CHAPTER

2

Chemical Properties and Hazardous Chemicals Information Resources

Introduction

Often, confusion results from the inconsistent use of the terms hazard, hazardous material, poison, and toxic substance. A hazard is any physical, chemical, or biological agent that has the capacity to cause physical damage (e.g., heat, ultraviolet radiation, mercury) or harm the health of living organisms. A hazardous material is any chemical substance or agent (e.g., arsenic or a microorganism, respectively) that poses a potential health hazard. Toxic substances are thus a subset of hazardous materials. Those chemical substances or agents (hazardous materials) that have the potential to harm the health of living organisms are called *toxic substances*.

Elements, Atoms, and Compounds

All matter, whether a solid, liquid, or gas, is made up of elements. Thus far we have identified approximately 115 different elements. Many of these are familiar to us (e.g., aluminum, iron, lead, sulfur, carbon, silicon), whereas many others may not be (e.g., rhenium, thulium, terbium). An atom is the smallest unit of an element that retains the properties

of that element. When an atom of one element chemically combines with atoms of the same element, a molecule is formed. When the atoms of different elements combine during a chemical reaction, a compound is formed. Our bodies are made up of elements that form inorganic and organic compounds. Of the greater than 90 naturally occurring elements, approximately 99% of our body weight is made up of compounds containing the elements carbon, hydrogen, nitrogen, oxygen, calcium, phosphorus, and sulfur. Simple inorganic compounds such as water and sodium chloride contribute to the larger portion of the mass of our bodies when compared with organic compounds, which are of much greater molecular weight than inorganic compounds. We are all familiar with many of the important compounds that make up the body (**Figure 2-1**). In turn, these compounds are composed of elements specifically bonded to produce them (**Table 2-1**).

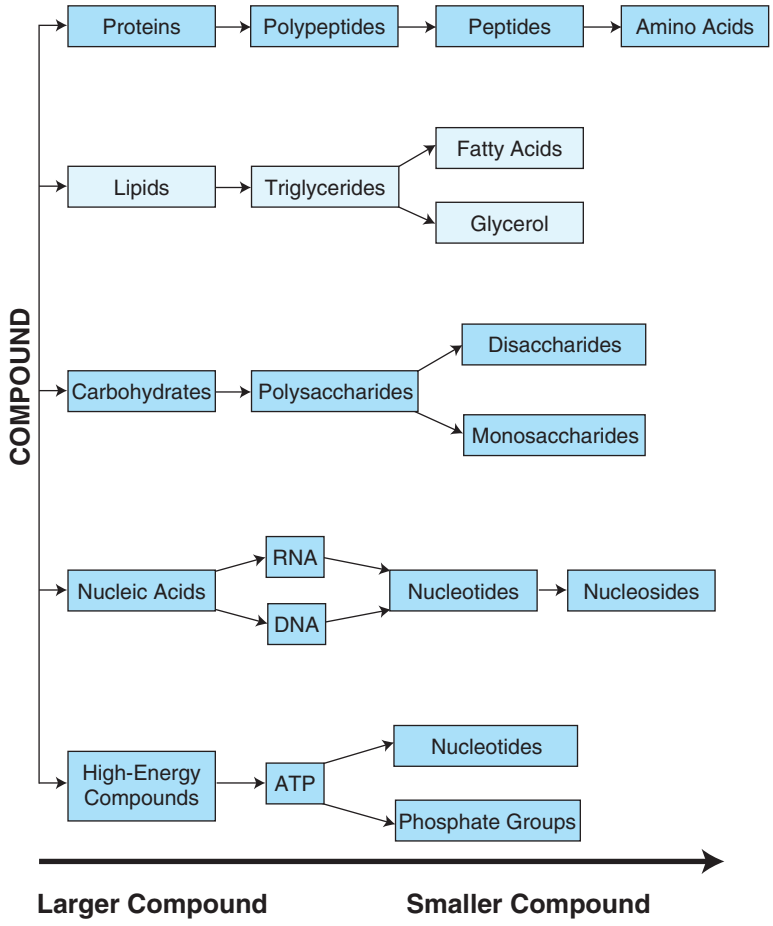


FIGURE 2-1 Important compounds of the body. *Source:* Adapted from the Toxicology and Environmental Health Information Program of the National Library of Medicine, U.S. Department of Health and Human Services. (2010). Types of Organic Compounds in the Body. http://sis.nlm.nih.gov/enviro/toxtutor/Tox3/a25.htm. Accessed January 24, 2013.

Table 2-1 Atomic Mass, Electronic Configuration, and Typical Number of Covalent Bonds of Several Important Elements Present in Organic Molecules

Atomic Number	Symbol	Name	Mass	Number of Covalent Bonds
1	H	Hydrogen	1.008	1
6	C	Carbon	12.011	4
7	N	Nitrogen	14.007	3, (4)[a]
8	O	Oxgyen	15.999	2, (1)[b]
9	F	Fluorine	18.998	1
15	P	Phosphorus	30.974	3, 5
16	S	Sulfur	32.060	2, 4, 6, (1)[a]
17	Cl	Chlorine	35.453	1
53	I	Iodine	126.905	1

[a]Number in parentheses indicates positively charged atom
[b]Number in parentheses indicates negatively charged atom

There are also millions of chemical compounds that have no physiological role in the body. There are greater than 6 million different chemical compounds that are known, with about 80,000 that are in common industrial and household use. Many thousands of new organic chemicals are synthesized yearly. With just carbon, nitrogen, hydrogen, oxygen, and sulfur, for example, numerous compounds can be formed, including some aromatic (=ring form) ones of toxicological importance (**Figure 2-2**).

Mixtures, Suspensions, and Aerosols

The term mixture refers to any substance that contains more than one chemical compound or element that has retained its individual properties. A mixture of alcohols, for example, may contain ethanol, isopropanol, and butanol all "mixed" together, giving the appearance of a single substance. Each of the three components of this mixture is a pure substance, and each can be individually recovered from the mixture using appropriate methods. The term suspension refers to a mixture of liquid and small solid substances, whereas an aerosol (mist) is a mixture of tiny droplets of a liquid or tiny particles of a solid in a gas.

