



BURN PROTOCOLS

JUNE 2007

©Benson Chemicals Limited and Workplace Medical Corporation, 2007

BENSON CHEMICALS LIMITED
R.R. #1, FREELTON, ONTARIO L0R 1K0
PHONE 905-659-3351 1-800-265-0014 FAX 905-659-1689
www.bensonchemicals.ca info@bensonchemicals.ca
Member of the Canadian Association of Chemical Distributors

BENSON CHEMICALS BURN PROTOCOLS

This protocol is intended to be carried in your vehicle with a copy at various company sites where burns and other chemical exposures could potentially occur.

We know that all of you are very conscious of your health and safety, but we also know that accidents do occasionally occur. These protocols are basic protocols of things that you can use should a spill occur. It is also a protocol which you can take with you to a health facility where the professionals might not be terribly familiar with the particular chemicals that you are carrying in your truck. This protocol will give them a guideline as to what you have potentially already done, so that they can most effectively treat you.

The following chemicals will be addressed:

- Hydrochloric Acid, 29%
- Hydrochloric Acid, 32%
- Sulphuric Acid, 93%
- Phosphoric Acid, 75%
- Nitric Acid, 68%
- Sodium Bisulphite, Aqueous 38%
- Sodium Hydroxide Solution, 50%
- Potassium Hydroxide Solution, 50%

If for some reason you are in an area where there is no medical care but you have access to a telephone, call The National Poison Control Center (1-800-222-1222) this hotline number will let you talk to experts in poisoning.

Craig Karpilow MD
Company Physician
Workplace Medical Corporation

Benson Chemicals may from time to time provide recommendations, comments and advice with respect to certain practices including health & safety and environmental responsibility, although Benson Chemicals accepts no responsibility for the use that the Customer may make of such advice. Benson Chemicals is not acting in a consulting or professional adviser capacity. Benson Chemicals provides this document as a public service. You are strongly urged to consult with your physician or the staff of the burn unit or emergency room of the nearest hospital.

Of these substances the alkaline substances are the most dangerous. The worst damage can occur if these come in contact with your eye, are ingested, or the fumes are inhaled. Burns from direct contact with the skin can also be extremely dangerous and disfiguring. The two major substances which you will be carrying are either alkali or acid.

- **Alkali burns** are the most dangerous. Alkalis—chemicals that have a high pH—penetrate the surface of the area they come in contact with very effectively. In general, more damage occurs with higher pH chemicals.
 - Common alkali substances contain the hydroxides of ammonia, lye, potassium hydroxide,, magnesium, and lime.
- **Acid burns** result from chemicals with a low pH and are usually less severe than alkali burns because they do not penetrate as readily as alkaline substances. The exception is a hydrofluoric acid burn, which is as dangerous as an alkali burn.

Common acids causing eye burns include sulfuric acid, sulfurous acid, hydrochloric acid, nitric acid, acetic acid, chromic acid, and hydrofluoric acid.

Chemical Eye Burns

Since the eyes are the most important and very vulnerable, here are some facts and practical information regarding burns to the eye.

Chemical Eye Burn Symptoms

Early signs and symptoms of a chemical eye burn are

- Pain
- Redness
- Irritation
- Tearing
- Inability to keep the eye open
- Sensation of something in the eye
- Swelling of the eyelids
- Blurred vision

Chemical Eye Burn Treatment

before you get to the hospital ;;; your own treatment:

For all chemical injuries, the first thing you should do is immediately irrigate the eye freely. Ideally, specific eye irrigating solutions should be used for this, but if none are available regular tap water will do just fine.

- Begin washing your eye before taking any other action and continue for at least 10 minutes. The longer a chemical is in your eye, the more damage will occur. Diluting the substance and washing away any particles that may have been in the chemical is extremely important.
- Ideally, in the plant, you would be placed in an emergency eyewash or shower station and your eye washed with sterile isotonic saline solution. If sterile saline is not available, use cold tap water.
- If you are on the road and do not have special eye wash, step into the shower with your clothes on to wash out your eye.
- Even though it may be uncomfortable, open your eyelids as wide as possible as you rinse them out.

- If an alkali or hydrofluoric acid burn has occurred, continue washing until you have been taken to a hospital's emergency department.

Any time you experience pain, tearing, redness, irritation, or vision loss, go to a hospital's emergency department for immediate evaluation, even if you believe the chemical is only a mild irritant. All acid or alkali eye burns require immediate treatment and evaluation by a doctor.

