### Problem: Evaluate SCBA

- First responders “unexpected” chemical exposure concern
  - Ensure that dispatch information is shared between all disciplines to enhance responder safety
  - Be alert for information indicating the potential for occupants in any enclosed space
  - First responders must utilize the proper protective equipment
- Mixing household chemicals to create toxic vapors
  - Look for and recognize containers that may indicate presence of common household chemicals
- In most cases, two (or more) chemicals will be mixed to produce vapors

### Analyze the Problem

- **Recognition/ID and Warning Signs**
  - Open containers or a ‘mixing container’. Chemicals may not be properly marked/labeled
  - Do NOT rely on suicide notes or placards near the entry pathway for first responders which warn of danger
  - Open containers or household chemicals where they would not normally be found (vehicles, bedrooms, etc.)
  - Taping of doors, windows, dash vents, openings or other attempts to seal the enclosure
- **Locations: Vehicles and Structures**
  - If this is a chemical suicide remember it is a crime scene and once life safety considerations are met to treat as such
  - Look for indicators in the surrounding area and question occupants. After analysis, vehicles and structures can be ventilated. Do NOT rely on presence or lack of chemical/unusual odors. Be aware of contact with liquids or powders and provide decontamination for occupants and responders

### Plan the Response

- **Two seconds to look into the vehicle for signs of a suicide (mixing vessels, residue, containers), ten seconds for law enforcement**
- **Response Options**
  - Rescue/Recovery
  - Evacuation/Isolation
  - Protective handline
  - Decontamination
  - Preserve evidence
- **Selection of PPE**
  - Follow department policy and procedure for proper PPE and respiratory protection selection
- **Obtain control of air monitoring equipment**
- **Selection of Decontamination**
  - Occupants need to be decontaminated using a simple water shower of 3-5 minutes, following clothing removal
  - Technical decontamination should be established for entry teams conducting control tasks
- **Plan of Action**
  - Implement agency Hazardous Materials Response Protocols
  - Develop a site safety plan
  - Use a **Risk Based Response** control plan that is based on possible options listed above
  - **Vehicle vs. Structure**
    - Compartment size will/can play a role in the levels of concentration, resulting in varying levels of evacuation/shelter in place options
    - The smaller the compartment the higher the concentration -> higher toxic levels and potential to reach LEL levels
    - Ventilate all occupancies to change the concentration levels of the environment
    - Open the doors to vent and remove any occupant(s)
      - Check for signs of life prior to removal (chest movement, body movement)
      - If vehicle/structure is locked and there are no signs of life, isolate and warn others
- **Evacuation vs. Shelter in place** — a determination must be made of which method will be more effective in life safety

### Implement the Plan

- **Handline (vapor disbursement or extinguishment)**
  - Vapor Disbursement - Use water spray to reduce vapors or divert vapor cloud drift. Attempt to control and isolate runoff
  - Extinguishment - May form explosive mixtures with air. May be ignited by heat, sparks or flames
- **Ventilation/Change the Environment** – Properly trained and equipped first responders should ventilate after a thorough analysis of potential hazards
- **Air monitoring** - Should be conducted throughout the incident and until evidence has been collected and the scene rendered safe
- **Victim transport** – Decon prior to leaving the scene; methods will be based on occupant’s status
- **Decontamination** – All entry team members should undergo a technical decon according to local protocols. Beware of potential for occupants and clothing to ‘off-gas’ trapped vapors. EMS and the hospital must be notified in advance in order to avoid contamination of personnel/equipment
- **Crime scene considerations** – Minimize responder exposure while preserving evidence and supporting law enforcement

### Evaluate

- **Maintain Situational Awareness** – Don’t count on warning signs. Be aware of secondary contamination
## CHEMICAL PROPERTIES