Identifying Chemicals

Chemicals have common names, trade names, technical names, and chemical formulas associated with them, which can often be confusing. Manufacturers frequently choose commercial names for their products. This is done for obvious marketing purposes because it is easier to remember a product by a simple trade name than a complex chemical name. The chemical formula uses the appropriate abbreviations for the elements that are contained in the molecules of the chemical in question, for example, sodium = Na, hydrogen = H, carbon = C, and

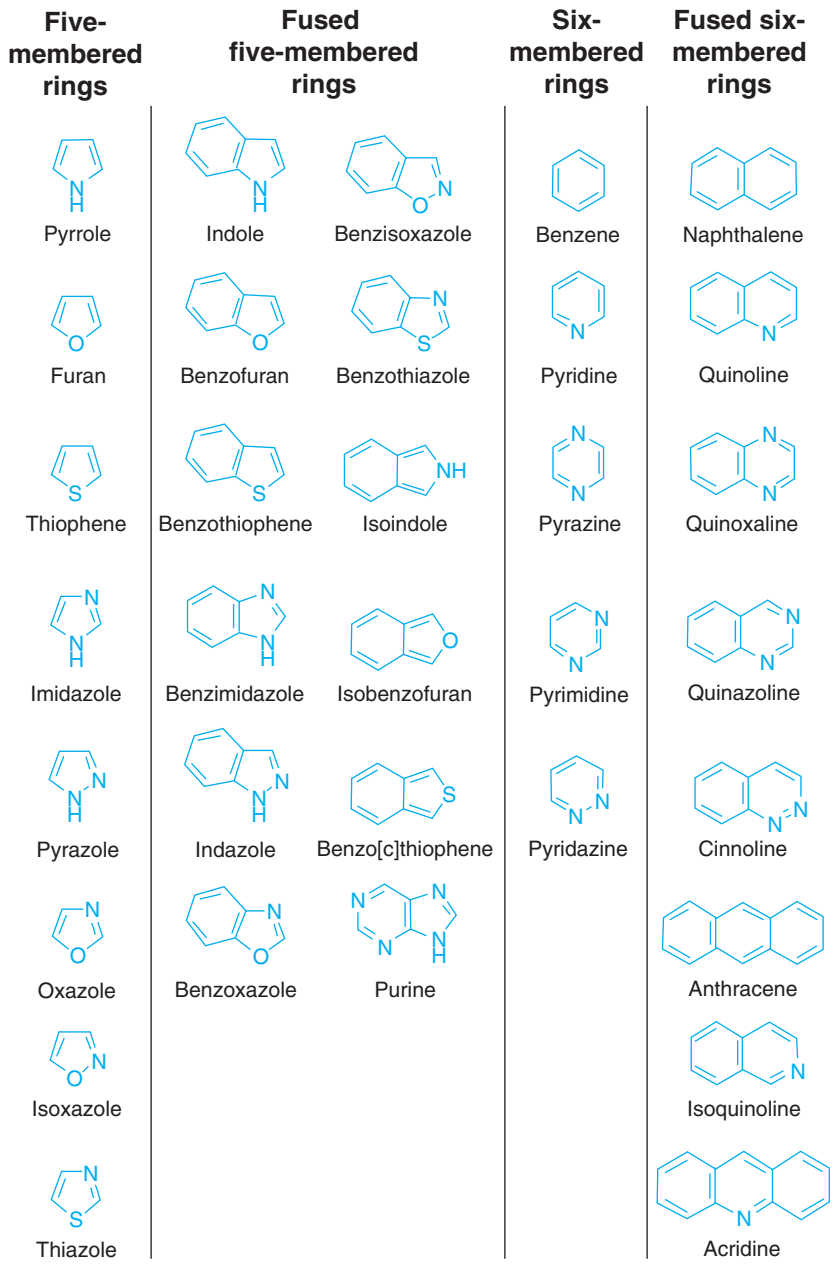


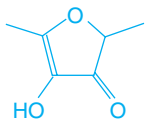
FIGURE 2-2 Examples of aromatic structures of toxicological importance.

oxygen = O. What I refer to as bicarbonate of soda may be called sodium bicarbonate by another person or sodium hydrogen carbonate by a third. We are all referring, however, to a substance that contains these four elements that are chemically combined into a compound containing the chemical formula $NaHCO_3$. In this example, one atom each of sodium, hydrogen, and carbon and three atoms of oxygen combine to produce the compound. The chemical formula,

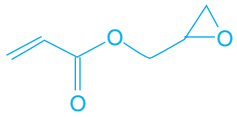
however, may not be enough to indicate what the actual chemical is because several chemicals may share the same formula. Although the chemical formula tells us how many atoms of each element are contained within a compound, it does not specify the arrangement of these atoms. Different arrangements of the same types and numbers of atoms result in different compounds. Each compound, as we will see in the following section, is identified by a different Chemical Abstracts Service (CAS) registry number. For example, $C_6H_8O_3$ is a formula that is shared by several different chemicals, as shown in **Figure 2-3**.

The chemical structure is therefore important because it shows the arrangement of atoms within a compound, allowing us to identify the compound. The chemical structure is vitally important because it can provide important clues about the potential health effects from exposure to that chemical. Organic chemicals contain functional groups that can often indicate the type of toxicity one could predict from their exposure. Examples of common functional groups in toxicants are shown in **Table 2-2**.

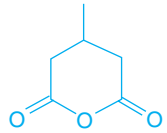
- 2,3-Dihydro-4-hydroxy-2,5-dimethyl-3-furanone
  (CAS Registry Number: 3658-77-3)



- 2-Propenoic acid, oxiranylmethyl ester
  (CAS Registry Number: 106-90-1)



- 3-Methylglutaric anhydride
  (CAS Registry Number: 4166-53-4)



- 7-Oxy-6, 8-dioxabicyclo-(3,2,1) - octane
  (CAS Registry Number: 5257-20-5)

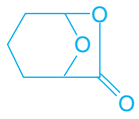


FIGURE 2-3 Variations of the formula $C_6H_8O_3$.

Table 2-2 Common Functional Groups*

Functional Group	General Formula	Suffix/Examples
Hydroxyl	R–OH Carbon–oxygen bond	-ol (e.g., methanol, ethanol, propanol)
Methyl	R–CH_3 Carbon–carbon single bond	-ane Methane (CH_4) Ethane (C_2H_6) Propane (C_3H_8) Butane (C_4H_{10})
Alkene	R–CH=CH–R'	-ene Ethene (C_2H_4) Propene (C_3H_6)
Alkyne	R–C≡C–R'	-yne Ethyne (C_2H_2) Propyne (C_3H_4) Butyne (C_4H_6)
Amide	R–C(=O)N(–H)–R'	Ethanamide (CH_3CONH_2)
Primary amine	R–NH_2	-amine Ethylamine ($C_2H_5NH_2$)
Secondary amine	R–N(–H)–R'	-amine Dimethylamine (C_2H_6NH) Diethylamine ($C_4H_{10}NH$)
Tertiary amine	R–N(–R')–R	-amine Trimethylamine $(CH_3)_3N$
Azo	R–N=N–R'	Diazoacetamide Azobenzene
Nitrile	R–C≡N	Ethanenitrile (C_2H_5CN)
Pyridyl	R–C_5H_4N	3-Pyridyl bromide
Carboxyl	R–C(=O)OH *Non-ionized* R–C(=O)O^- *ionized*	-oic acid Acetic acid (CH_3COOH)
Aldehyde	R–C(=O)H	-al (ethanal: CH_3CHO)
Ketone	R–C(=O)–R'	-one Propanone (CH_3COCH_3)
Primary imine	R–C(=NH)–R'	-imine *N*-methylimine
Secondary imine	R–C(–H)=N–R'	-imine
Ether	R–O–R'	Methyl CH_3OCH_3

Functional Group	General Formula	Suffix/Examples
Ester	R–C(=O)O–R'	Ethyl acetate CH_3OOCH_3
Halogen	F, Cl, Br, etc. Carbon–halogen bonding	Chloromethane (CH_3Cl) Iodobutane (C_4H_9I)
Isocyanate	R–N=C=O	Methyl isocyanate CH_3NCO
Isothiocyanate	R–N=C=S	Methyl isothiocyanate NCH_3S
Phenyl	R–C_6H_5	Phenylethane (=ethylbenzene) $CH_3C_6H_5$
Benzyl	R–CH_2–C_6H_5	Benzyl acetate $C_9H_{10}O_2$
Phosphodiester	R–$OP(=O)_2O$–R'	Nucleic acids
Sulfhydryl	R–SH	-thiol Methanethiol (=methyl mercaptan) CH_3SH
Thioether	R–S–R'	Methylthioether (=diethylsulfide) CH_3SCH_3

*R and R' can denote any group of atoms.

