Household Poisons

The house was blessedly silent as Geri headed up toward the bathroom, ready to begin her cleaning. She wouldn’t have to pick Kim up from nursery school for several hours yet. At the tub she stared down at the mess her daughter had made and, taking out the ammonia, she began to scrub. No effect. Well, maybe bleach was needed. The strong odor assailed her in a moment, dizziness had struck. Surprised, Geri sank down on the toilet seat, not understanding what was happening. She was still unconscious when her husband found her several hours later.

—ADAPTED FROM NORTHWESTERN MEMORIAL HOSPITAL EMERGENCY ROOM RECORD, CHICAGO, ILLINOIS, 1973

Given the huge number of chemicals in the home, surprisingly few are lethal. Because they can do severe damage, however, and many will kill small children, these potential poisons should be stored carefully.

In pre-1970s households, lethal products were more common, so characters in a novel set in this time or before would have access to stronger detergents and poisons.

One of the many changes since then is in the type of gas found in the home; Coal gas, which was used in homes from the 1920s through the 1960s, was much more lethal than the natural gas used today. So putting the victim’s head in the stove—à la poetess Sylvia Plath—will cause illness, but probably not kill. However, all gases can eventually suffocate, because they replace oxygen. The clever writer, therefore, will find a believable way to seal the room in which the victim is trapped, though death will probably take longer than in previous decades. And an even cleverer writer will instead take advantage of the fact that natural gas burns and can explode to create the wanted mayhem.

Many household poisons turn up in industrial situations as well. Carbon monoxide is often listed in poison texts as an industrial hazard, which it can be. But it’s probably better known as a hazard in the home, which is why it is listed here. Phenol is another toxin with many industrial uses that most of us will find at home, though perhaps not in the form we expect.

Most people are likely to have access to boric acid in the home, both in its diluted form as an antiseptic for eye injuries and as good old 20
Mule Team Borax, a laundry and cleaning agent. It can be found in other laundry detergents and stain removers, as well. It's also widely used as an ant poison.

So household poisons cover a wide range of things; some of those poisons follow in alphabetical order.

**ALKALINE CORROSIVES AND INORGANIC SALTS**

Other: While there are many types of alkalis, those focused on here are potassium hydroxide, sodium hydroxide (better known as lye), sodium phosphates, and sodium carbonate.

**TOXICITY: 6**

Form: Because penetration through the skin is painful and slow, fatalities are caused by ingestion.

Potassium hydroxide is found in liquid cuticle remover and in some small batteries. Sodium hydroxide (often sold by its common name, lye) is found in other small batteries, aquarium products, and drain cleaners: Drano, for example, combines several alkalis. Sodium phosphates help give cleansers or abrasive cleaners their punch. Dye removers remove dye with sodium carbonate, which is also found in dishwasher soap. Furniture polish once contained alkalis but now does not.

Effects and Symptoms: These chemicals team up with the proteins and the fats in the body to turn firm, healthy tissue into soft, decayed (necrotic) tissue—not unlike the process of lye and fatty acids becoming soap.

Severe pain immediately follows ingestion, followed by diarrhea and vomiting, at which time the victim collapses and can possibly die. If the victim doesn’t die initially, he may improve during the first twenty-four hours after the ingestion, and there may be some blood-tinged vomit. However, more problems can occur anywhere from two to four days later, if the stomach or esophagus was perforated by the corrosion and the treating physician didn’t find the perforation, thus allowing peritonitis—a potentially severe infection of the abdominal lining—to set in. The patient has a sudden onset of stomach pain, boardlike abdominal rigidity, a rapid fall in blood pressure, dizziness, headache, blurred vision, and fainting. Survival will depend on how fast and aggressively the patient is treated, although it’s not guaranteed.

Death, if it’s going to occur, usually happens by the third day, and is painful. Necrotic (dead) tissue is shed in strips through vomiting. An autopsy finds gelatinous, dead areas wherever the alkali went.

Even when a victim survives ingestion of an alkali, the esophagus can
constrict weeks or months later, making swallowing very difficult.

Reaction Time: Immediate. Death, if it occurs, may take several days.

Antidotes and Treatments: Vomiting is not induced since it brings the poison back up, causing more injury. As soon as possible, the physician puts a specially equipped tube down the victim’s throat to examine the injuries. Afterward, antibiotics may be given to patients with fever or other signs of perforation, and surgery may be needed to repair damaged tissues.

Notes: Strong alkalis are so corrosive that it would be difficult to accomplish even a suicide with such a substance, since one taste would likely give the victim a third-degree burn on the mouth and esophagus. Many people, however, accustomed to their five o’clock martini, will down a drink without even checking it. Since very little poison is needed to damage the tissue, the esophagus and stomach could quickly be perforated by one large gulp, resulting in eventual death.

Sodium hydroxide, potassium hydroxide, sodium phosphates, and sodium carbonate are all corrosive chemicals found in many cleaning products. Acids are generally thought of as the principal corrosives, but alkalis, the chemical opposites of acids, can be just as damaging. Just as there are many weak acids, such as vitamin C (ascorbic acid), that are completely harmless on or in the human body, there are many weak alkalis that people use daily, such as dish detergent and shampoo.

Batteries also contain alkalis, and even small watch batteries, when swallowed, can do considerable damage to the esophagus and upper gastrointestinal tract.

Even though there are several chemicals involved in this category, they are grouped together because they have the same effects and are treated the same way.