### Hydrogen Sulfide

<table>
<thead>
<tr>
<th>Description</th>
<th>Colorless gas</th>
<th>Odor threshold</th>
<th>0.77 ppm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molecular formula</td>
<td>( \text{H}_2\text{S} )</td>
<td>Odor description</td>
<td>Rotten egg</td>
</tr>
<tr>
<td>Molecular weight</td>
<td>34.08</td>
<td>Exposure route</td>
<td>Inhalation</td>
</tr>
<tr>
<td>Density</td>
<td>1.19 (= 20% heavier than air)</td>
<td>Signs &amp; symptoms</td>
<td>Irritation of respiratory system &amp; eyes, apnea, coma</td>
</tr>
<tr>
<td>Auto ignition temperature</td>
<td>260°C (500°F)</td>
<td>LEL/UEL</td>
<td>4%, 44%</td>
</tr>
<tr>
<td>Vapor pressure</td>
<td>15, 600 mm Hg @ 25°C (77°F)</td>
<td>IDLH</td>
<td>100 ppm</td>
</tr>
<tr>
<td>Solubility</td>
<td>Soluble in water, hydrocarbon solvents, ether and ethanol</td>
<td>Detection</td>
<td>PID with 10.6 eV lamp</td>
</tr>
<tr>
<td>Notes</td>
<td>Death by inhalation can occur quickly at low levels</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Hydrogen Cyanide

<table>
<thead>
<tr>
<th>Description</th>
<th>Bluish-white liquid/colorless gas</th>
<th>Odor threshold</th>
<th>0.58 ppm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molecular formula</td>
<td>( \text{HCN} )</td>
<td>Odor description</td>
<td>Bitter almond (odor may not be detected by smell)</td>
</tr>
<tr>
<td>Molecular weight</td>
<td>27.03</td>
<td>Exposure route</td>
<td>Inhalation, absorption</td>
</tr>
<tr>
<td>Density</td>
<td>0.94 (lighter than air)</td>
<td>Signs &amp; symptoms</td>
<td>Respiration/depth change, confusion, asphyxia</td>
</tr>
<tr>
<td>Auto ignition temperature</td>
<td>538°C (1000°F)</td>
<td>LEL/UEL</td>
<td>5.6%, 40%</td>
</tr>
<tr>
<td>Vapor pressure</td>
<td>630 mm Hg @ 20°C (68°F)</td>
<td>IDLH</td>
<td>50 ppm</td>
</tr>
<tr>
<td>Solubility</td>
<td>Miscible in water, alcohol, slightly soluble in ether</td>
<td>Detection</td>
<td>PID with 13.6 eV lamp</td>
</tr>
<tr>
<td>Notes</td>
<td>Death by inhalation can occur quickly at low levels</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For more information on chemical assisted suicide response visit [www.hazmatfc.com](http://www.hazmatfc.com)
HYDROGEN SULFIDE SUICIDE TREND – FIRST RESPONDER SAFETY UPDATE

Trend Update: In February 2010, the Central Florida Intelligence Exchange (CFIX) distributed a “First Responder Safety” bulletin regarding a new trend of chemical suicide. This increasingly popular method of suicide is advertised on the internet and is spreading throughout US, with additional cases recently occurring in Florida. Nationally, there have been 14 confirmed cases of chemical suicides since 2008, with the State of Florida reporting the greatest number with 6 incidents.

The purpose of this bulletin is to provide situational awareness to first responders and private sector security which may come in contact with this hazardous and deadly method of committing suicide.
HYDROGEN SULFIDE SUICIDE TREND – FIRST RESPONDER SAFETY UPDATE

Chemical Suicide Websites – “How To”

In Japan (2008), more than 500 people had killed themselves by inhaling hydrogen sulfide produced by mixing common household chemicals. Several Japanese websites still provide detailed information on how to commit suicide and/or cause multiple deaths by hosting “Hydrogen Sulfide Parties”. A viewer could instantly print out a suicide sign warning the public and first responders of the deadly gas (pictured below).


DON'T MIX IN SUBWAY OR UNDERGROUND SHOPPING MALL!!!!

MATERIAL LISTS

Acid Sources

Lime Sulfur, Cleaning Acid (which is highly caustic), Hydrochloric Acid (safe for dilution)

Strong Acid 

Lime Sulfur

Strong acid + Lime Sulfur = Hydrogen Sulfide Gas

It reaches a fatal concentration over 1000ppm quickly.