- **What to expect at the emergency room:** Doctors likely will continue washing your eye. No standard exists for the amount of washing required. Usually, doctors use at least one liter of fluid.
 - Depending on the type of chemical involved, the doctor may test the pH of your eye and continue washing until the pH returns to normal.
 - You may receive topical anesthetic eye drops to numb your eye to make washing less painful.
 - Doctors will wipe or irrigate away any solid foreign material in your eye.
- **Exams and Tests:** The doctor will complete a thorough eye examination.
 - You will be given an eye examination using an eye chart or machine to determine how well you can see.
 - Structures surrounding the eye are checked.
 - Eyelids, in particular, require careful assessment. The doctor will turn them inside out to look for foreign material.
 - The doctor may stain your eye with a dye called fluorescein to help determine the extent of damage. This is an orange - colored solution.
- If the burns are minor, you are usually sent home with antibiotic eye drops and oral pain medications. Occasionally, you may be given dilating eye drops to help with comfort, and your injured eye may or may not be covered with an eye patch.

- Any significant burn, especially an alkali or hydrofluoric acid burn, may require admission to the hospital.
- For any minor eye injury, an ophthalmologist will most likely evaluate you within 24-48 hours of your injury and for any moderate to significant injury, an ophthalmologist will evaluate you before you leave the Emergency Room.
- Your tetanus immunization status may be determined and updated.

Hydrochloric acid

Hydrochloric acid is a clear, poisonous liquid. It is highly corrosive, which means it immediately causes severe damage, such as burning, on contact due to spilling, swallowing or breathing in hydrochloric acid.

Symptoms from skin contact or ingestion of hydrochloric acid may include:

- redness of the skin
- pain in the skin
- severe abdominal pain
- Breathing difficulty due to swelling of throat
- Chest pain - severe
- Drooling
- Mouth pain - severe
- Rapid drop in blood pressure
- Throat pain - severe
- Vomiting blood

Symptoms from breathing in hydrochloric acid:

- Bluish color to lips and fingernails
- Chest tightness
- Choking and inflammation of the nose
- Coughing
- Coughing up blood
- Dizziness
- Low blood pressure
- Rapid pulse
- Shortness of breath potential pulmonary edema, circulatory system failure
- Weakness and potential death

Your treatment

DO NOT make yourself throw up

If the chemical is on the skin, flush with lots of water for at least 15 minutes.

If the chemical was swallowed, immediately take water or milk, unless instructed otherwise by a health care provider. DO NOT give water or milk if you are vomiting, or having convulsions, or a decreased level of alertness that make it hard to swallow.

Immediately move to fresh air.

What to expect at the emergency room

The health care provider will measure and monitor your vital signs, including temperature, pulse, breathing rate, and blood pressure. You may receive:

- More washing of the skin
- Cutting away any dead skin after this skin is deadened
- A dressing with a white cream called Silvadene
- Fluids by IV
- Medicines to treat symptoms
- Endoscopy -- camera down the throat to see burns in the esophagus and the stomach
- Oxygen
- Breathing tube
- Bronchoscopy -- camera down the throat to see burns in the airways and lungs

Sulphuric acid burns

Initial symptoms usually include severe pain on tissue contact, redness, and then a white colored skin around the burn.

If swallowed, there may be speech problems, drooling, vomiting, bloody vomit, severe abdominal pain, and burns on the mouth and throat.

Other symptoms from swallowing may include:

- Severe pain in the mouth and throat
- Fever
- Breathing difficulty due to throat swelling
- Rapid development of low blood pressure

Other symptoms from breathing in the poison may include:

- Body weakness
- Chest pain (tightness)
- Coughing
- Breathing difficulty (sensation of not getting enough air)
- Shortness of breath
- Coughing up blood
- Choking
- Bluish skin, lips, and fingernails
- Low blood pressure
- Rapid pulse
- Dizziness

your Treatment

DO NOT try to throw up. Seek immediate medical help.

If the chemical is on the skin or in the eyes, flush with lots of water for at least 15 minutes.

If the chemical was swallowed, immediately take water or milk. DO NOT take water or milk if you are vomiting or have a decreased level of alertness.

If you breathed it, immediately move to fresh air.