Label instructions on Drano clearly read, “Do not mix with ammonia, toilet bowl cleaners, household cleaners, or other drain cleaners. Mixture may release hazardous gases or cause violent eruption from drain.” (Wouldn’t that be a great sight to write about?) Also, you don’t want to follow lye or any other drain cleaner down a drain with hot water, because lye heats up water on contact. If the water is already warm, corrosive steam can escape—perhaps a good trap for your victim.

Because acids and alkalis are chemical opposites, they do neutralize each other, as long as the pH, or strength, of one is balanced against the other. Soap is made on this principle. The alkali, usually a small amount of lye, is mixed with a much larger amount of acid from fats (fats and proteins are actually mild acids). Because we are made up of proteins and fats, this is exactly the reaction that happens when a strong alkali comes
into contact with our tissues. The two combine to form glycerine in a process called saponification. So while there is lye in soap, it’s no longer lye by the time you wash your face. Making soap at home is an increasingly popular hobby, and soap makers need to keep lye around.

**CASE HISTORY:**
In the movie Throw Momma From the Train, the character Owen Lift (played by Danny DeVito) tries to kill his mother (Anne Ramsey) by adding lye to her soft drink, but then chickens out and knocks the cup away. It probably wouldn’t have done much, however, since the acids in the soda would have neutralized some of the lye.

**AMMONIA**
Other: Ammonium hydroxide.
Toxicity: 4.5
- Form: Ammonia is an ordinary gas that is inhaled. Ammonium hydroxide, household ammonia, is a solution that is ingested.
- Effects and Symptoms: Both gas and liquid damage cells with caustic action, and painfully irritate mucous membranes.
  - If swallowed, coughing; vomiting; extreme pain in the mouth, chest, and abdomen; and shocklike collapse occur. The stomach and esophagus may perforate later, which increases the abdominal pain and causes fever and rigidity. After twelve to twenty-four hours, irritation and fluid retention in the lungs occurs. If ammonia is inhaled in high concentrations, the lips and eyelids swell; there is temporary blindness, restlessness, tightness in the chest, and reddish skin color, and the victim’s pulse becomes rapid and weak. In the case of ingestion, autopsy findings are identical to those of alkali poisoning; in inhalation cases, there will be pulmonary edema, irritation, and pneumonia.
  - Reaction Time: Immediate.
  - Antidotes and Treatments: As a temporary measure, water may be given to dilute the ammonia. Activated charcoal is not recommended, as it does not absorb ammonia and can block the view of an endoscope, which will be used to look for injuries to the esophagus and stomach.
  - Notes: Real ammonia is a gas at room temperature. It has a number of industrial uses, including as a refrigerant and fertilizer. Colorless and strongly alkaline, it has a characteristic odor. The household cleaner is a frequent source of poisoning around the home; although because the concentration is usually less than 10 percent ammonia, the effects are seldom severe, except in small children.
  - Ammonia becomes an extremely toxic gas when combined with
strong oxidizers, calcium, gold, mercury, silver, or bleaches. The ammonia/chlorine bleach combination is the mixture many people have been warned about—mixing the two substances creates chlorine gas, causing unconsciousness and other symptoms of chlorine gas poisoning (see chlorine, on page 42), especially if the area is small and unventilated. The victim would need to be in the fumes for over an hour for the effects to be severe. Because of the length of time needed to kill, a short duration can be used either as a warning to “get off the case” or as a red herring.

CASE HISTORY
In 1972, one depressed man tried to kill himself by locking himself in a poorly ventilated bathroom and mixing the chemicals ammonia and bleach together. He soon lost consciousness, but was found in time and appeared to have suffered no permanent ill effects from his attempted suicide.

BACTERIAL FOOD POISONING
Other: There are several variants, but the best known are salmonella, e. coli, and listeria.
Toxicity: Highly variable and dependent on the host food, concentrations, and susceptibility of the victim.
Form: Bacteria. Listeria is mostly found in milk and soft cheeses; e. coli and salmonella can be found in water, meat products, and contaminated vegetables.
Effects and Symptoms: Bacteria invade and infect the stomach and intestines. Gastroenteritis, or upset stomach, is the basic symptom, including nausea, vomiting, cramping, and diarrhea. Fever is also common.
Reaction Time: Highly variable. While different sources offer different incubation rates, one can expect listeria to incubate between nine and thirty-two hours. Depending on the strain of e. coli, it can take anywhere from twelve hours to eight days for symptoms to develop. Salmonella usually shows up anywhere from twelve to thirty-six hours after consuming the tainted food.
Antidotes and Treatments: Most treatment is centered on fluid replacement, since dehydration presents the most serious danger. Medicines to ease the vomiting and diarrhea are sometimes given, although doing so is considered somewhat controversial since stopping the diarrhea will also keep the bacteria in the intestines longer. Since listeria can harm fetuses, pregnant women who have eaten food tainted with listeria are treated more aggressively, even though they may only be suffering mild symptoms.
Notes: Food poisoning has gotten a tremendous amount of press in recent years. While there is no question that some strains of it can be deadly, deaths are relatively rare and unlikely. The small percentage of fatalities occurs mostly among children and the infirm—which can be useful if your villain is trying to bump off an elderly and infirm great-aunt, or a small child standing in the way of an inheritance, or even someone with a suppressed immune system from an organ transplant or chemotherapy.

Death by food poisoning, however, is a hit-or-miss proposition, even among more vulnerable individuals. Chicken, considered a sure thing for producing salmonella, can be left out all day, then only partially cooked, and still not affect anyone. But this is not recommended: The risk of contracting salmonella from chicken (or any meat) handled this way is great. It’s just not guaranteed, which can be a problem for a believable plot line. On the other hand, it may be just the twist you need if you want a frustrated villain.