(please mix in a vessel, such as buckets)

Strong Acid (ecure) Lime Sulfur

="(o)O KNOCK DOWN

[Image]

PDF for print No.1
PDF for print No.2
The Chemical suicide methods utilize chemicals with an acid base mixed with chemicals containing sulfur compounds such as the following:

**ACID BASE SOURCES**
- Muriatic or Sulfuric Acid
- Battery Acid
- Toilet Bowl Cleansers
- Acidic Drain Cleaners

**SULFUR COMPOUND SOURCES**
- Polysulfide Marine Sealant
- Lime Sulfur Spray
- Japanese Bath Salts
- Leather Tanning Agents
- Detergents
- Pesticides

**MIXED TOGETHER**

At 500+ ppm, breaths can cause immediate death

<table>
<thead>
<tr>
<th>LEVEL</th>
<th>CONCENTRATION</th>
<th>EFFECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOW</td>
<td>0 – 10 ppm</td>
<td>Irritation of the eyes, nose, and throat</td>
</tr>
<tr>
<td>MOD</td>
<td>10 – 50 ppm</td>
<td>Headache, Dizziness, Nausea and vomiting, Coughing and breathing difficulty</td>
</tr>
<tr>
<td>HIGH</td>
<td>50 – 200 ppm</td>
<td>Severe respiratory tract irritation, Eye Irritation / acute conjunctivitis, Shock and convulsions, Coma, Death in severe cases</td>
</tr>
</tbody>
</table>
HYDROGEN SULFIDE SUICIDE TREND – FIRST RESPONDER SAFETY UPDATE

2010 – FLORIDA CASES

02/06/2010 – Sarasota County
Sarasota County deputies found a person dead inside a vehicle sitting in an apartment parking lot. The person placed a note on the vehicle to warn anyone approaching that dangerous chemicals were used and not to open the car door. Residents of an apartment building were evacuated as HazMat crews prepared to open the car to release the chemical content.

02/13/2010 – St. Petersburg
A 23-year-old male used common household chemicals mixed together to generate Hydrogen Sulfide gas to commit suicide in a motor vehicle. A St. Pete PD officer was affected by the gas as well and had to be hospitalized for treatment.

03/01/2010 – Orange County
A male was passed out inside his vehicle, which was located in a wooded area off of Nova Rd. at the Orange/Osceola county line. The vehicle had a warning sign taped to the window with indications of hazardous chemicals inside. There were no injuries to first responders due to immediate situation notification from their Communications Center and their awareness generated by the “Chemical Suicide – First Responder Safety” bulletins that were disseminated by Orange County and CFIX.
HYDROGEN SULFIDE SUICIDE TREND – FIRST RESPONDER SAFETY UPDATE

2010 – FLORIDA CASES cont...

08/07/2010 – Okaloosa County
A vehicle was discovered in a church parking lot with a note taped to the window warning people to stay away due to chemicals used to commit suicide. The victim was a 24 year-old male.

10/01/2010 – St. Lucie County
A security guard found a male slumped over inside a vehicle at a rest stop on I-95. There were signs on the windows indicating “POISON - DO NOT OPEN” and a smell of sulfur or rotten eggs coming from the vehicle. The hydrogen sulfide was so highly concentrated, it sent a trooper to the hospital just by touching the vehicle’s door.
HYDROGEN SULFIDE SUICIDE TREND – FIRST RESPONDER SAFETY UPDATE

2010 NATIONAL CASE CONSIDERATIONS

03/27/2010 – North Carolina
A 35 year-old school teacher was found dead in her vehicle, with chemicals in a bucket on the passenger seat. There were NO warning signs posted in or on her vehicle, exposing several law enforcement officers to the dangerous chemical mixture.

Note: Typically, persons committing this act have left hazardous warning signs to anyone approaching the scene, however this is not always the case.

04/13/2010 – Indiana (Indiana University)
A student was found dead and hundreds were evacuated from a residence hall when officers detected a chemical in the air while conducting a welfare check. HAZMAT crews discovered a suicide note that said ‘Warning H2S’. The deceased student was found inside a closet with a bucket of hydrogen sulfide.

Note: Other countries have experienced an increase of Chemical suicides occurring in college dorm rooms. This trend should be considered when responding to a HAZMAT call on campus or conducting a welfare check on a student.
HYDROGEN SULFIDE SUICIDE TREND – FIRST RESPONDER SAFETY UPDATE

Response:

- Size up any situation involving an unresponsive person in an enclosed space.

- Review call guidelines with 911 dispatchers and call takers educating them on questions to ask regarding suspicious chemical incidents or a person that may be unconscious in a vehicle; warning signs posted inside or on doors/windows, visible chemical containers, foul rotten egg or almond odor, etc. It is critical that first responders are aware of any potential hazards.

- The smell of “rotten egg” would indicate possible exposure of hydrogen sulfide; the smell of almonds typically indicates the presence of cyanide compounds.

- Consider wind speed and direction when determining the need to evacuate nearby structures.