What to expect in the emergency room

you may receive:

- IV fluids
- Milk of magnesia
- Medications and therapies to treat the symptoms
- Antibiotics
- Surgery to repair any tissue damage
- Breathing tube

Phosphoric Acid burns

The symptoms of burn with phosphoric acid can be very serious. Phosphoric acid can affect you through inhalation of mist, ingestion, and contact with the skin and eyes. Symptoms that occur with contact with the skin include pain, redness. It can burn the mouth, and eyes, and cause a sour acrid taste, coughing, conjunctivitis, tearing, and paralysis of the eyelids, severe gastrointestinal irritation, nausea, vomiting, bloody diarrhea, difficult swallowing, severe abdominal pains, extreme thirst, difficult breathing, convulsion, shock, and even death.

If you take too much of it, it can cause circulatory collapse with clammy skin, weak and rapid pulse, shallow respirations, and scanty urine. It can corrode the mucous membranes of the mouth, throat, and esophagus, with immediate pain and difficulty swallowing.

your Treatment

DO NOT try to throw up. Seek immediate medical help.

If the chemical is on the skin or in the eyes, flush with lots of water for at least 15 minutes.

If the chemical was swallowed, immediately take water or milk. DO NOT take water or milk if you are vomiting or have a decreased level of alertness.

If you breathed it in, immediately move to fresh air.

What to expect in the emergency room

you may receive:

- IV fluids
- Milk of magnesia
- Medications and therapies to treat the symptoms
- Antibiotics
- Surgery to repair any tissue damage
- Breathing tube

Nitric acid

Initial symptoms usually include severe pain on contact with the skin, redness, and then a white colored skin around the burn.

Symptoms from swallowing nitric acid may include:

- Abdominal pain - severe
- Burns to skin or mouth
- Fever
- Mouth pain - severe
- Rapid drop in blood pressure
- Throat swelling, which leads to breathing difficulty
- Throat pain - severe
- Vomiting, bloody

Symptoms from breathing in (inhaling) nitric acid may include

- Bluish colored lips and fingernails
- Chest tightness
- Choking
- Coughing
- Coughing up blood
- Dizziness
- Low blood pressure
- Rapid pulse
- Shortness of breath
- Weakness

your Treatment

Seek immediate medical help. DO NOT try to throw up unless told to do so by a health care professional.

If the chemical is on the skin or in the eyes, flush with lots of water for at least 15 minutes.

If the chemical was swallowed, immediately take water or milk, unless instructed otherwise by a health care provider. Take 4 to 6 ounces of milk of magnesia, if possible.

DO NOT take water or milk if you are having symptoms (such as vomiting, convulsions, or a decreased level of alertness) that make it hard to swallow.

If you breathed in the poison, immediately move to fresh air.

What to expect at the emergency room

The health care provider will measure and monitor your vital signs, including temperature, pulse, breathing rate, and blood pressure. you may receive:

- Medicines to treat symptoms
- Nasogastric (NG) tube thru the nose into the stomach to empty the stomach (gastric lavage)
- more washing of the skin
- Silvadene cream and dressing to the skin

Sodium bisulphite

Initial symptoms usually include severe pain on contact with the skin, redness, and then a brown colored skin around where the acid touched the skin.

Symptoms from swallowing this poison may include:

- Asphyxiation (death due to inability to breathe) from swelling in the throat
- Burning pain in the mouth
- Diarrhea
- Vomiting
- Severe low blood pressure

your Treatment

Seek immediate medical help. DO NOT throw up unless told to do so by a health care professional.

If the chemical was swallowed, immediately give water or milk, unless instructed otherwise by a health care provider. DO NOT take water or milk if you are having symptoms (such as vomiting, convulsions, or a decreased level of alertness) that make it hard to swallow.

If the chemical is on the skin or in the eyes, flush with lots of water for at least 15 minutes.

If you breathed in the poison, immediately move to fresh air.