Another problem with food poisoning is that the vast majority of people infected by listeria, salmonella, or even e. coli will be sick to their stomachs, maybe spend the night vomiting and suffering from diarrhea, but will bounce back after a day or two. This is the reason that food poisoning is a real danger to the very old and the very young, who have the most trouble bouncing back from the shock and dehydration brought on by prolonged vomiting and diarrhea. And because food poisoning is mostly bacterial, immunosuppressed people are more at risk because their immune systems aren’t up to fighting the bacteria.

Even so, deaths from food poisoning are relatively rare. Listeria is the most deadly form of these toxins, and is on the rise in the United States, although it is still fairly rare, with only three cases per million people in 2005. However, out of the 2,500 cases reported that year, there were five hundred deaths.

CASE HISTORY
In 1984, the Rajneeshee cult attempted bacterial contamination of the town of Dalles, Oregon, in an attempt to make people too sick to vote. They placed the bacteria on personal drinking glasses, doorknobs, salt-shakers, urinal handles, produce at the local supermarket, and salad bars in ten restaurants. It took one year for the health department to determine that the 751 cases of salmonella (none fatal) had been caused by one strain that had reproduced. Cult members had already put dead rats and raw sewage, as well as the salmonella, into the Dallas water supply.

In 1993 there was an outbreak of e. coli in the Pacific Northwest, and in 2006, grocery chains Trader Joe’s and Whole Food Markets recalled
several batches of guacamole and salsa believed to be tainted with listeria.

In 1993, six hundred people got sick with e. coli after eating undercooked hamburgers at Jack in the Box restaurants in the Pacific Northwest. Of those six hundred, there were four deaths, all children—less than 1 percent of the victims. While no consolation to the families of those children, that figure does demonstrate the relatively low mortality rate of food poisoning.

**BOTULISM**

Scientific Name: Clostridium botulinum.
Toxicity: 6

Form: The botulism bacillus is eaten with the contaminated food. It's an anaerobic spore, which means it grows without oxygen, so foods packed in oil can grow it easily. As a spore, it is invisible to the eye.

Effects and Symptoms: Botulism causes muscle paralysis by keeping nerve impulses from getting to the brain. It also affects the other organs in the body, especially those of the autonomic nervous system. The main symptoms are double vision, muscular paralysis, nausea, and vomiting, and can be delayed twelve to twenty-four hours. An autopsy shows congestion and hemorrhages in all of the organs, especially the central nervous system. The liver and kidneys also degenerate. The corpse looks as if the victim had been very ill.

Reaction Time: Varies according to source and victim, but can start around eight hours after eating the contaminated food; death occurs as much as eight days later.

Antidotes and Treatments: Botulin antitoxins are available to bind up whatever toxin is currently circulating in the patient’s system and stop the illness from getting worse; however, it is contraindicated in patients allergic to drugs made with horse serum. The patient might also be put on a respirator to alleviate breathing problems. Otherwise, treatment is focused on fluid replacement to combat dehydration.

Notes: Botulism, the bane of the home canner, kills up to 50 percent of its victims. Low-acid foods such as meat, fish, and some vegetables that have been insufficiently heated and improperly canned are the source of the often tasteless and odorless botulinus toxin. The usual indications that botulism may be present are moldy, leaking, or exploded containers. But since botulism can be present even without these signs, the USDA Complete Guide to Home Canning strongly recommends boiling any home-canned food at least ten minutes (longer in higher elevations) unless you are absolutely sure the canning was done properly and
that the equipment was functioning as it should.

Babies can get botulism from honey, even if it is processed, which is why honey is not a recommended food until after the age of two. Some adults have retained this sensitivity, but it is very rare.

Deaths from botulism poisoning have actually become very rare, because home canning has gotten very rare.

Doctors initially took advantage of botulism’s paralyzing properties to cure eye twitches and help with underarm sweating with a drug made from the bacteria known as Botulinum toxin type A. But when plastic surgeons noticed that the stuff also plumped out wrinkles, Botox, the brand name of the drug, took off, and Botox injections became among the most common cosmetic procedures done.

CASE HISTORY
In A Pint of Murder, by Alisa Craig (aka Charlotte MacLeod), an improperly canned jar of food was used to murder the victim.

Sarah Shankman’s novel Then Hang All the Liars also featured a jar of poorly canned marinated mushrooms. The killer knew the botulism was present because other jars from the batch had exploded.

BROMATE
Other: The focus here is specifically potassium bromate.
Toxicity: 5

Form: Usually found as 3 percent of a solution with water. To be poisonous, bromate must be taken orally.

Effects and Symptoms: When ingested, bromates have a corrosive action on the tissues. They can cause vomiting, collapse, diarrhea, abdominal pain, and oliguria (less-than-normal urination) or anuria. Lethargy, deafness, coma, convulsions, low blood pressure, and a fast pulse also occur. Tiny, pinprick red spots can appear on the skin as a later reaction. These will remain on the corpse, and an autopsy will also show damaged kidneys.

Reaction Time: Within five to twenty minutes.

Antidotes and Treatments: Sodium bicarbonate can be given within an hour of ingestion in an attempt to prevent hydrogen bromate from forming. Sodium thiosulfate is also given intravenously as an antidote. If this is being used in a period piece, then definitely include gastric lavage (stomach pumping) with sodium bicarbonate as part of the treatment because that was the standard for care before the early to middle part of the twentieth century.

Notes: Almost unheard of in the home nowadays, bromates were
found primarily in the neutralizer solutions of cold permanent waves (perms), popular starting in the 1940s. Home perm kits are widely available pretty much anywhere hair care products are sold and some may still contain bromates.