- If there is a possibility that the individual may be sleeping, attempt to wake them with a vehicle public address system, bullhorns, or sirens.

- If the individuals cannot be awakened responders should perform a thorough recon before entering the space to assist the victim.

- Individuals who initiate chemical suicide may, or may not, place a warning signs on doors or windows to indicate the presence of deadly gas inside the space. (Signs may not be easily visible.)

- Be cautious that the victim's breath and clothing will “OFF GAS” as well as other items exposed to the gas. The victim's clothing should be double bagged for safety.

- Look for household containers that hold chemicals, pails, buckets, pots or other containers where chemicals could be mixed.
HYDROGEN SULFIDE SUICIDE TREND – FIRST RESPONDER SAFETY UPDATE

First responders and/or security personnel should exercise caution if they suspect the presence of hazardous chemicals indicating suicide. Knowing what to look for could mean the difference between life and death for responders. Below are indicators of chemical suicide scenes:

- HAZMAT warnings and/or suicide notes taped to the window
- Container used to mix the chemicals
- Bottles of household chemicals
- Suicide note inside vehicle
- Tools used to mix the chemicals
- Subject slumped over in the vehicle
HYDROGEN SULFIDE SUICIDE TREND – FIRST RESPONDER SAFETY UPDATE

Potential Use For Terrorist Attack

It would be difficult for terrorists to create fatal concentrations of hydrogen sulfide in large open areas because the gas would dissipate; however, terrorist could use it in enclosed spaces to cause disruption, panic, injuries or even death depending on the concentration levels of the chemical mixture.

Currently, CFIX has no information indicating that a terrorist attack is imminent using this chemical, however terrorist training manuals have discussed using hydrogen sulfide gas in an attack.


5. POISONOUS GASES

5.1 Hydrogen Sulphide Gas

Chemical Formula: H2S

Odor: Foul, garlic-like. Odorless in large quantities.

Preparation:

2.5 Solution

5g Sodium Sulphide (Na2S) + Sulfuric acid (H2SO4) → Na2SO4 + H2S

Note: Good quality Na2S should have a strong smell.

The “Mujahideen Poisons Handbook” describes producing hydrogen sulfide gas by reacting sodium sulfide and sulfuric acid.
HYDROGEN SULFIDE SUICIDE TREND – FIRST RESPONDER SAFETY UPDATE

Sources:


How to Detergent Suicide.

Incident Reports from:
• Orange County
• Okaloosa County
• St. Petersberg
• St. Lucie County

On-Scene photos: St. Lucie County
CHEMICAL SUICIDE

Safety Alert

In December, 2010, Portland Fire & Rescue responded to its first “Detergent Suicide” call. There is an increasing potential for more of these calls that may impact your safety, should you respond on a call to check a patient in a vehicle or a small room. Please review the following information about this important safety topic.

“Detergent Suicide” or “Chemical Suicide,” is a new way to commit suicide by mixing two or more chemicals that can be purchased at local stores. Once mixed, these chemicals produce a heat releasing or exothermic reaction, creating by-product gases that quickly fill the enclosed area. This technique that first originated in Japan, is gaining popularity via instructions posted on the internet. It is often communicated as a quick and painless way to end one’s life.

There have been hundreds of these incidents in Japan over the last several years and now have been seen in the United States – specifically in Idaho, California, Florida and Georgia.

This is an overview of the detergent suicide process:

- In Japan, a brand of detergent was combined with bath salts – here it is most likely an inorganic acid and a pesticide or garden product
- Usually, tape will be used to seal joints and seams in the room or the vehicle, to contain the toxic products inside
- In most but not all incidents, a suicide note will be taped to a door or window, warning responders of the hazards
- Common products from hardware stores are combined in a bucket or tub and quickly overcome the victim, leaving a crime scene and a hazardous materials cleanup site
- The main toxic product is Hydrogen Sulfide (H2S), which can cause coma and death at 1000 parts per million (only 1/10 %)
- There will be evidence of this process – you may note the smell of H2S upon approach (sulfur or rotten eggs) or tubs/buckets in the vehicle, along with multiple chemical product containers
Common sources for the **acids** may be: Lysol, toilet cleaner, tile, brick or drain cleaners

Common sources for the **sulfur** may be: Dandruff shampoo, Epsom salts, pesticides or fungicides

Possible **toxic products** could include: H2S, Sulfur Dioxide, Carbon Monoxide, Acid Gases, Nitrogen Oxides, Phosgene, Carbon Disulfide, Methyl Isocyanate, Thallium