Assigning Identification

Perhaps the best way to identify a chemical is by its CAS registry number. This is similar to the way a Social Security number identifies individuals as uniquely different. The CAS number does not provide information concerning the properties of the chemical. The use of the number is important in overcoming any confusion about the identity of the chemical due to multiple common, trade, and technical names. Use of the CAS number is observed in scientific literature and product information, including material safety data sheets. Another way that chemicals can be identified is through the Registry of Toxic Effects of Chemical Substances, or RTECS, number. This registry, operated by Symyx Technologies, Inc., contains technical information about commonly used industrial chemicals. There are other systems for numbering and classifying chemicals, including the IUPAC (International Union for Pure and Applied Chemistry), EC (assigned by the European Community), and UN numbers, or UN IDs, which are four-digit numbers that identify hazardous substances and products (such as poisonous materials or explosives) of commercial importance. This numbering scheme is widely used in international commerce, for instance to label the contents of shipping containers for transportation of hazardous substances.

Physical Properties of Chemicals

Water Solubility

Water solubility is defined as the maximum weight (generally in grams or milligrams) of a substance that can be completely dissolved in 1 liter of water to form a solution at a given temperature. The solubility in water may give some idea of what maximum concentrations might occur in water, whether we are referring to the body water of an organism or to an environmental body of water such as a lake.

pH

A pH refers to how acidic or basic (caustic) a substance is. A pH of 7 is considered neutral, whereas numbers below 7 are on the acid side of chemical neutrality and numbers above 7 are on the basic side. A pH of 1 is a very strong acid and a pH of 13 is very caustic.

Relative Molecular Mass

This refers to the relative weight of a molecule of a chemical compared with the relative weight of an atom of the lightest element, hydrogen.

Octanol-to-Water Partition Coefficient

This ratio indicates how readily any chemical dissolves in a fatty or oily medium compared with water. A very water-soluble chemical has a greater affinity for water than for octanol; thus it would have a low partition coefficient. A pesticide with the partition coefficient of 7, for example, indicates that it is much more lipophilic (fat loving) and thus accumulates in body fat, where it may be stored for a relatively long time. The octanol-to-water partition coefficient is therefore an indicator of bioaccumulation. Chemicals that have relatively high octanol-to-water partition coefficients are usually absorbed quickly through the skin and enter into the blood.

Boiling Point, Melting Point, and Vapor Pressure

The boiling point is the temperature at which the chemical changes from a liquid state to the gaseous state. The melting point of the chemical is the temperature at which there is a change from a solid to a liquid. The vapor pressure is the pressure at which the chemical in the liquid or solid state turns into the gaseous state even at temperatures below the boiling point. Chemicals with a high vapor pressure tend to "evaporate" more readily than others with a low vapor pressure and are therefore of more concern with respect to respiratory exposure.

Flash Point

The flash point is the temperature at which a substance gives off enough vapor in the air to form an ignitable mixture. The lower the flash point, the greater the risk for explosion and fire.

Autoignition Temperature and Flammability

The autoignition temperature is that temperature at which a substance spontaneously burns, that is, catches fire in the absence of a flame or a spark. A flammable material can be a solid, liquid, or gas. Something that is not flammable is not given the term inflammable. Inflammable is an older term for flammable and to avoid confusion should not be used.

Flammability (Explosive) Limits

This represents a range of concentrations for a flammable vapor or gas in air at which an explosion may occur in the presence of a flame or spark. The lower explosive limit (LEL) is a level below which there is not enough chemical present to burn (i.e., the mixture is too lean). The upper explosive limit (UEL) is a level above which there is too much chemical to burn (i.e., the mixture is too rich).

Relative Density or Specific Gravity

This is commonly defined as the weight of a specific volume of a liquid or solid chemical substance compared with the weight of the same volume of water. More correctly, specific gravity is the ratio of the density of a material to the density of water. The density of water is approximately 1 gram per cubic centimeter. Substances with a specific gravity of less than 1 are lighter than water and therefore float, whereas those that have specific gravities exceeding 1 are heavier than water and thus sink. Knowing the specific gravity is important for planning spill cleanup and fire-fighting procedures.

Relative Vapor Density

The relative vapor density refers to the weight of a specific volume of a chemical substance in the gaseous state compared with the weight of the same volume of air. From the exposure viewpoint, if the relative vapor density is less than 1, the gas collects at the ceiling level indoors or disperses into the atmosphere outdoors. On the other hand, if the gas is heavier than air (that is, it has a relative vapor density of a gas greater than 1), then the gas tends to collect at floor level indoors or in depressions outside. The possibility exists that gases having relative vapor densities greater than 1 may displace air in the breathing zone of confined spaces, thus leading to asphyxiation.

Odor Threshold

Some chemicals when present in the air can be smelled, and this can serve as a warning. The odor threshold represents the smallest concentration of the chemical in the air that can be smelled and is usually expressed in parts per million or parts per billion. Some odor thresholds are sufficiently low enough to provide adequate warning properties (e.g., sulfur dioxide), but others are not. It is important to realize that many chemicals have no smell associated with them and thus there are no warning properties associated with odor. Other important physical properties include the boiling point, vapor pressure, and melting point.

APPENDIX 2-1

Some Web-Based Resources

A vast amount of information about chemicals and their hazardous properties can be found on the Internet. Information ranging from adverse reactions to clinical drugs to the physical chemical properties of industrial chemicals may be accessed with relative ease. Examples of these types of resources are provided here. Websites do change from time to time; however, at the time of this writing the websites provided were current.

- **Adverse Reactions to Drug Reports:** Reports that are voluntarily submitted by physicians to the U.S. Food and Drug Administration (FDA) after a drug has been approved and in use. Adverse reactions to drugs in clinical trials are subject to mandatory report.
  http://www.fda.gov/Safety/MedWatch/HowToReport/ucm085568.htm
- **Agency for Toxic Substances and Disease Registry (ATSDR):** The principal federal public health agency involved with hazardous waste issues. ATSDR helps to prevent or reduce the harmful effects of exposure to hazardous substances on human health. Information about ATSDR, a database containing all information where ATSDR has worked, fact sheets on 60 of the most common contaminants at Superfund sites, and links to related sites can be found here.
  http://www.atsdr.cdc.gov/
- **American Association of Poison Control Centers:** Brochures on preventing poisonings in the home, emergency action cards for poisoning, poisoning fact sheets, lists of Poison Centers, and so forth.
  http://www.aapcc.org
- **American College of Medical Toxicology:** Professional nonprofit association of physicians with recognized expertise in medical toxicology. Their mission is to ensure that patients exposed to poisons and toxic substances receive optimal care by direct contact with qualified medical toxicologists. Their publication, *Internet Journal of Medical Toxicology*, can be accessed from this site.
  http://www.acmt.net
- **Carcinogenic Potency Project:** The Carcinogenic Potency Database (CPDB) covers results of long-term animal cancer tests.
  http://potency.berkeley.edu/cpdb.html
- **Centers for Disease Control and Prevention (CDC):** The CDC is one of the 13 major operating components of the Department of Health and Human Services (HHS), which is the principal agency in the U.S. government for protecting the health and safety of all Americans.
  http://www.cdc.gov/