What to expect at the emergency room

The health care provider will measure and monitor your vital signs, including temperature, pulse, breathing rate, and blood pressure. You may receive:

- Medicines to treat symptoms
- Activated charcoal
- more washing of the skin
- various creams for the burn

Sodium hydroxide burns

symptoms include:

- Respiratory
 - Sneezing
 - Breathing difficulty (from inhalation)
 - Throat swelling (which may also cause breathing difficulty)
 - Lung inflammation
- Eyes, ears, nose, and throat
 - Severe pain in the throat
 - Severe pain or burning in the nose, eyes, ears, lips, or tongue
 - Loss of vision
- Gastrointestinal
 - Severe abdominal pain
 - Vomiting
 - Burns of the esophagus (food pipe) and stomach
 - Vomiting blood
 - Blood in the stool
 - Diarrhea
- Heart and blood vessels
 - Hypotension (low blood pressure) develops rapidly
 - Collapse
- Skin
 - Irritation
 - Burn
 - Necrosis (holes) in the skin or underlying tissues
- Blood
 - Severe change in pH (too much or too little acid in the blood, which leads to damage in all of the body organs)

your Treatment

DO NOT throw up.

If the chemical is on the skin or in the eyes, flush with lots of water for at least 15 minutes.

If the chemical was swallowed, immediately take water or milk. However, DO NOT take liquids if you are vomiting or your mental status appears altered.

If you breathed in the chemical, immediately move to fresh air.

What to expect at the emergency room

Some or all of the following procedures may be performed:

- For swallowed poison
 - Endoscopy -- the placement of a camera down the throat to see the extent of burns to the esophagus and the stomach.
 - Give IV fluids
 - Admission to the hospital
 - Give an antidote
 - Treat the symptoms
- For inhaled poisons
 - A breathing tube may need to be inserted
 - Oxygen
 - Admission to the hospital or to the intensive care unit
 - Bronchoscopy (inserting a camera down the throat into the airway to evaluate the extent of burns to the airway and lungs)
- For skin exposure
 - more washing of the skin, perhaps every few hours for several days
 - Skin debridement (surgical removal of burned skin)

The doctor will probably perform endoscopy -looking at your esophagus and stomach with a special tube- in all cases of suspected sodium hydroxide ingestion. In cases of severe esophageal corrosion, the doctor will probably use large doses of a drug called steroids. (This is not for bodybuilding) . General supportive measures with continual monitoring of gas exchange, acid-base balance, electrolytes, and fluid intake are also probably going to be done. This means you will get blood tests and breathing tests.

Potassium hydroxide burns

The symptoms of potassium hydroxide burns can be even greater if it is mixed with alcohol. Potential Health Effects:

Inhalation:

Inhalation of vapors can cause irritation to the respiratory tract. Prolonged exposures to high concentration may cause drowsiness, loss of appetite, and inability to concentrate. Potassium Hydroxide: Respiratory tract irritant, may cause serious burns on acute contact. The self-limiting coughing and sneezing symptoms usually avoid severe injury.

Ingestion:

Can cause gastritis, vomiting, and central nervous system depression with headache, dizziness, and dullness. Potassium hydroxide: Toxic! Corrosive to mucous membranes and may cause perforation of the esophagus and stomach. Abdominal pain, nausea, vomiting, general gastro-intestinal upset can be expected.

Skin Contact:

May cause irritation. Prolonged contact may produce discoloration. Potassium hydroxide is corrosive! Contact of skin can cause irritation or severe burns and scarring with greater exposures.

Eye Contact:

May cause severe irritation. Splashes may cause temporary pain and blurred vision. Potassium hydroxide is highly corrosive to the eyes! Causes irritation of eyes with tearing, redness, swelling. Greater exposures cause severe burns with possibly blindness resulting.

Your treatment

Inhalation:

Move to fresh air. If breathing is difficult, get oxygen. Get medical attention immediately.

Ingestion:

If the chemical was swallowed, immediately take water or milk. However, DO NOT take liquids if you are vomiting or your

mental status appears altered.

Skin Contact:

Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately. Wash clothing before reuse. Thoroughly clean shoes before reuse.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

What to expect at the emergency room

Some or all of the following procedures may be performed:

- For swallowed poison
 - Endoscopy -- the placement of a camera down the throat to see the extent of burns to the esophagus and the stomach.
 - Give IV fluids
 - Admission to the hospital
 - Give an antidote
 - Treat the symptoms
- For inhaled poisons
 - A breathing tube may need to be inserted
 - Oxygen
 - Admission to the hospital or to the intensive care unit
 - Bronchoscopy (inserting a camera down the throat into the airway to evaluate the extent of burns to the airway and lungs)
- For skin exposure
 - more washing of the skin, perhaps every few hours for several days
 - Skin debridement (surgical removal of burned skin)

Craig Karpilow MD
Company Physician
Workplace Medical Corporation