**All Very Toxic Products !!!**

On 12-26-2010, Hazmat 7 responded to a Detergent Suicide call, close to the station in SE Portland. This is a synopsis of that incident:

At about 7pm, they responded on a UN1 medical call that morphed into a hazmat call. The mother of the victim checked her 50 year old son and found him unresponsive in his pickup. **Note the yellow stain on the driveway.**

This note was found inside the victim’s home, not on the exterior of the vehicle. A likely scenario is that the victim loses consciousness in 60-90 seconds and may die within 5-10 minutes. This family member noticed strong chemical odors when the door was opened. This patient required treatment, while the crew found the victim DOA.
Upon arrival, HM7 noted the odor of rotten eggs, a yellow stain on the ground below the vehicle and the presence of tubs and chemical containers in the back seat. Note the combination of chemicals needed to initiate the exothermic reaction and release of toxic gas.

The yellow color in the mixing tub is from the element Sulfur that is present in many of the garden chemicals used in this process. *Be aware that Hydrogen Sulfide is only one of many hazardous byproducts of this deadly reaction.*

HM7 monitors detected dangerous readings at the gaps of the truck doors, even when closed. Levels inside the vehicle triggered high alerts on the 4 gas monitor. *Note that H2S will deaden your sense of smell at about 150 ppm, masking estimates of the on scene danger.*
LESSONS OBSERVED AND ACTION STEPS

☐ DON’T BECOME COMPLACENT! Always be aware of ALL on scene clues available to you. Size-up the situation before you act.

☐ IF THERE IS A SMELL OF SULFUR OR ROTTEN EGGS – This may indicate the presence of H2S gas which is very dangerous even at low levels, deadening your sense of smell. Back off and don PPE with respiratory protection before acting. Request fire/hazmat with monitoring capability.

☐ UNRESPONSIVE PATIENT IN A VEHICLE: Warning notes or taped door and window seams, glass stains or residue on the ground are a sure sign that you should exercise caution and escalate the response. Call for a hazmat team and police.

☐ EVIDENCE OF CHEMICALS IN THE VEHICLE – Typical chemicals, tubs and other equipment mentioned in this bulletin are clues that an active reaction has filled the vehicle with toxic products. DO NOT ENTER THE VEHICLE FOR PATIENT ASSESSMENT, WITHOUT DONNING FULL PPE!

☐ CREATE HAZARD ZONES – Inside the vehicle is a hot zone. Create an appropriate warm zone around the vehicle. Prohibit entry from anyone not wearing full PPE.

☐ NOTIFY APPROPRIATE ASSISTANCE – Call the nearest hazardous materials response team, police and other appropriate agencies. TREAT THIS AS A HAZMAT SCENE!

☐ ENTRY INTO THE VEHICLE – If the decision is made to enter the vehicle, use full PPE and completely vent the vehicle first. Position the patient OUTSIDE the vehicle for assessment. Remember, the atmosphere inside the vehicle is both an inhalation hazard and possibly an explosive hazard.

☐ IF POLICE NEED TO PERFORM A TACTICAL ENTRY EITHER INTO A VEHICLE OR A SMALL ROOM – Full SCBA is mandatory and the use of flash-bang or sting ball devices could cause an explosion because of the presence of flammable gases.

☐ REMEMBER THAT THIS IS A POSSIBLE CRIME SCENE – Make immediate notifications to Police, Medical Examiner, etc and avoid disturbing any evidence.
☐ BE ALERT FOR SECONDARY DEVICES – Scan the vehicle or room for the presence of anything that looks out of place or suspicious. DO NOT DISTURB OR TOUCH ANYTHING UNNECESSARILY!

☐ FIRST AID ACTIONS – Remove victim(s) from exposure and if appropriate, support breathing. Skin contact with corrosive product may cause burns.

☐ DECONTAMINATION – Remove clothing ASAP. For eye or skin exposure, flush with lukewarm water for 15 minutes.

☐ HAZMAT WASTE – After victim/patient care and legal scene issues, scene must be treated as a hazmat site. Waste products must be overpacked and handled as hazardous waste by a licensed contractor. Notify appropriate environmental agencies as needed.

For more information, contact Grant Coffey, team coordinator of Portland Fire & Rescue's Hazmat Response Team #6 at: grant.coffey@portlandoregon.gov