LEPC – Industry Subcommittee

Accidental Mixing of Chemicals

Dec 8, 2016

GS Moerer
Accidental Mixing

• Friday October 21, 2016 ~ 125 people were treated after chemical leak in Atchison, KS
• Sodium Hypochlorite and Sulfuric Acid mix together in holding tank
• Subsequent reaction caused release of Chlorine gas
Accidental Mixing

Drone captures chemical plume over Atchison 0:57
Accidental Mixing
Accidental Mixing

**Bleach and Chlorine Gas**

The reaction of sulfuric acid and sodium hypochlorite doesn't stop with the production of sodium sulfate and hypochlorous acid. In water solutions, hypochlorite (HClO) and chlorine (Cl₂) reach an equilibrium that is dependent on the pH of the solution. In an acidic solution, the equilibrium favors chlorine in the following fashion: Hypochlorous acid partially breaks down into the hypochlorite anion (OCl⁻) and hydrogen cation (H⁺). Hypochlorous acid is a strong oxidant, so the remaining hypochlorous acid in the solution oxidizes the hypochlorite anion producing the irritating and toxic chlorine gas (Cl₂).

If however you add an acid to a "chlorine bleach" (a mixture of NaClO and NaCl) or you acidify NaClO with HCl, then the formed hypochlorous acid, which is a very strong oxidant, oxidizes the chloride anions forming chlorine (Cl₂):

\[ \text{NaClO(aq)} + \text{NaCl(aq)} + \text{H}_2\text{SO}_4(aq) \rightarrow \text{Na}_2\text{SO}_4(aq) + \text{H}_2\text{O} + \text{Cl}_2(g) \]
Accidental Mixing

Sodium Hypochlorite Incompatibility Chart

Do NOT mix Sodium Hypochlorite (bleach) with ANY other chemical unless adequate engineering controls and personal protective equipment (PPE) are in place. Accidental mixing may cause dangerous conditions that could result in injury to personnel and/or damage to property or the environment. Common locations where accidental mixing of incompatible chemicals can occur include, but are not limited to, containment systems and drains, sinks, unloading piping, and warehouse storage areas.

This is only a listing of the more common incompatible chemicals and is not an all-inclusive list. Contact your supplier or The Chlorine Institute for more information.

<table>
<thead>
<tr>
<th>Incompatible Material</th>
<th>Mixing May Result In</th>
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<tbody>
<tr>
<td>Acids and Acidic Compounds such as (Note 1):</td>
<td>- Release of chlorine gas, may occur</td>
</tr>
<tr>
<td>- Alum (Aluminum Sulfate)</td>
<td>- Hydrofluoric Acid</td>
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<tr>
<td>- Aluminum Chloride</td>
<td>- Fluorosilicic Acid</td>
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<tr>
<td>- Ferrous or Ferric Chloride</td>
<td>- Phosphoric Acid</td>
</tr>
<tr>
<td>- Ferrous or Ferric Sulfate</td>
<td>- Brick and Concrete Cleaners</td>
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<tr>
<td>- Nitric Acid</td>
<td>- Chlorinated Solutions of Ferrous Sulfate</td>
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<tr>
<td>- Hydrochloric Acid (HCl)</td>
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<tr>
<td>- Sulfuric Acid</td>
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Accidental Mixing

CI has the following resources available:

- Bleach Incompatibility Chart (Available in English and Spanish)
- Avoiding Accidental Mixing of Sodium Hypochlorite 1-Page Document
- Accidental Mixing Video
- Accidental Mixing Poster (Available in Letter Size and Poster Size)
- Accidental Mixing PowerPoint Presentation with Embedded Reaction Videos
- Best Practices for Receiving Bleach 2-Page Article
- Building a Supplier Customer Partnership 2-Page Article
- Install a Sign on Your Sodium Hypochlorite System, PDF format - 37KB
- Sodium Hypochlorite Accidental Mixing Form, PDF format - 75KB
- Sodium Hypochlorite Customers Generic Safety Checklist (Bulk Users), PDF format - 215KB
- Sodium Hypochlorite Incompatibility Chart (English Version), PDF format - 253KB
- Sodium Hypochlorite (NaOCl) Incompatibility Chart (Spanish Version), PDF format - 90KB
- Sodium Hypochlorite Only - Guidance Document Signage, PDF format - 19KB
- Sodium Hypochlorite Customers Generic Safety Checklist (Bulk Users)
Accidental Mixing

Also try
atchison kansas chlorine spill
atchison kansas chlorine
chlorine gas formula
chlorine gas exposure
mustard gas
how to make chlorine gas
chlorine gas ww1
phosgene
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Chemical Safety Board Deploying to Site of Chemical Release in Atchison, Kansas

Washington, DC, October 24, 2016 – An investigative team from the U.S. Chemical Safety Board (CSB) has deployed to the scene of a chemical release that led to a shelter-in-place order for thousands of residents and at least 85 members of the public seeking medical attention in Atchison, Kansas.

The release occurred at a plant owned and operated by MGP Ingredients, the facility produces distilled spirits and specialty wheat proteins and starches.

The CSB’s four person investigative team will be led by Supervisory Investigator Johnnie Banks.

Chairperson Vanessa Allen Sutherland said, “This incident underscores the very serious consequences that can occur when a chemical release goes beyond a facility’s fence line and impacts nearby residents.”

The CSB is an independent federal agency charged with investigating industrial chemical accidents. The agency’s board members are appointed by the president and confirmed by the Senate. CSB investigations look into all aspects of chemical accidents, including physical causes such as equipment failure as well as inadequacies in regulations, industry standards, and safety management systems.

For more information, contact Hillary Cohen at 202-446-8094 or via email at public@csb.gov.