Safe Use of Perchloric Acid

SafetyNet #: 18

Perchloric acid is a strong inorganic acid used for digestions of organic material, plant matter, soils, etc. It is normally supplied at 70-72% concentration in Safety Coated glass containers, less than one gallon in capacity. In many respects, its hazards are similar to those of nitric acid, as both are oxidizing acids. Anhydrous perchlorate acid is unstable and can decompose explosively at ordinary temperatures or in contact with organic compounds. It is not typically used in general chemistry laboratories. Heated above room temperature, the oxidizing power of perchloric acid is greatly increased and hot concentrated solutions are very dangerous. Perchloric acid mists and vapors can condense in ventilation systems to form metallic perchlorates that can be explosive.

Researchers using or anticipating using perchloric acid in their experiments should keep the following in mind:

- Perchloric acid digestions of any size must be performed in a fume hood. No open benchtop digestions should be performed.

- All perchloric acid digestions performed above ambient temperature (hot acid digestions) require a special perchloric acid hood with a wash down system. These hoods used for hot acid digestion must be posted with a label stating “Perchloric Acid Hood Only. Organic Chemicals Prohibited.” Labels are available from EH&S.

- Wash down of the fume hood must be accomplished after each use or at the end of the work day.

- Regardless of the size of the digestion, no organic solvents are to be in the hood during the digestion. Organic solvents and other organic materials (paper towels, boxes, etc.) must never be stored or used in a designated perchloric acid hood at any time.

- When diluting perchloric acid (or any other acid) always add acid to water, not the reverse.

- Perchloric acid will digest human tissues as readily as it will digest samples of organic material. To prevent injury, chemical splash goggles or face shield, nitrile, neoprene, or PVC gloves and apron should be worn when handling perchloric acid. Closed-toe, closed-heel shoes must be worn.

- Because of the potential for explosion, no repair or maintenance should be done on a fume hood used for perchloric acid digestions until it has been thoroughly decontaminated.

- Perchloric acid waste must not be mixed with any other waste. It should be collected in
acid-resistant bottles (preferably the original acid container), clearly labeled and treated as hazardous chemical waste. See SafetyNet #8 [1], “Guidelines for Disposal of Chemical Waste” for more information.

- Perchloric acid may be stored with other inorganic acids such as hydrochloric, sulfuric or nitric acid, provided the container of perchloric acid is kept in appropriate secondary containment (such as a dish tub or bucket) capable of collecting any spilled material. Perchloric acid may also be stored with compatible oxidizers like hydrogen peroxide, nitric acid and sodium hypochlorite. DO NOT store perchloric acid with organic acids (e.g., acetic acid), bases or with organic solvents or flammable/combustible material.

- In the event of a spill contact UC Davis Fire Department at 911.

Contact

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More information

Related content

1. Chemical Waste Disposal Guidelines

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