Bromates are also a part of some bread preservatives, although in a very diluted form. You might be able to add some mayhem to your story by setting it close to where they make the preservative.

Bromate becomes poisonous in the stomach, where the hydrochloric acid found naturally there turns the potassium bromate into hydrogen bromate, which is an irritating acid.

**CARBON MONOXIDE**

Toxicity: 5  
Form: A colorless, odorless gas, which is inhaled.

Effects and Symptoms: Unlike oxygen atoms, which hook up with red blood cells and let go when they arrive where they are needed, carbon monoxide molecules hook up with a red blood cell and hang on permanently. With enough red blood cells unable to carry oxygen to the tissues, the body suffocates.

What makes carbon monoxide so dangerous is that its victims are often unawar of being suffocated. Many survivors first think they’ve got a bad flu bug. Some even describe the sensation as that of falling asleep.

The symptoms progress as the blood saturates. The victim will first feel a slight headache and shortness of breath. Continued exposure will make the headache worse, and cause nausea, irritability, labored breathing, chest pain, confusion, impaired judgment, and fainting with exertion. Increased concentrations of the gas and continued exposure will cause respiratory failure, unconsciousness, and death. Should the victim survive, the whole range of brain injury symptoms may continue, from problems with memory and concentration, to mood disorders, to a permanent vegetative state. A pregnant woman might survive the exposure, but stands a high risk of losing her baby.

The autopsy will reveal microscopic hemorrhages and dead tissues throughout the body, as well as congestion and swelling of the brain, liver, kidneys, and spleen. The skin is often, but not always, a bright cherry red.

Reaction Time: Depends on the concentrations of the gas and the level of activity of the victim. Fairly heavy concentrations can cause death within one hour.

Antidotes and Treatments: The victim must first be removed from exposure, after which 100-percent oxygen is given until there are suf-
ficient red blood cells again. In serious cases, a hyperbaric chamber, such as those used to cure scuba divers of the bends, can be used, as the increased air pressure in the chamber can increase the absorption of oxygen into the blood.

Notes: Carbon monoxide is often abbreviated to CO, for one carbon atom connected to one oxygen atom.

This silent, odorless killer is the result of incomplete burning of carbon materials. Although CO is relatively rare, a badly vented gas heater can make a small room dangerous in minutes—which is why carbon monoxide detectors became so popular in the mid-1990s. The exhaust from gasoline engines can be 3 to 7 percent carbon monoxide. Tobacco smoke is 4 percent CO.

People breathe it all the time, and every time they do, they diminish the number of red blood cells carrying oxygen to their bodies, and in addition make it harder for the remaining blood cells to release the oxygen they contain. A person who smokes twenty cigarettes a day has at least 6 percent of his or her red blood cells saturated with carbon monoxide. CO is also a common killer among families—usually in poor neighborhoods—who use charcoal grills to heat their homes without providing adequate ventilation.

CASE HISTORY
Depression Era screen star Thelma Todd died of CO poisoning while in her car, which was left running in her garage. How she got there was a source of considerable controversy and sensational speculation in the papers of the time and even today.

In Harry Kemelman’s Saturday the Rabbi Went Hungry, an alcoholic scientist was killed when the villain left him knocked out in his garage with the car running.

Robin Cook’s Coma has CO being fed into the patient via the operating room oxygen line during surgery.

CATIONIC DETERGENTS
Other: Benzethonium chloride, benzalkonium chloride, methylbenzethonium chloride, and cetylpyridinium chloride are just a few cationic detergents.
Toxicity: 4

Form: Cationic detergents are found in solutions or creams. Benzethonium chloride and benzalkonium chloride are both antiseptics. Cationic detergents are usually swallowed but can be absorbed through the skin after the poison has undergone prolonged heating.
Effects and Symptoms: Symptoms are the same whether the poison is ingested or absorbed. The body’s cells readily absorb the detergents, which in turn interfere with the cells’ functions. Cationic detergents will also injure mucous membranes.

Nausea, vomiting, corrosive damage to the esophagus, collapse, low blood pressure, convulsions, coma, and death occur. An autopsy shows nothing characteristic of cationic detergents.

Reaction Time: First symptoms take ten minutes to an hour. Death occurs in one to four hours.

Antidotes and Treatments: First, an airway is established and respiration is maintained as convulsions are treated. Because the esophagus is often injured, gastric lavage and forced vomiting are not advised. Activated charcoal is administered. In cases of skin contact, ordinary soap is a good antidote for whatever cationic detergents have not been absorbed into the body, but there is no antidote once the detergent has been absorbed.

Notes: Cationic detergents are found mainly in dishwasher soap and fabric softeners. The other major use is as an antibacterial disinfectant on skin, surgical instruments, cooking equipment, sickroom supplies, and cloth diapers.

Many cationic detergents are found in solutions, which means they are usually too diluted to be lethal in a reasonable dose. As always, the elderly, the infirm, or the very young are the most susceptible to these compounds. A villain may work for a diaper service or some other cleaning company, and might have access to stronger solutions used to disinfect cloth diapers.

**CHLORINE**

Other: Hypochlorite.

Toxicity: As gas, 5; otherwise 3 or less.

Form: The gas is yellowish green with a very irritating smell. Bleaches and pool cleaners are clear liquids with a yellowish cast to them.