- **ChemFinder:** A chemical database that provides basic chemical data, including CAS numbers, and also provides other information, including physical property data and two-dimensional chemical structures. It is the largest single list of chemical information sites. Individual access to ChemFinder is complimentary on a limited basis. Access by corporations, academic institutions, and government organizations is granted on an enterprise subscription basis.
  http://www.cambridgesoft.com/databases/login/?serviceid=128
- **Chemical Carcinogenesis Research Information System (CCRIS):** Carcinogenicity and mutagenicity test results for over 8,000 chemicals.
  http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?CCRIS
- **ClinicalTrials:** ClinicalTrials.gov provides regularly updated information about federally and privately supported clinical research in human volunteers.
  http://www.clinicaltrials.gov/
- **Developmental & Reproductive Toxicology (DART/ETIC):** References to developmental and reproductive toxicology literature.
  http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?DARTETIC
- **Environmental Protection Agency (EPA):** The mission of the EPA is to protect human health and the environment.
  http://www.epa.gov/
- **Extension Toxicology Network (EXTOXNET):** Information about pesticides and other toxicology issues from the consortium formed by the University of California, Davis, Oregon State University, Michigan State University, Cornell University, and the University of Idaho.
  http://extoxnet.orst.edu/
- **Extremely Hazardous Substances (EHS):** Chemical profiles and emergency first aid guides.
  http://www.epa.gov/emergencies/index.htm
- **Food and Drug Administration (FDA):** The FDA is responsible for protecting the public health by ensuring the safety, efficacy, and security of human and veterinary drugs, biological products, medical devices, our nation's food supply, cosmetics, and products that emit radiation.
  http://www.fda.gov/
- **Genetic Toxicology (Mutagenicity) (GENE-TOX):** Peer-reviewed genetic toxicology test data for over 3,000 chemicals.
  http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?GENETOX
- **Hazardous Materials:** U.S. Fire Administration. Guide for first responders.
  http://www.usfa.fema.gov/citizens/home_fire_prev/hazmat.shtm
- **Hazardous Substances Data Bank (HSDB):** Comprehensive peer-reviewed toxicology data for about 5,000 chemicals.
  http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB
- ***Healthy People 2020*:** *Healthy People 2020* challenges individuals, communities, and professionals—indeed, all of us—to take specific steps to ensure that good health, as well as long life, are enjoyed by all.
  http://www.healthypeople.gov/2020/default.aspx

- **Integrated Risk Information System (IRIS):** Hazard identification and dose–response assessments for over 500 chemicals.
  http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?IRIS
- **International Toxicity Estimates for Risk (ITER):** Risk information for over 600 chemicals from authoritative groups worldwide.
  http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?iter
- **The Library of the Karolinska Institute of Sweden:** Collection of links to causes of poisoning, including food poisoning, bites and stings, drug toxicities, and lead poisoning.
  http://kib.ki.se/en
- **Material Safety Data Sheets (MSDS), now referred to as SDS Online**
  http://www.ilpi.com/msds/index.html
- **MEDLINEplus:** Comprehensive medical information and literature searches.
  http://www.nlm.nih.gov/medlineplus/
- **National Institute for Occupational Safety and Health (NIOSH):** NIOSH is the federal agency responsible for conducting research and making recommendations for the prevention of work-related injury and illness. NIOSH is part of the Centers for Disease Control and Prevention in the Department of Health and Human Services.
  http://www.cdc.gov/niosh/
- **National Institute of Environmental Health Sciences (NIEHS):** Focuses on basic science, disease-oriented research, global environmental health, and multidisciplinary training for researchers.
  http://www.niehs.nih.gov/
- **National Institutes of Health (NIH):** The NIH, a part of the U.S. Department of Health and Human Services, is the primary federal agency for conducting and supporting medical research.
  http://www.nih.gov/
- **National Report on Human Exposure to Environmental Chemicals:** The Fourth Report, released in 2009, presents biomonitoring exposure data for 212 environmental chemicals over the 4-year period 1999–2004. The Updated Tables, released in 2012, includes updated tables for 119 chemicals and tables for 34 new chemicals.
  http://www.cdc.gov/exposurereport/
- **National Toxicology Program:** An interagency program to coordinate toxicological testing; strengthen the science base in toxicology; develop and validate improved testing methods; and provide information about potentially toxic chemicals to health regulatory and research agencies, the scientific and medical communities, and the public.
  http://ntp-server.niehs.nih.gov/
- **Occupational Safety and Health Administration (OSHA):** OSHA's mission is to ensure the safety and health of America's workers by setting and enforcing standards; providing training, outreach, and education; establishing partnerships; and encouraging continual improvement in workplace safety and health.
  http://www.osha.gov/

- **Poisonous Plants Informational Database:** Includes plant images, botany, chemistry, toxicology, diagnosis, and prevention of poisoning of animals.
  http://www.ansci.cornell.edu/plants/
- **Recognition and Management of Pesticide Poisonings:** Presented by The National Pesticide Telecommunications Network, 5th edition (1999).
  http://npic.orst.edu/rmpp.htm
- **Right to Know Hazardous Substance Fact Sheets:** New Jersey Department of Health & Senior Services, Division of Epidemiology, Environmental and Occupational Health. Available in English and Spanish.
  http://web.doh.state.nj.us/rtkhsfs/indexfs.aspx
- **Toxicon Multimedia Project:** Medical Toxicology Consortium including Cook County Hospital, The University of Illinois Hospital, and RUSH Medical Center, Chicago, Illinois. Includes Virtual Toxicology Cases and Virtual Toxicology Lectures.
  http://www.biologydir.com/toxikon-multimedia-project-info-7167.html
- **Toxics Release Inventory (TRI):** Annual environmental releases of over 600 toxic chemicals by U.S. facilities.
  http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?TRI
- **TOXLINE:** Biochemical, pharmacological, physiological, and toxicological effects of drugs and other chemicals: References from toxicology literature.
  http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?TOXLINE
- **U.S. Department of Agriculture (USDA):** The USDA's mission is to enhance the quality of life for the American people by supporting the production of agriculture.
  http://www.usda.gov/
- **World Health Organization (WHO):** The WHO's objective, as set out in its constitution, is the attainment by all peoples of the highest possible level of health. Health is defined in the WHO's constitution as a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity.
  http://www.who.int

APPENDIX 2-2

Regulatory Agencies That Maintain Lists for Hazardous Chemicals

Some regulatory agencies maintain lists of environmental and industrial chemicals that are deemed to be hazardous. In addition, technical reports are available from many of these agencies. The following table is a compilation of a number of agencies that maintain such lists with contact information, and websites current at the time of this writing.

