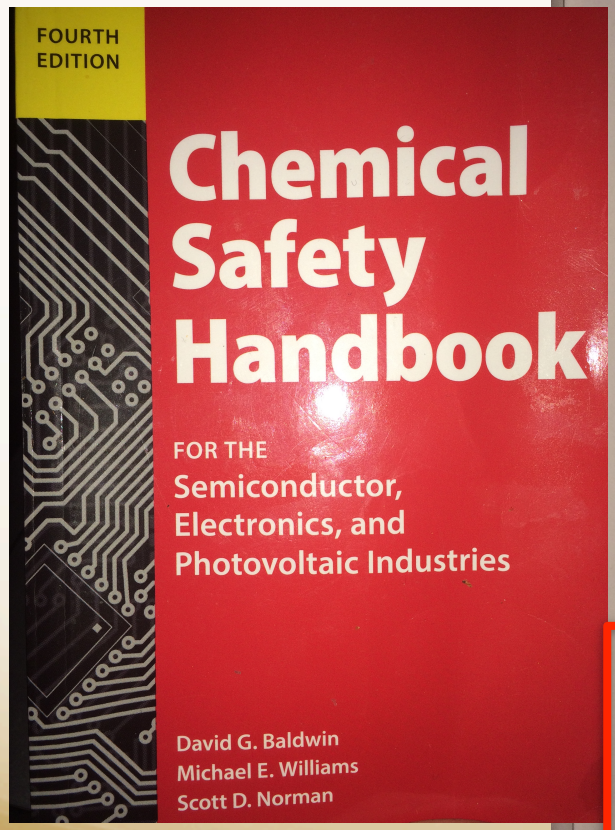
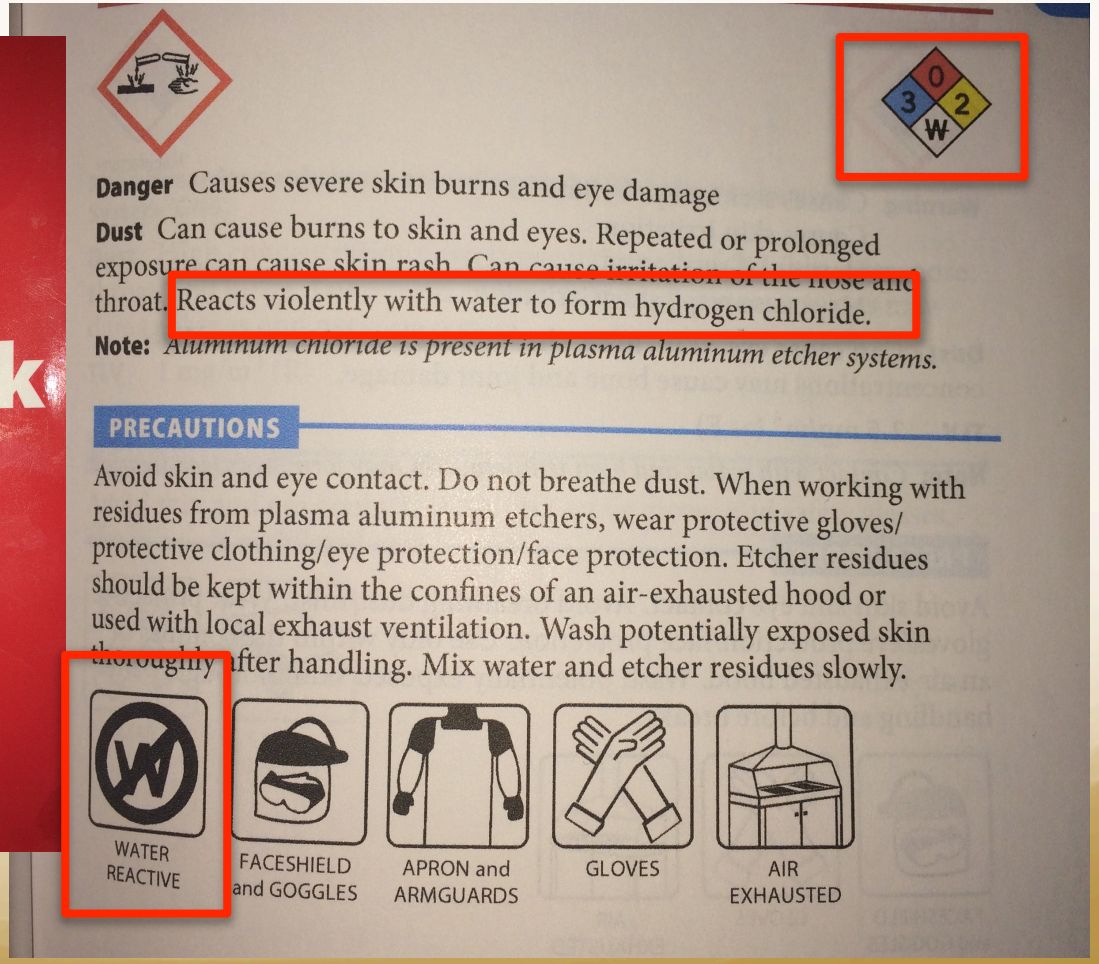
Chemical Compatibility

- Incident summary:
  - A student received aluminum chloride from Sigma for an experiment.
  - The SDS said to store under inert gas and vent periodically.
  - The lab didn't have any easy way to do this, but saw that the chemical was water soluble.
  - After checking the SDS and calling Sigma to determine if this was a good plan, the student and EHS rep added the chemical to water.
  - The result was a reaction with heat and gas production.

