

Preventing Pool Chemical Injuries: Safety, Storage, and Emergency Preparedness

A Quick Guide for Health Departments and Operators



About Pool Chemical Injuries



Chemicals are used in pools, hot tubs, spas, and water playgrounds to protect swimmers from harmful germs and to prevent outbreaks. Some chemicals aid in disinfection, such as controlling pH levels, while others enhance water quality, prevent equipment corrosion and scaling, and combat algae growth. However, when pool chemicals are mixed incorrectly or personal protective equipment is not used during handling, they can pose a risk of injury. Be sure to follow our safety recommendations as well as the manufacturer's instructions to handle these chemicals safely.

Pool chemical injuries such as skin rash, eye irritation, chemical burns, and pulmonary edema, result in approximately 4,500 emergency department visits annually, with at least one-third of the patients being under 18 years old. [1]

Develop an emergency response plan to ensure you're prepared for what to do before, during, and after a pool chemical emergency.

Background

This quick reference guide can be used by local, state, tribal, and territorial health departments and aquatic venue operators as a tool for understanding the Centers for Disease Control and Prevention's (CDC's) most important recommendations for preventing pool chemical injuries. Visit CDC's Model Aquatic Health Code (MAHC) website at [cdc.gov/model-aquatic-health-code/php/our-work/index.html](https://www.cdc.gov/model-aquatic-health-code/php/our-work/index.html) for more detailed information.



Designing the Pool Chemical Storage Area and Pump Room Guidelines



Construction Guidelines

- » Incorporate spill containment features, or secondary containment, in chemical storage areas to prevent pool chemicals from leaking or mixing with other substances.
- » Ensure that aquatics staff and patrons have easy access to safety showers, eye wash stations, and other necessary chemical safety equipment. [2]
- » Install the appropriate fire suppression systems by consulting with your local fire department or code enforcement agency for proper guidance. Ensure sufficient lighting is available in the chemical storage area and pump room to read container labels.

Indoor Air Maintenance

- » Adhere to local building codes or the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) Standards.
- » Isolate air handling systems for the chemical storage area, pump room, and venue from the rest of the building.
- » For older buildings lacking separate air handling systems, consider installing emergency HVAC cutoffs in these areas.
- » Ensure proper ventilation in the chemical storage area, pump room, and venue.

Engineering

- » Install an alarm to notify aquatics staff if the recirculation pump stops working.
- » Install a device that automatically shuts off the chlorine and pH feed pumps when there is no flow or low flow in the recirculation system.



Security

- » Secure the chemical storage area and pump room to restrict access, particularly children and animals.
- » Install locking mechanisms on the chemical controller to prevent unauthorized tampering.

Personal Protective Equipment (PPE) and Safety Data Sheets (SDSs)

- » Ensure that PPE and up-to-date SDSs are readily available and easily accessible near the chemical storage area, pump room, venue area, and any other locations where pool chemicals are stored or used (e.g., in the hallway just outside).
- » Provide an alternate location for PPE and current SDSs, separate from the areas listed above, in case of a chemical spill or incident that may prevent access.

Chemical Storage

- » Store pool chemicals according to local or state building and fire codes. [3]
- » Keep chemicals at temperatures below 95°F (35°C) and in conditions recommended by the manufacturer, which may include low humidity and keeping it away from direct sunlight.
- » Protect chemicals from exposure to moisture, and ensure that they are stored separately in their respective containers to prevent mixing.
- » Each chemical should have its dedicated storage area, with incompatible chemicals stored away from one another such as in a separate room or building, in a secondary containment if space is limited, and/or based on hazard class. Always store chemicals in their original, manufacturer-labeled containers.
- » If a container is damaged, consult the manufacturer for guidance.
- » Dispose of deteriorating, unwanted, or unlabeled chemicals properly by contacting the manufacturer or the local hazardous materials authority for disposal instructions.
- » Ensure chemicals are kept away from heat sources and flames.
- » *Do not* store ignition sources, like gasoline or diesel-powered equipment, in the chemical storage or pump room, and prohibit smoking in these areas.
- » Maintain cleanliness and order in these rooms—avoid allowing trash, rags, or debris to accumulate. Store food and drinks in a designated area separate from any pool chemicals.



Chemical Handling

- » Only trained personnel should handle pool chemicals.
- » Establish clear communication among handlers, including a chain of command, and document chemical use.
- » Post safety instructions in the chemical storage and pump room. In case of a spill, follow the emergency response plan and use dedicated materials to clean it up *immediately*.