Controlling Regulatory Entity	List Name	List Producer and Contact Information	Reference	List Description
Canada	Domestic Substances List of Canada	nsn-infoline@ec.gc.ca Notification and Client Services Division New Substances Branch Risk Assessment Directorate Environment Canada Place Vincent Massey, 14th Floor Gatineau QC K1A 0H3 Telephone: (800) 567-1999 (Toll Free in Canada) (819) 953-7156 (Outside of Canada) Facsimile: (819) 953-7155	http://www.ec.gc.ca/substances/nsb/download/DSL .PDF The final list was developed in several stages: a Core List, a Provisional List, and a Final List in 1994.	Mandated by the Canadian Environmental Protection Act (CEPA), this list covers substances manufactured or imported into Canada for industrial use.
	Workplace Hazardous Materials Information System (WHMIS): Ingredient Disclosure List, Canada	Canadian Product Safety Branch, Consumer and Corporate Affairs 50 Victoria St. Hull Quebec OC9, Canada Telephone: (819) 953-4763	Canadian Workplace Hazardous Material Information System. Canada Gazette Part II, 122(2) (1 Jan 1988). http://www .hc-sc.gc.ca/hecs-sesc/whmis/application.htm	A list of chemicals that must be identified on Canadian Material Safety Data Sheets if they are included in products that fall within the Workplace Hazardous Material Information System (WHMIS) hazard criteria specified in the Controlled Products Regulations of Canada.

(continues)

Controlling Regulatory Entity	List Name	List Producer and Contact Information	Reference	List Description
European Union	European Inventory of Existing Commercial Chemical Substances	The European Commission http://europa.eu.int/ Office for Official Publications of the European Communities, 2 rue Mercier, L-2985 Luxembourg; Telephone: 011-352-49928 425 66 or 011-352-488-573 North America: European Union Delegation of the European Commission, Attn: Public Affairs, 2300 M Street N.W., Washington, DC 20036 Telephone: 1-202-862-9539 Facsimile: 1-202-429-1766	Official Journal of the European Communities, June 1990. http://stneasy.cas.org/dbss/chemlist/einecs.html	EINECS is the European counter part of TSCAINV. It lists chemical substances that were reported by the Member States to the European Commission as existing on the European Community Market between January 1, 1971, and September 18, 1991.
	European Inventory of Existing Commercial Chemical Substances Supplement (Elincs)	The European Commission. http://europa.eu.int/ Office for Official Publications of the European Communities, 2 rue Mercier, L-2985 Luxembourg; Telephone: 011-352-49928 425 66 or 011-352-488-573 North America: European Union Delegation of the European Commission, Attn: Public Affairs, 2300 M Street NW, Washington, DC 20036 Telephone: 1-202-862-9539 Facsimile: 1-202-429-1766	Official Journal of the European Communities, Dec 17, 1994. http://europa.eu.int/eur-lex/en/com/cnc/2003/com2003_0642en01.pdf	Elincs supplements EINECS, and these two include all substances placed on the community market before August 15, 1993.
World Health Organization	International Agency for Research on Cancer List	International Agency for Research on Cancer, World Health Organization, Lyon, France	IARC Monographs http://www.IARC.fr/	Substances that have been evaluated by the International Agency for Research on Cancer (IARC) for carcinogenic risk to humans and animals.

Controlling Regulatory Entity	List Name	List Producer and Contact Information	Reference	List Description
World Health Organization (continued)		For publications, call (518) 436-9686, or write to WHO Publication, Centre USA, 49 Sheriden Avenue, Albany, NY 12210		These evaluations are recognized as authoritative sources of information on the carcinogenicity of chemicals.
International Maritime Association	Marine Pollutants List	International Maritime Organization, 4 Albert Embankment, London SE1 7SR, United Kingdom Telephone: +44 (0)20 7735 7611 Facsimile: +44 (0)20 7587 3210 National Response Center, RM 2611, 2100 Second Street SW, Washington, DC 20593	CFR 49,172.101, App. B, 1995; http://www.myregs.com/dotrspa/	A list of substances, materials, and articles identified as marine pollutants or severe marine pollutants in the International Maritime Dangerous Goods (IMDG) code and of the not otherwise specified (n.o.s.) and generic entries to be used to offer marine pollutants for shipment.
U.S. Environmental Protection Agency	Hazardous Air Pollutants	EPA: (202) 272-0167 200 Pennsylvania Avenue NW, Washington, DC 20640 Clean Air Docket, EPA Library, Research Triangle Park, 109 T.W. Alexander Drive, Durham, NC 27711 Telephone: (919) 541-2777	Section 112 (b)(1) Hazardous Air Pollutants Section (b)(1) of the Clean Air Act (CAA) http://www.epa.gov/ttn/atw/188polls.html	The Clean Air Act Amendment of 990, Title 3 established this initial list of 189 hazardous pollutants.
	Ozone Depletion Chemicals List	Stratospheric Protection Information Hotline at 1-800-296-1996. (202-343-9210 from outside the U.S.) U.S. EPA Mail Code 6205J, 1200 Pennsylvania Avenue NW, Washington, DC 20460-0001 Telephone: (202) 343-9410	CRF 40,82, Subpt A. App A and B, 1996. http://www.epa.gov/ozone/ods.html	A list of controlled substances in Sections 602–607 and 616 of the Clear Air Act imposing limits on the production and consumption of certain ozone-depleting substances.

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Controlling Regulatory Entity	List Name	List Producer and Contact Information	Reference	List Description
U.S. Environmental Protection Agency (continued)	EPA Pesticide List	U.S. EPA Chemical Support Group, Office of Pesticide Programs, Ariel Rios Building, 1200 Pennsylvania Avenue NW, Washington, DC 20460 Telephone: (703) 305-7090	1) Federal Register 54(204), 4388, 1989 (Oct 24). 2) Federal Register 54(34), 7740, 1989 (Feb 22). 3) Federal Register 54(100), 22706, 1989 (May 25). 4) Federal Register 54(140), 30848, 1989 (Jul 24). 5) Federal Register 55(147), 31164, 1990 (Jul 31). http://www4.law.cornell.edu/uscode/html/uscode07/usc_sup_01_7_10_6.html	The list contains those chemical substances (active ingredients) for which pesticide Registration Standards have been issued and those subject to reregistration under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA).
	EPA High Production Volume Chemical List	U.S. Environmental Protection Agency, P.O. Box 1473, Merrifield, VA 22116 Attention: Chemical Right-to-Know Program Telephone: (202) 564-4770	http://www.epa.gov/opptintr/chemrtk/hpvcolst.htm	Non-Confidential Information Submitted by Companies on Chemicals Under the 1990, 1994, and 1998 Inventory Update Rule (IUR).
	List of Pesticide Product Inert Ingredients	Office of Prevention, Pesticide and Toxic Substances U.S. EPA, 401 M Street SW, Washington, DC 20460 Public Response and Program Resources Branch at (703) 305-5805	List of Pesticide Product Inert Ingredients (May 1995). http://www.epa.gov/opprd001/inerts/inerts_list4 .pdf	Pesticide product inert ingredients
	Master Testing List (MTL)	Office of Pollution Prevention and Toxic Substances, U.S. Environmental Protection Agency, Washington, DC 20460. TSCA Hotline at (202) 554-1404 TSCA-Hotline email: @epamail.epa.gov EPA website: http:www.epa .gov/opptintr/main/ctibhome.htm	Publication of the EPA Office of Pollution Prevention and Toxics, and Office of Prevention, Pesticides, and Toxic Substances, Washington, DC, December 1, 1996. http://www.epa.gov/opptintr/chemtest/mtl.htm	A listing from the EPA Office of Pollution Prevention and Toxics' (OPPT) existing chemical testing priorities, as well as those of other EPA program offices, other federal agencies, the TSCA Interagency Testing committee, and international organizations.

