and reuse of a plastic container that previously held 10M HCl: I have a large (2.5L) commercial stock plastic container that is empty. It used to contain 10M HCl and I would like to wash it out and reuse the container. What is the best way to do this? Should I add water to the container and neutralise any remaining acid with sodium carbonate? Or should I add dilute sodium carbonate solution directly to the container? I don't want to cause a massive exothermic reaction and break the container.

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Asked By: Anonymous

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Submitted by [Science ASSIST ...](#) on Tue, 2019-03-12 09:31

Expert Answer

Answer reviewed 26 February 2023

Cleaning the container

If your container is empty, then there would only be a small amount of residual 10M HCl, which would be unlikely to cause any extreme exothermic reaction. We recommend the following steps:

- In an operating fume cupboard and wearing appropriate PPE, add water to thoroughly rinse out the bottle and collect the rinse waters in a beaker. Repeat the rinse process 3 times.
- Neutralise the rinse water to a pH between 6-8 with sodium carbonate powder or solution. Use universal indicator or pH strips to give an indication of the pH of the waste solution before washing to waste.
- Assess the suitability of the bottle for reuse, see points below. If the container is determined to be suitable then we recommend reuse only with chemicals that are compatible.
- Take the bottle out of the fume cupboard and wash with warm water and a mild detergent and rinse well several times with tap water followed by deionised or distilled water. It is also important to remove any detergent residues prior to reuse.
- Care must be taken not to use anything abrasive that might scratch the plastic. Note that strong alkaline detergents can crack and craze polycarbonate surfaces.¹
- Allow to thoroughly dry before reuse.

Caution - concentrated acids being stored in plastic bottles

The container should be inspected for signs of deterioration due to an extended length of time storing a corrosive liquid and in addition, possible degradation from light exposure and high or low storage temperatures.

Regular checks on the integrity of existing plastic storage bottles for all concentrated acids should be conducted to reduce the likelihood of the bottle breaking and causing a spill of concentrated acid.

- Check that the container has not degraded
- Check that the cap and any cap liner are in good condition
- Check that the cap is fitted securely to prevent leaks and evaporation.

If the integrity of the container has been compromised, then we recommend that in conjunction with a risk assessment and using safe procedures, it is decanted into an appropriately labelled glass screw capped bottle.

We recommend the following as good chemical management practices:

- purchase and store chemicals in minimum quantities
- assess all chemicals periodically (the annual stocktake is a convenient time to do this).
- provide secondary containment for concentrated acids as a precaution in case of bottle breakage; the secondary container should have a capacity 1.1 times the volume of the primary container.

Effect of chemicals on plastics

Exposure of plastics to chemicals can result in physical changes to colour, flexibility, surface appearance and strength. Additionally, the chemical resistance of some plastics can be affected by chemical concentration, temperature and duration and frequency of exposure. A plastic container should not be reused if any of the following are evident:²

- Hazing or stress cracks which may result from chemical and/or physical stresses
- Discolouration due to age and/or UV light exposure
- Weakness due to extreme temperature exposure

- Brittleness or reduced flexibility of the plastic

Consult a chemical compatibility chart for different types of plastic and the chemical SDS for specific storage requirements.

Assessing the suitability of a container for reuse

An initial risk assessment should be conducted to determine the physical condition and suitability of a plastic chemical storage container for reuse:

- The condition of the container and its lid
 - must be checked for any signs of deterioration as plastics can be affected by age and chemical attack.
 - must be thoroughly cleaned of any chemical residue prior to reuse to ensure no incompatible reaction between any new chemicals being stored. If the rinsing water from cleaning the container is hazardous, it should be collected and either treated to safely put down the sink or be disposed of as hazardous waste.
- The type of container and its lid
 - must be chemically resistant to any new chemical.
 - must suit the chemical properties of any new chemical, such as if it light-sensitive, hygroscopic and if a vented lid is required
 - should have a suitable sized opening. Wide mouth containers are suitable for storing solids and viscous liquids while narrow mouth containers are suitable for storing liquids.
 - Original labels should be retained until just prior to reuse to ensure that there are no incompatibilities with the original contents of the container. The label must then be removed and the container should be clearly labelled with the new contents.
- Old empty containers which contained substances which are very water-soluble and of low hazard are suitable for use as waste containers. Never use the container of an acutely toxic or highly reactive chemical as a waste container. These should be stored for collection by a waste disposal contractor.

References and further reading

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