Effects and Symptoms: Both the gas and the liquid are corrosive. Inhalation will cause immediate coughing and burning in the eyes, nose, and throat. In heavier doses, swelling in the airways will cause constriction, increasing the cough. Wheezing can also occur. If a person swallows pool cleaner or industrial-strength bleach, which is a 20 percent solution, the mouth and throat burns are more severe, causing difficulty swallowing, drooling, and severe pain. There’s also the possibility of perforation in the esophagus and stomach. Both the gas and the solution can cause nausea and vomiting.
Reaction Time: Immediate.

Antidotes and Treatments: Mostly supportive. In inhalation cases, the patient is removed from the exposure, then treated with humidified oxygen; if there is wheezing present, bronchodilators, such as albuterol, may be used. If the chlorine was ingested, an endoscopy tube is used to look for injuries to the esophagus and stomach, and X-rays may be needed to find air pockets that could signal a perforation.

Notes: Most of us associate chlorine with the disinfectant we put in our pools that also turns blonde hair green. There’s also chlorine bleach, a popular cleaning agent and laundry additive. Both of these are actually hypochlorite, a water-based solution containing the heavier-than-air, yellowish green gas that is real chlorine. The household bleach usually contains 3 to 5 percent chlorine; if swallowed, it only causes minor burns to the mouth and throat. Pool chlorine and industrial strength bleach, which are 20 percent solutions, are more dangerous and can cause more significant damage. The gas is deadly, but is usually only found in industrial situations. It is listed here because it is more accessible as the pool cleaner and bleach.

Since this is a corrosive, it will be very hard to trick someone into drinking a fatal amount of industrial bleach, unless you set up a situation in which the fictional victim cannot reach medical aid. The other option would be to set the dramatic final chase in the pool store, where your plucky heroine can throw pool chlorine into the villain’s face and make her escape. The burns do cause a rash, so that might make an identifying mark as well.

CASE HISTORY
Chlorine gas was one of the earlier gases used in World War I. While it did cause some fatalities, like most gases, it ultimately wasn’t very effective because of the difficulty getting high enough concentrations to kill people and because it was easy to protect soldiers against it with gas masks. Like the better known mustard gas, it did cause a lot of permanent injury.

ETHYLENE GLYCOL
Other: Ethylene glycol is found in antifreeze.
Toxicity: 3 or 4

Form: A clear, odorless liquid (the bright green of antifreeze is a dye).

Effects and Symptoms: Ethylene glycol metabolizes into oxalic and other similar acids, throwing off the body’s metabolism. The oxalic acid then combines with calcium in the body and forms calcium oxalate crys-
tals, which can be deposited in the kidneys, leading to kidney failure. The victim will appear drunk for the first few hours after an acute ingestion. There may be some vomiting. Between four and twelve hours later, respiratory problems set in, including hyperventilation; convulsions can also occur, but they are rare. Death can occur at this point from cardiac symptoms or respiratory problems. Between thirty-six to seventy-two hours after ingestion, as the kidneys are increasingly injured, there is the onset of kidney failure, which, if not treated, results in death.

Reaction Time: First symptoms can start appearing in thirty minutes.

Antidotes and Treatments: Activated charcoal is not effective with ethylene glycol poisoning. Supportive care is given and in the presence of kidney problems, the patient is put on dialysis. In acute poisonings, the drug fomepizole is given because it reacts with and neutralizes the ethylene glycol, preventing it from metabolizing into the toxic oxalic acids. If fomepizole is not available, or there is a great deal of ethylene glycol in the victim’s system, the physician might instead use ethanol, another name for the alcohol found in beer, wine, and hard liquor. Since ethanol reacts with the ethylene glycol in a similar way to fomepizole, it prevents ethylene glycol from becoming toxic in the system, so a fictional husband trying to poison his alcoholic wife may find his scheme frustrated.

Notes: Pet owners are routinely warned to avoid leaving antifreeze on their driveways. That’s because the primary ingredient of antifreeze, ethylene glycol, has a sweet taste that attracts animals and small children. It’s one of the few toxins that is relatively easy to hide and readily available. And since the initial symptoms mimic being intoxicated, it can believably be responsible for delayed medical treatment. Alcoholics will sometimes drink ethylene glycol if they can’t get regular ethanol products.

CASE HISTORY
There was a case in Southern California a couple years ago in which a woman poisoned her husband first with oleander, then with ethylene glycol in his Gatorade.

IRON
Toxicity: 4

Form: While iron itself is a black metal that oxidizes (rusts) to the familiar brownish red dust, it is most toxic in its form as a vitamin supplement. Poisoning occurs with ingestion.

Effects and Symptoms: Iron acts initially as a corrosive, then attacks the cells. Symptoms begin with vomiting and diarrhea, often bloody due
to corrosion in the gastrointestinal tract, and abdominal pain. Mild lethargy may also be present. Within hours, the vomiting and diarrhea can reappear, along with coma, seizures, liver failure, and death. Even if the patient survives, scarring from the corrosion in the gastrointestinal tract can cause obstructions as much as six weeks after ingestion.

Reaction Time: Five to twenty minutes.

Antidotes and Treatments: Aggressive supportive care is given, along with deferoxamine, a chelating drug that binds with the iron to remove it from the body; if the patient’s kidneys are already shutting down down, however, deferoxamine is contraindicated. Activated charcoal does not bind well with iron and is not given unless there’s reason to believe another poison may have been taken as well. Whole bowel irrigation is also used to get the iron pills out of the colon.

Notes: Iron is a common nutritional supplement; without sufficient iron, our bodies cannot produce enough red blood cells. But it is also one of the most common causes of poisoning in small children and, according to one source, the leading cause of fatalities in such cases. Children’s vitamins contain up to 18 mg of iron, far below the lethal dose. The trouble happens when a child ingests the whole bottle.