Controlling Regulatory Entity	List Name	List Producer and Contact Information	Reference	List Description
	CERCLA Hazardous Substances Table 302.4	U.S. Environmental Protection Agency, 401 M Street SW, Washington, DC 20460 Telephone: (703) 412-9810	CFR 40,302.4,1996. http://www.epa.gov/NCEI/plainlanguage/documents/epcra.pdf	The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) hazardous substances as defined by the Clean Water Act Sections 311 and 307(a); RCRA Section 3001; Clean Air Act, Section 112; and TSCA Section 7.
	Superfund Amendments and Reauthorization Act (SARA) of 1986, Section 110, ATSDR/EPA Priority List	The Agency for Toxic Substances and Disease Registry (ATSDR) in conjunction with EPA ATSDR Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333 Telephone: 1-888-42-ATSDR (1-888-422-8737) Facsimile: (770)-488-4178 Email: ATSDRIC@cdc.gov	http://www.atsdr.cdc.gov/clist.html	The ATSDR Profile Priority List (APPL) ranks the 275 substances of the highest concern at National Priority List (NPL) waste sites from a public health perspective, as per SARA Section 110 and CERCLA Section 104(i)(2)(A), as amended, and likelihood of human exposure, with lowest rank (1) highest priority. Comprehensive reviews of health effect information, available from ATSDR and NTIS.
	Superfund Amendments and Reauthorization Act (SARA) of 1986, Section 302, Extremely Hazardous Substances List	Chemical Emergency Preparedness and Prevention RCRA, Superfund, and EPCRA Call Center Telephone: (800) 424-9346 (Toll Free); (703) 412-9810 (Metropolitan DC area and international calls)	CFR 40,355 App. A, 1996 http://yosemite.epa.gov/oswer/ceppoehs.nsf/Alphabetical_Results?openview d	The list of extremely hazardous substances subject to reporting requirements under Title III of SARA, when stored in amount in excess of a Threshold Planning Quantity (TPQ).

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Controlling Regulatory Entity	List Name	List Producer and Contact Information	Reference	List Description
U.S. Environmental Protection Agency (continued)	Toxic Chemical Release Inventory	U.S. Environmental Protection Agency Emergency Planning and Community Right To Know Information Hotline: (1-800) 535-0202	http://www.epa.gov/tri/	A list of toxic chemicals whose emissions or releases are subject to annual reporting under Title III of SARA.
	Toxic Substances Control Act Chemical Substances Inventory	U.S. Environmental Protection Agency, Office of Toxic Substances, Washington, DC 20460 Telephone: (202) 554-1404	Toxic Substances Chemical Substance Inventory. http://www.epa.gov/opptintr/newchems/invntory.htm	Existing commercial chemical substances in the U.S. From a regulatory perspective, substances that are not found in the Inventory are considered "new" by EPA and therefore are subject to the Premanufacture Notification requirements of TSCA. The Inventory is not intended to cover all commercial chemical substances. Certain substances such as drugs and pesticides that are regulated by other laws are explicitly excluded.
U.S. Department of Transportation (DOT)	DOT Coast Guard Bulk Hazardous Materials	Coast Guard, U.S. DOT Coast Guard Headquarters, Hazardous Materials Branch, 2100 Second Street SW Washington, DC 20593-0001 Telephone: (202) 267-1577	CFR 46,150, Table I,1995; CFR 46,30.25, 1995. http://www.access.gpo.gov/nara/cfr/waisidx_01/46cfr30_01.html	Flammable and combustible bulk liquid materials regulated by the Coast Guard.
	DOT Coast Guard Noxious Liquid Substances	Coast Guard, U.S. Department of Transportation Coast Guard Headquarters, Hazardous Materials Branch, 2100 Second Street, Washington, DC 20593-0001 Telephone: (202) 267-1577	CFR 46,153, Table I, 1995. CHAPTER I—COAST GUARD, DEPARTMENT OF TRANSPORTATION PART 153—SHIPS CARRYING BULK LIQUID, LIQUEFIED GAS, OR COMPRESSED GAS HAZARDOUS MATERIALS	Noxious liquid substances regulated by the Coast Guard.

Controlling Regulatory Entity	List Name	List Producer and Contact Information	Reference	List Description
	DOT Hazardous Materials Table	U.S. Department of Transportation DOT Docket Office at (202) 366-5046	FR 59(249),67395, 1994 (Dec 29). http://hazmat.dot.gov/enforce/forms/ohmforms.htm#101 Title 49 CFR 172.101 Table (List of Hazardous Materials)	Hazardous materials regulated by the U.S. DOT.
U.S. Drug Enforcement Administration (DEA)	DEA Controlled Substances	Drug and Chemical Evaluation Section, Office of Diversion Control, Drug Enforcement Administration 600 Army Navy Dr., Arlington, VA 22202 Telephone: (202) 305-8500	1) List of Controlled Substances, Scheduling Actions 2) CFR 21, 1308.11-15,1996. http://www.deadiversion.usdoj.gov/schedules/	Controlled substances regulated by the DEA, Department of Justice.
USDA/FDA	Direct Food Substances Generally Recognized as Safe	U.S. FDA Center for Food Safety and Applied Nutrition, Office of Premarket Approval Division of Petition Control, Direct Additive Branch. Telephone: (202) 418-3066 Food and Drug Administration 5600 Fishers Lane, Rockville, MD 20857 Telephone: 1-888-463-6332	CFR 21,184,1996. http://www.access.gpo.gov/nara/cfr/waisidx_99/21cfrv3_99.html	Direct food additives generally recognized by the FDA as safe so long as used as prescribed.
	List of Substances Added to Food in the U.S.	U.S. FDA, Center for Food Safety and Applied Nutrition CFSAN Toll free hotline is 1-888-SAFEFOOD CFSAN, 5100 Paint Branch Parkway, College Park, MD 20740-3835	Priority-Based Assessment of Food Additives (PAFA) File, 1996. http://www.cfsan.fda.gov/~dms/opa-indt.html	An official FDA listing maintained by the Center for Food Safety and Applied Nutrition (CFSAN) of all substances known to be added to the U.S. food supply, including Generally Recognized As Safe (GRAS) compounds.
NTP/HHS	NTP Carcinogens List	National Toxicology Program, Public Health Service, U.S. Department of Health and Human Services NTP, P.O. Box 12233, MD EC-14, Research Triangle Park, NC 27709 Telephone: (919) 541-4096	Ninth Annual Report on Carcinogens, 2001, U.S. DHHS, PHS, NTP .http://ntp.niehs.nih.gov/index.cfm?objectid=72016262-BDB7-CEBA-FA60E922B18C2540	A list of substances that are either known to be carcinogens or that may reasonably be anticipated to be carcinogenic to which a significant number of persons residing in the U.S. are exposed.