Maintenance and Repair

- » Close the venue to swimmers if the recirculation system is down or when servicing the chlorine and pH control feed or recirculation system.
- » Swimmers should *not* return until systems have restarted and have run for at least five minutes, and provided the water quality meets required standards.
- » Always turn off both the chlorine/pH control feed and recirculation systems before servicing.
- » Ensure proper ventilation in and around the pump room and venue during maintenance, and use appropriate (PPE) during all maintenance service updates.
- » Only trained personnel should service the chlorine and pH control feed and recirculation systems.
- » Establish and follow protocols that prevent mixing pool chemicals during maintenance, such as flushing chlorine feed tubing with water before cleaning it with acid which will prevent dangerous reactions.
- » Communicate maintenance activities to staff and document repairs.
- » Set up a preventive maintenance program to replace equipment or parts before failure, such as checking for leaks in the pump tubing, replacing tubing regularly, and inspecting valves and clamps based on manufacturers' recommendations.

Pool Chemical Training for Staff

- » Train all staff in pool chemical safety basics, with additional training for those working directly with chemicals. Include topics such as chemical impact on water chemistry; safe storage, handling, and maintenance practices; first aid for chemical exposures; and OSHA chemical hazard communication.
- » Provide clear labeling and packaging for chemicals to avoid mixing errors. [4]



WARNING!

- Never mix chlorine products with acid, as this can produce toxic gases.
- Never mix different pool chemicals (such as various chlorine products) with each other or any other substance.
- Never add water to the pool chemical. This can cause a violent and potentially explosive reaction.

ALWAYS FOLLOW LABELS.

- Only pre-dissolve pool chemicals when instructed by the product label.
- If the label specifies pre-dissolving, always add the pool chemical to the water based on product label instructions.



Response Planning



Create an emergency response plan [5] that includes:

- ✓ Spill cleanup procedures.
- ✓ Actions taken to address the chemical incident and exposure.
- ✓ A clear chain of command with contact information and designated alternates.
- ✓ An evacuation plan.
- ✓ A communication plan to alert patrons, staff, and emergency responders.



Once the plan is established:

- ✓ **Train** aquatics staff on the procedures outlined in the emergency response plan.
- ✓ **Keep** a copy of the plan in a readily accessible location, such as in the hallway just outside the chemical storage area, pump room, and venue area, and ensure another copy is available at a remote location, such as a separate building or a designated storage area, to be used if the main area is evacuated. Ensure remote location is noted in the plan as well.
- ✓ **Ensure** up-to-date safety data sheets are easily accessible to first responders during an evacuation.
- ✓ **Place** a phone with up-to-date emergency numbers near the chemical storage area, pump room, and venue area, and ensure a phone is also available at a remote location for evacuation purposes.
- ✓ **Coordinate** emergency response drills with first responders to ensure preparedness.

During an Incident:

- ✓ Activate the emergency response plan *immediately*.
- ✓ For indoor venues, if chemical fumes are released in the chemical storage area, pump room, or venue area:
 - ☑ If the area has a dedicated HVAC system: Keep the system on to help ventilate the fumes.
 - ☑ If the HVAC system is shared with other areas: Turn the system off *immediately* to prevent the spread of fumes.

After an Incident:

- ✓ Record the details of the incident and the response actions and report them to local or state regulatory authorities. Local or state authorities may want to review and update public health regulations based on reports of pool chemical injuries to help prevent future occurrences.
- ✓ Hold a debriefing session with all individuals involved in the response to evaluate the incident. [6]
- ✓ Make necessary updates to the emergency response plan based on the findings.



[QUICK GUIDE]

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Resources



1. Pool Chemical Injuries Lead to Over 4,500 Emergency Department Visits Each Year: archive.cdc.gov/www_cdc.gov/media/releases/2019/p0515-pool-chemical-injuries.html
2. *Store Pool Chemicals Safely* poster: cdc.gov/healthy-swimming/media/pdfs/Pool-Chemical-Safety-STORAGE-poster-p.pdf
3. 2024 Annex to the Model Aquatic Health Code Scientific Rationale: cdc.gov/model-aquatic-health-code/media/pdfs/2024/11/5th-Ed-MAHC-Annex-508.pdf
4. Hazard Communication Standard: Labels and Pictograms: osha.gov/sites/default/files/publications/OSHA3636.pdf
5. Occupational Safety and Health Administration – Emergency Preparedness and Response: Getting Started: osha.gov/emergency-preparedness/getting-started
6. Ohio School Safety Center – Hotwash Guide: dam.assets.ohio.gov/image/upload/ohioschoolsafetycenter.ohio.gov/Hotwash%20Guide.pdf

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Have Questions?

Contact NACCHO at mahcnet@naccho.org.



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