Chemical Compatibility

- Aluminum chloride – a closer look . . .





Danger Causes severe skin burns and eye damage

Dust Can cause burns to skin and eyes. Repeated or prolonged exposure can cause skin rash. Can cause irritation of the nose and throat. Reacts violently with water to form hydrogen chloride.

Note: *Aluminum chloride is present in plasma aluminum etcher systems.*

PRECAUTIONS

Avoid skin and eye contact. Do not breathe dust. When working with residues from plasma aluminum etchers, wear protective gloves/protective clothing/eye protection/face protection. Etcher residues should be kept within the confines of an air-exhausted hood or used with local exhaust ventilation. Wash potentially exposed skin thoroughly after handling. Mix water and etcher residues slowly.

Chemical Compatibility

GHS Label elements, including precautionary statements

Pictogram

Note: No symbol for reactivity. . .

Signal **Hazards not otherwise classified (HNOC) or not covered by GHS**

Reacts violently with water.

Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place.

Store under inert gas. Vent periodically. Handle and open container with care. Keep in a dry place.

Storage class (TRGS 510): Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of h
No data availab

10.4 Conditions to avoid
Avoid moisture.

10.5 Incompatible materials
Strong oxidizing agents, Alcohols, Mixtures of nitrobenzene and aluminum chloride are thermally unstable and may lead to explosive decomposition due to a multi-step decomposition reaction occurring above 90 degrees C, which self-accelerates with high exothermicity producing azo- and azoxypolymers.

NFPA Rating

Health hazard:	3
Fire Hazard:	0
Reactivity Hazard:	2

Unstable or may react violently if mixed with water.

Reactivity Hazard:	0

Chemical Compatibility

- What went right?
  - Lab members had attempted to determine if the chemical was water reactive.
  - The procedure was done in a fume hood.
  - The EHS rep reached out to the Coordinator for assistance following the reaction.
- What went wrong?
  - The chemical was water reactive, but the SDS didn't include this in the reactivity section.
  - A more careful reading of the SDS, or a Google search, would have shown that aluminum chloride is water reactive, generating hydrogen chloride.

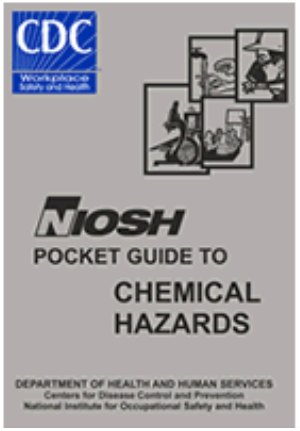
Chemical Compatibility

- Quick guide to SDSs – what to look for.
  - Pictograms
  - Other hazards
  - Reactivity
  - NFPA ratings
- Other resources
  - NIOSH guide
  - Chemical compatibility tool – Cameo Chemicals

Chemical Compatibility

NIOSH Pocket Guide to Chemical Hazards

The NIOSH Pocket Guide to Chemical Hazards is intended as a source of general industrial hygiene information on several hundred chemicals/classes for workers, employers, and occupational health professionals. The NIOSH Pocket Guide does not contain an analysis of all pertinent data, rather it presents key information and data in abbreviated or tabular form for chemicals or substance groupings (e.g. cyanides, fluorides, manganese compounds) that are found in the work environment. The information found in the NIOSH Pocket Guide should help users recognize and control occupational chemical hazards.



Search the NIOSH Pocket C

Enter search terms separated by

International Chemical Safety Cards (ICSC)

The International Chemical Safety Cards (ICSC) summarize essential health and safety information on chemicals for their use at the "shop floor" level by workers and employers in factories, agriculture, construction and other work places.

ICSC summarize health and safety information collected, verified, and peer reviewed by internationally recognized experts, taking into account advice from manufacturers and Poison Control Centres. More about the ICSC.

http://www.cdc.gov/niosh/

Chemical Compatibility

http://cameochemicals.noaa.gov/my

Hazard Predictions (for pairs of substances)

ALUMINUM CHLORIDE, ANHYDROUS *mixed with* WATER

Incompatible

- Reaction products may be corrosive
- Reaction products may be flammable
- Reaction liberates gaseous products and may cause pressurization
- Exothermic reaction at ambient temperatures (releases heat)
- May produce the following gases:
  - Acid Fumes
  - Hydrogen

Documentation

When in doubt, seek help!