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Controlling Regulatory Entity	List Name	List Producer and Contact Information	Reference	List Description
NTP/HHS (continued)				The publication of this list by the National Toxicology Program (NTP) of the Department of Health and Human Services (DHHS) is mandated for information purposes only by Public Law 95-622.
	NTP Technical Reports List	National Toxicology Program, Division of Toxicology Research and Testing, U.S. Department of Health and Human Services. Central Data Management, Mail Drop A0-01, NIEHS, P.O. Box 12233, Research Triangle Park, NC 27709 Telephone: (919) 541-3419	The NTP Technical Report Series. http://ntp.niehs.nih.gov/ntpweb/index.cfm?objectid=78CC7E4C-F1F6-975E-72940974DE301C3F	A list of chemicals for which NTP technical reports are available. The reports describe the results of experiments to determine carcinogenicity.
NIOSH/ OSHA	OSHA Toxic and Hazardous Substances	Occupational Safety and Health Administration, DO. Technical Service Center at (202) 219-7894	CFR 29,1910.1000, 1996. http://www.access.gpo.gov/nara/cfr/waisidx_01/29cfr1910a_01.html	The U.S. Labor Department List of Regulated Toxic and Hazardous Substances for which occupational exposure limits are defined.
	1989 OSHA Toxic and Hazardous Substances List	Produced by OSHA in 1989, and vacated by court order in 1992.	OSHA Publication number 3112, 1989	Although this OSHA list was vacated by court order in 1992, it is still enforced in some states including Utah, Alaska, Michigan, New Mexico, and Vermont.
	NIOSH Recommended Exposure Limits List	National Institute for Occupational Safety and Health Telephone: 1-800-35-NIOSH (1-800-356-4674) Outside the U.S.: 513-533-8328	DHHS (NIOSH) Publication No. 92-100. http://www.cdc.gov/niosh/92-100.html	The NIOSH list of substances with recommended exposure limits.

Controlling Regulatory Entity	List Name	List Producer and Contact Information	Reference	List Description
American Conference of Governmental Industrial Hygienists (ACGIH)	ACGIH Threshold Limit Value List	ACGIH, 6500 Glenway Avenue, Building D-7, Cincinnati, OH 45211-4438 Telephone: (513) 742-2020	Threshold Limit Values and Biological Exposure Indices for 2001	A list of substances for which the ACGIH recommended Threshold Limit Values (TLV), where TLV is defined as an airborne concentration to which most workers can be exposed without adverse effects.
State of California EPA	California List of Chemicals Known to Cause Cancer or Reproductive Effects	CA EPA Office of Environmental Health Hazard Assessment at (916) 445-6900. 1001 Eye Street, Sacramento, CA 95814	The Safe Drinking Water and Toxic Enforcement Act of 1986 http://www.oehha.org/prop65/prop65_list/newlist.html	Chemicals (regulated by California) believed to cause cancer or reproductive toxicity.
State of Massachusetts DOH	Massachusetts Substance List	MA Department of Health, Boston, MA 02133 Telephone: (617) 727-2660	Massachusetts Substance List for "Right-to-Know" Law (4/11/1994) M.G.L. c. 111F, General Law, Chapter 30A, 28 June 1984, Appendix A of 105 CMR 670.000 Code of MA Regulation. http://www.michigan.gov/deq/0,1607,7-135-3307_3667_4136-12130—,00.html	Toxic and hazardous substances applicable to the provisions of MA General Law C.111F.
State of Michigan DNR	Michigan Critical Materials Register (CMR)	Michigan Department of Natural Resources Great Lakes Environmental Assessment Section Surface Water Quality Division Telephone: (517)-373-2190 http://www.michigan.gov/deq	Michigan Department of Natural Resources, Critical Materials Register, January 1, 1994	Critical materials for which reporting is required under Michigan Act 293, P.A. 1972. This Act requires all businesses discharging wastewater to lagoons, deep wells, the surface of the ground, surface waters, septic tanks, or municipal sewer systems to file a report with Michigan Department of Natural Resources.

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Controlling Regulatory Entity	List Name	List Producer and Contact Information	Reference	List Description
State of New Jersey DEP	New Jersey Hazardous Substance List	Bureau of Hazardous Substances Division of Environmental Quality, New Jersey Department of Environmental Protection, 401 East State Street, Trenton, NJ 609-984-2202	New Jersey Worker and Community Right to Know Act, Department of Environmental Protection List of Hazardous Substances, 1995 .http://www.state.nj.us/health/eoh/rtkweb/factsheetlist.pdf	The New Jersey Right to Know Environmental Hazardous Substance List.
	New Jersey Extraordinarily Hazardous Substance List	New Jersey Department of Environmental Protection and Energy Division of Environmental Safety, Health and Analytical Programs, Bureau of Release Prevention, CN424 Trenton, NJ 08625 Telephone: (609) 633-7289	New Jersey Administration Code 7:31-2.3 (19 Jul 1993). http://www.nj.gov/dep/enforcement/relprev/tcpa/ehslist.html	Hazardous substances regulated by New Jersey Bureau of Release and Prevention under NJ Administration Code 7:31-2.3.
State of Pennsylvania DOLI	Pennsylvania Right to Know List	Department of Labor and Industry, Bureau of PENNSAFE, Labor and Industry Building, P.O. Box 68571, Harrisburg, PA 17120 Telephone: (717) 783-2071 Facsimile: (717) 783-5099	RTK Publication Number 691 Rev. 11-95 (Pennsylvania Right to Know Compliance Materials for Employers 1995). http://www.dli.state.pa.us/landi/CWP/view.asp?a=185&Q=167513	Chemicals regulated under Pennsylvania Worker and Community Right to Know Act.

APPENDIX 2-3

Regional Poison Control Centers

Regional poison control centers represent important local resources for information about the toxic properties of chemicals, both clinical and nonclinical. They provide information to the public about the management of suspected poisonings by animal and plants, household products, over-the-counter and prescription drugs, pesticides, or virtually any substance available. They maintain huge databases of material safety data sheets and provide programs such as "Poisindex," whereby any published information on a chemical can be found rapidly. Regional poison control centers and contact numbers are organized by state.