The difficulty with using iron as a weapon in a story would be in finding a way to believably hide the vitamins, especially since large ingestions cause vomiting so quickly. But if your victim wants to commit suicide, iron tablets are not an uncommon choice.

**ISOPROPANOL**

Other: Isopropyl alcohol, rubbing alcohol.

Toxicity: 3

Form: Always a liquid at room temperature, isopropanol easily evaporates to a gas. It can be swallowed, inhaled as a vapor, or absorbed through the skin.

Effects and Symptoms: Isopropanol depresses the central nervous system, leading to coma. Isopropanol poisoning causes symptoms similar to extreme intoxication, though much more acute: persistent and severe nausea, vomiting, abdominal pain, depressed respiration, hematemesis (vomiting blood), oliguria, and excessive sweating. Coma can come on quickly. The autopsy may show hemorrhaging in the trachea and bronchial tubes, and pneumonia, swelling, and hemorrhaging in the chest cavity.

Reaction Time: Ten to thirty minutes. Just as with drinking alcohol, food in the stomach slows the reaction time.

Antidotes and Treatments: Treatment is supportive, and activated charcoal can be given. Dialysis is sometimes used if the patient is not
Notes: Isopropanol, a colorless liquid with a potent smell, is found in the home as rubbing alcohol and in window cleaners. This brother of ethanol (the alcohol in wine, beer, and other spirits) is two to three times as potent a central nervous system depressant, making it considerably more deadly. Alcoholics deprived of ethanol will sometimes try rubbing alcohol instead.

The residual effects of isopropanol poisoning last two to four times longer than those of the average alcoholic drink.

Physicians once prescribed alcohol sponge baths to reduce high fevers, but it was discovered that besides removing the fever, it sometimes produced a coma. Of course, an elderly grandmother who hasn’t caught up with modern medical practices might not know this and might do it by accident—or she might know, and do it on purpose.

Since the effects of isopropanol are so similar to those of intoxication, it can make hiding the poison among liquor a good way for a villain to spring a trap, especially if the bystanders have no reason to suspect that the victim’s stupor is not from ethanol.

NAPHTHALENE
Other: Mothballs, moth flakes.
Toxicity: 4 (except in the special case mentioned below)
Form: A white crystalline solid, naphthalene will usually be ingested.
Effects and Symptoms: Naphthalene destroys red blood cells by clumping them together and forcing the hemoglobin out, then causes kidney damage. The symptoms are nausea, vomiting, headache, diarrhea, oliguria, hematuria (blood in the urine), anemia, fever, jaundice, and pain while urinating. With more serious poisoning, coma and convulsions can occur.

Reaction Time: Rapid: five to twenty minutes, depending on whether the poison is inhaled or ingested.
Antidotes and Treatments: In the past, gastric lavage was performed and sodium bicarbonate given. Nowadays, however, with the emphasis on supportive care, doctors are more likely to give the drug methylene blue to counteract the clumping together of the blood cells. If severe anemia develops, a blood transfusion may be needed.

Notes: Naphthalene is nowadays mostly used in industry, where it has several uses. But since it used to be a common household product (moth balls and flakes were made of naphthalene), it is included here.

Some people have a hereditary deficiency of glucose-6-phosphate dehydrogenase that can make them more susceptible to naphthalene
poisoning. This is very rare, occurring most frequently in people of Medi-
terranean descent. The same deficiency also makes these people sensi-
tive to aspirin, so unless they were adopted and have never taken an 
aspirin, it’s likely they will know they have the trait. This could be a good 
clue or a good red herring.

**PETROLEUM DISTILLATES**

Other: Kerosene, paint thinner, gasoline, naphtha, solvent distillates.

Toxicity: 4

Form: All petroleum distillates are liquids. While inhalation of fumes 
is possible in some cases, ingestion is much more common. Injection can 
also happen, particularly when a painter’s hand gets in the way of a paint 
gun.

Effects and Symptoms: Petroleum distillates dissolve fat; but before 
taking them to lose weight, remember they also change the way the 
nerves work, causing depression, coma, and occasionally convulsions. 

Ingestion and retention of an extremely large dose of gasoline (which 
is possible, though not common) results in weakness, dizziness, slow and 
shallow respiration, unconsciousness, and convulsions. Smaller doses 
cause nausea, vomiting, and coughing and spitting up blood. Chest ir-
ritation often becomes pulmonary edema and bronchial pneumonia.

While not usually fatal, injection can cause severe scarring and per-
manent injury from tissue inflammation and necrosis—a useful device 
should your fictional villain need a way to injure but not kill someone.

Reaction Time: Five to twenty minutes.

Antidotes and Treatments: Basic supportive care is given. Oxygen 
may also be necessary if the breathing is slowed.

Notes: Kerosene, gasoline, and paint thinner are three of the most 
common products distilled from petroleum oil. Petroleum jelly is another, 
but it is about as nontoxic as a compound can be. While people have 
 survived fairly large doses of the toxic distillates, some have died from 
minuscule amounts, though this is unlikely.

Petroleum distillates can cause mild heart attacks after either inges-
tion or inhalation. They also cause reddened and calloused skin.

People who pump their own gasoline at self-service stations notice 
warning signs that indicate gasoline can be harmful or fatal and can 
cause fetal defects if it is swallowed or if its fumes are breathed for any 
length of time. While getting someone to swallow gasoline is highly 
unlikely, especially since the odor is so strong, the noxious fumes could 
possibly be pumped into a closed room, rendering the victim uncon-
scious.
CASE HISTORY
In The Palace Guard, by Charlotte MacLeod, a guard in an art museum was found dead after the liquor in his private bottle had been replaced with paint thinner.

Guerillas in South America were known to inject gasoline into victims’ feet as a form of torture.

PHENOL
Other: Carbolic acid, phenic acid, phenylic acid, phenyl hydroxide, hydroxybenzene, oxybenzene.
Toxicity: 5

Form: A white, crystalline substance that turns pink or red if not completely pure, phenol has a burning taste, a distinct, aromatic, acrid odor, and is soluble in water. In addition to the household uses listed the notes below, it is used in production of fertilizers, paints, paint removers, textiles, drugs, and perfumes. All equally deadly are inhalation of mist or vapor; skin absorption of mist, vapor, or liquid; ingestion; and skin or eye contact. Phenol penetrates deeply and is readily absorbed by all surfaces of the body.

Effects and Symptoms: Phenol is a corrosive. In high concentrations, contact with the eyes can result in severe corneal damage or blindness. Skin contact, which can occur at low vapor concentrations, causes burns that form white patches.

If a sufficient amount of phenol is ingested (and in most household forms, it is very diluted), the victim will suffer from vomiting and diarrhea. Because of the corrosive effects, burns can injure the gastrointestinal tract; if the phenol is absorbed into the system, it may cause seizures, coma, low blood pressure, irregular heartbeat, and respiratory arrest.

Reaction Time: Thirty minutes to several hours.

Antidotes and Treatments: For skin contact, washing for fifteen minutes, followed by mineral oil or olive oil or petroleum jelly to treat the burns. Eyes that have been exposed are flushed repeatedly with water or saline solution. After inhalation, victims are removed from exposure and given oxygen. Activated charcoal is recommended for ingestion; however, one source suggests withholding it if the doctor expects to use an endoscope to check for damage to the gastrointestinal tract.

Notes: This is another toxin that had widespread household use as a germicide and a local anesthetic until replaced by less toxic substances. Even now it constitutes roughly 4.7 percent of the topical ointment Campho-Phenique, and is used in a variety of sore throat remedies, including lozenges and the spray Chloraseptic. It is also used to cause skin peeling
for cosmetic purposes.

Dinitrophenol was formerly used medically as a metabolic stimulator for weight reduction.

Phenol is used in making creosotes (wood or coal tar); phenol derivatives are used in making disinfectants, antiseptics, caustics, germicides, surface anesthetics, and preservatives.

CASE HISTORY
In the past, an anti-mildew agent containing pentachlorophenol was used in the final disinfecting rinse of diapers and nursery linens, until it was discovered that it caused fever and “sweating syndrome.” There were two deaths and severe poisoning in at least nine infants in a Chicago day care center.

POTASSIUM PERMANGANATE
Toxicity: 5

Form: Potassium permanganate is a violet crystal compound that dissolves in water. It might make a nice gift of bath salts for an intended victim.

Potassium permanganate is usually swallowed but can also be absorbed through mucous membranes, usually the vagina. In fact, many drugs mixed in a petroleum jelly base are given as vaginal suppositories; so if your potential victim is taking one, the killer can substitute the poison dose.

Effects and Symptoms: Potassium permanganate destroys mucous membrane cells with the same caustic action as alkalis. The main symptom of potassium permanganate poisoning is corrosion. Swallowing will cause brown discoloration and swelling of the mucous membranes in the mouth and throat, coughing, swelling of the larynx, decayed tissue in mucous membranes, a slow pulse, and shock with a drop in blood pressure. Topical application of potassium permanganate to the vagina or urethra will cause severe burning, hemorrhages, and collapse of the blood vessels. The vaginal wall may be perforated, which will cause peritonitis with fever and abdominal pain. An autopsy will show decayed tissue, hemorrhage, and corrosion in the mucous membranes where the potassium permanganate came in contact.

Reaction Time: Within five to ten minutes.

Antidotes and Treatments: Washing the affected areas with water is the first emergency step. The victim is treated for shock. If the poison was ingested, the physician will also look into the throat with a laryngoscope to determine damage, and any perforations will be surgically
Notes: Potassium permanganate is used in aquariums and by hospitals as a disinfectant and as an oxidizing agent. Usually only available in very dilute forms, it can produce burns in even small concentrations. It has a reputation of inducing abortions when placed in the vagina, but the amount needed to cause an abortion will also kill the victim.

TURPENTINE
Toxicity: 5

Form: As is the case with all volatile oils, turpentine is a liquid that evaporates easily at room temperature. Turpentine can be inhaled or swallowed. There is a characteristic odor.

Effects and Symptoms: Turpentine irritates the skin and any other tissues it comes in contact with. Locally, turpentine will cause an immediate reddening of skin. Coughing, chest pain, and respiratory distress as initial reactions indicate it has been taken into the lungs. Swallowing causes abdominal burning, nausea, vomiting, diarrhea, painful urination, hematuria, unconsciousness, shallow respiration, and convulsions. The pulse is weak and rapid. Breathing the fumes causes dizziness, rapid, shallow breathing, rapid heartbeat, irritation of the bronchial tubes, and unconsciousness or convulsions. Kidney shutdown and pulmonary edema (water on the lungs) can develop; also bronchial pneumonia, which, should the victim survive, may complicate recovery.

An autopsy shows damage to the kidneys and intense congestion and swelling in the lungs, brain, and stomach linings.

Reaction Time: As an irritant, turpentine works within seconds; if ingested, within minutes.

Antidotes and Treatments: Vomiting should be avoided since, if vomit is reswallowed, it can go into the lungs and cause pneumonia and other problems. Artificial respiration is sometimes necessary. Skin contact is treated by a thorough scrubbing of the area with soap and water.

Notes: Many households have some turpentine stored away. A volatile oil, turpentine is a mixture of hydrocarbons, ethers, alcohols, esters, and ketones. It’s now banned in many places because it’s a hazard to the environment. This venerable old paint remover is a natural product, a plant derivative from the resin of pines, firs, and other cone-bearing trees. It also has several medical applications as a skin irritant. Like other irritants, it’s rarely lethal, simply because it’s too painful to swallow or breathe enough for a fatal dose, even for a determined suicide.

MISCELLANEOUS HOUSEHOLD HAZARDS
There are other items found in every household that can be poisonous, depending on the amount consumed and the current health of the patient. Salt, monosodium glutamate, baking soda, potassium, calcium, hydrogen peroxide, laxatives, insect repellants, and even wine, water, and cheese can all prove deadly under certain conditions.

Hidden salt can be a problem for people with hypertension and other cardiac problems, as it can be for people suffering from kidney or liver diseases. It seems unlikely that anyone with heart problems would be totally unaware of the effects of an overdose of salt, but if such an intake of salt occurred, it would result in a heart attack.

MSG (monosodium glutamate) used to be fairly common, especially in Chinese foods. It’s a rarity in food products today, partly because of the high sodium content, and also because many people were prone to sensitivity reactions including headaches, increased blood pressure, and other cardiac symptoms. Some more traditional Chinese restaurants still use it. You can arrange for a character to have a sensitivity to MSG and have your opportunistic villain take advantage of it. Just be careful about who else has this information, or you may give your bad guy away too early.

An excessive intake of water or other fluids can also be dangerous. Drinking massive amounts of water, perhaps while on a health kick, can cause sodium depletion and death from a heart attack. Loss of sodium (hyponatremia) can cause lightheadedness, dizziness, blurred vision, inability to balance correctly, profuse sweating, palpitations, difficulty breathing, and heart failure.

Sodium bicarbonate (baking soda) can be lethal to heart patients if enough is swallowed, but it would take a very clever writer to believably get someone to swallow the cup or more needed to kill. Mixed with sterile water and injected, much less sodium bicarb is needed for a lethal dose, although you would still need a good-sized syringe. While sodium bicarb is used in hospitals to save patients going into respiratory acidosis (a condition that occurs when the lungs cannot remove all of the carbon dioxide produced by the body), an overdose could swing the body into alkalosis (increased alkalinity of the blood and tissues), which would prove just as fatal.

Excessive potassium (hyperkalemia), perhaps from a vitamin overdose, causes the heart to dilate and become flaccid, and slows the heart rate. Other symptoms are nausea, diarrhea, muscle weakness, and numbness of hands, feet, tongue, and face. Large quantities weaken the heart, causing an abnormal rhythm, and cardiac arrest occurs.

Too little potassium (hypokalemia) can cause respiratory alkalosis (low
carbon dioxide in the blood), resulting in cardiac failure. People who take diuretics (water pills) are often prescribed potassium to balance the water loss. K-Lyte, one brand of potassium, comes mixed in an orange-flavored tablet that foams with water. Potassium also comes in capsule or pill form, as well as an orange- or cherry-flavored liquid. Bananas are a popular source of potassium, as well. As with all drugs, the elderly and the infirm are most susceptible to overdoses. Hidden potassium often causes heart problems that can quickly lead to death. The symptoms of potassium depletion and sodium overdose are the same.

Calcium (Ca) is another element crucial to proper heart and bodily function. Excess calcium works opposite from excess potassium, causing the heart to go into spastic contractions. A lack of calcium causes flaccidity of the heart and other muscles, similar to excess potassium. Calcium deficit (hypocalcemia) involves such symptoms as tingling fingers, muscle cramps, hyperactive reflexes, convulsions, and spasms of the hands and larynx. This is why calcium pills are given for nightly leg cramps and calming the nerves.

Most medicine chests contain hydrogen peroxide, an antiseptic/acid. This often burns on contact and bleaches the skin. A colorless, unstable liquid with a bitter taste, hydrogen peroxide is quite corrosive. Highly concentrated solutions cause blistering burns and severe eye injuries on contact (used as a method of killing in Diane Mott’s book Dying for Chocolate, when the victim crashed his car due to eye injury), and inhalation may cause lung problems ranging from bronchitis to pulmonary edema. However, most of the peroxide found in homes today is the very diluted 3 percent concentration.

Wine and cheese can be deadly to those on certain antidepressants known as monamine oxidase inhibitors (MAO inhibitors). Since patients are usually warned about possible interactions with their meds, your villain would have to find some way to circumvent that. Or set it up so that your victim is very forgetful or otherwise disoriented.

Laxatives and purgatives are among other items found in the medicine cabinet. While these will not kill immediately, the resultant diarrhea or vomiting, if severe enough, can cause dehydration. If the victim does not know to seek medical help, the problem can lead to death. The flavored laxative can be used to make a “delicious” chocolate cake for a chocolate lover. The catch will be finding a believable way to keep the victim from seeking medical help once it’s obvious there’s a serious problem.

Insect repellants for human use sometimes contain N,N-diethyltoluamide, a compound used as a topical insect repellent that may cause
irritation to eyes and mucous membranes, but not to the skin. To cause harm from ingestion, a great deal would need to be consumed. While poisonings are rare, eye irritation can occur if sprayed into the face. In the movie Extremities, a fictional heroine, running for her life, grabbed a can of insect repellent and sprayed it in the villain’s eyes to temporarily blind him.