ALABAMA
Alabama Poison Center
2503 Phoenix Drive
Tuscaloosa, AL 35405
Emergency Phone: (800) 222-1222

Regional Poison Control Center
Children's Hospital
1600 7th Avenue South
Birmingham, AL 35233
Emergency Phone: (800) 222-1222

ALASKA
Oregon Poison Center
Oregon Health Sciences University
3181 SW Sam Jackson Park Road, CB550
Portland, OR 97201
Emergency Phone: (800) 222-1222

ARIZONA
Arizona Poison and Drug Information Center
College of Pharmacy—Phoenix
650 E. Van Buren Street
Phoenix, AZ 85004
Emergency Phone: (800) 222-1222

Banner Poison Control Center
901 East Willetta Street
Room 2701
Phoenix, AZ 85006
Emergency Phone: (800) 222-1222

ARKANSAS
Arkansas Poison and Drug Information Center
College of Pharmacy
University of Arkansas for Medical Sciences
4301 West Markham Street
Little Rock, AR 72205
Emergency Phone: (800) 222-1222

CALIFORNIA
California Poison Control System
California Poison Control System—Fresno/Madera Division
Valley Children's Hospital
9300 Valley Children's Place, MB15
Madera, CA 93638-8762
Emergency Phone: (800) 222-1222

California Poison Control System—Sacramento Division

UC Davis Medical Center
2315 Stockton Boulevard
Sacramento, CA 95817
Emergency Phone: (800) 222-1222

California Poison Control System—San Diego Division
University of California, San Diego, Medical Center
200 West Arbor Drive
San Diego, CA 92103-8925
Emergency Phone: (800) 222-1222

California Poison Control System—San Francisco Division
San Francisco General Hospital
University of California, San Francisco
Box 1369
San Francisco, CA 94143-1369
Emergency Phone: (800) 222-1222

COLORADO
Rocky Mountain Poison and Drug Center
990 Bannock Street
Denver, CO 80204-4028
Emergency Phone: (800) 222-1222

CONNECTICUT
Connecticut Poison Control Center
University of Connecticut Health Center
263 Farmington Avenue
Farmington, CT 06030-5365
Emergency Phone: (800) 222-1222

DELAWARE
The Poison Control Center
Children's Hospital of Philadelphia
3535 Market Street, Suite 985
Philadelphia, PA 19104-4303
Emergency Phone: (800) 222-1222

DISTRICT OF COLUMBIA
National Capital Poison Center
3201 New Mexico Avenue NW
Washington, DC 20016
Emergency Phone: 1-800-222-1222

FLORIDA
Florida Poison Information Center—Jacksonville
Shands Jacksonville Medical Center
655 West 8th Street, Box C23
Jacksonville, FL 32209
Emergency Phone: (800) 222-1222

Florida Poison Information Center—Miami
University of Miami, Dept. of Pediatrics
P.O. Box 110626 (R-131)
Miami, FL 33101
Emergency Phone: (800) 222-1222

Florida Poison Information Center—Tampa
Tampa General Hospital
P.O. Box 1289
Tampa, FL 33601
Emergency Phone: (800) 222-1222

GEORGIA
Georgia Poison Center
CHOA at Hughes Spalding
Grady Health System
80 Jesse Hill Jr. Drive, SE
Atlanta, GA 30335-3801
Emergency Phone: (800) 222-1222

HAWAII
Hawaii Poison Center
1319 Punahou Street
Honolulu, HI 96826
Emergency Phone: (800) 222-1222
Rocky Mountain Poison & Drug Center
777 Bannock Street
Denver, CO 80204-4028
Emergency Phone: (800) 222-1222

IDAHO
Rocky Mountain Poison and Drug Center
777 Bannock Street
Denver, CO 80204-4028
Emergency Phone: (800) 222-1222

ILLINOIS
Illinois Poison Center

222 S. Riverside Plaza, Suite 1900
Chicago, IL 60606
Emergency Phone: (800) 222-1222

INDIANA
Indiana Poison Center
Methodist Hospital, Room AG373
Clarian Health Partners
I-65 at 21st Street
Indianapolis, IN 46206-1367
Emergency Phone: (800) 222-1222

IOWA
Iowa Statewide Poison Control Center
Iowa Health System and University of Iowa Hospitals & Clinics
401 Douglas Street, Suite 402
Sioux City, IA 51101
Emergency Phone: (800) 222-1222

KANSAS
Mid-America Poison Center
University of Kansas Medical Center
3901 Rainbow Blvd., Room B-400
Kansas City, KS 66160-7231
Emergency Phone: (800) 222-1222

KENTUCKY
Kentucky Regional Poison Center
Medical Towers South, Suite 847
234 East Gray Street
Louisville, KY 40202
Emergency Phone: (800) 222-1222

LOUISIANA
Louisiana Poison Center
LSUHSC—Shreveport, Dept. of Emergency Medicine
Section of Clinical Toxicology
1521 Wilkinson Street
Shreveport, LA 71103
Emergency Phone: (800) 222-1222

MAINE
Northern New England Poison Center
Serving Maine, New Hampshire, and Vermont
22 Bramhall Street
Portland, ME 04102
Emergency Phone: (800) 222-1222

MARYLAND
Maryland Poison Center
222 Arch Street, #1
Baltimore, MD 21201
Emergency Phone: (800) 222-1222

National Capital Poison Center
3201 New Mexico Avenue NW
Suite 310
Washington, DC 20016
Emergency Phone: (800) 222-1222

MASSACHUSETTS
Regional Center for Poison Control and Prevention
Serving Massachusetts and Rhode Island
Children's Hospital Boston
Smith Building
300 Longwood Avenue
Boston, MA 02115
Emergency Phone: (800) 222-1222

MICHIGAN
Children's Hospital of Michigan
Regional Poison Control Center
4160 John R Harper Professional Office Building, Suite 616
Detroit, MI 48201
Emergency Phone: (800) 222-1222

DeVos Children's Hospital
Regional Poison Center
100 Michigan NE, Suite 203
Grand Rapids, MI 49503
Emergency Phone: (800) 222-1222

MINNESOTA
Hennepin Regional Poison Center
Hennepin County Medical Center
701 Park Avenue
Minneapolis, MN 55415
Emergency Phone: (800) 222-1222

MISSISSIPPI
Mississippi Regional Poison Control Center
University of Mississippi Medical Center
2500 N. State Street
Jackson, MS 39216
Emergency Phone: (800) 222-1222

MISSOURI
Missouri Regional Poison Center
7980 Clayton Road
St. Louis, MO 63117
Emergency Phone: (800) 222-1222

MONTANA
Rocky Mountain Poison and Drug Center
777 Bannock Street
Mail Code 0180
Denver, CO 80204-4028
Emergency Phone: (800) 222-1222

NEBRASKA
Nebraska Regional Poison Center
8401 West Dodge Road, Suite 115
Omaha, NE 68114
Emergency Phone: (800) 222-1222

NEVADA
Oregon Poison Center
Oregon Health Sciences University
3181 SW Sam Jackson Park Road
Portland, OR 97201
Emergency Phone: (800) 222-1222

Rocky Mountain Poison and Drug Center
777 Bannock Street
Denver, CO 80204-4028
Emergency Phone: (800) 222-1222

NEW HAMPSHIRE
Northern New England Poison Center
Serving Maine, New Hampshire, and Vermont
22 Bramhall Street
Portland, ME 04102
Emergency Phone: (800) 222-1222

NEW JERSEY
New Jersey Poison Information and Education System
University of Medicine and Dentistry at New Jersey
140 Bergen Street
Newark, NJ 07101
Emergency Phone: (800) 222-1222

NEW MEXICO
New Mexico Poison and Drug Information Center
MSC09 5080
1 University of New Mexico
Albuquerque, NM 87131-0001
Emergency Phone: (800) 222-1222

NEW YORK
Upstate New York Poison Center
750 East Adams Street
Syracuse, NY 13210
Emergency Phone: (800) 222-1222

Long Island Regional Poison and Drug Information Center
Winthrop University Hospital
259 First Street
Mineola, NY 11501
Emergency Phone: (800) 222-1222

New York City Poison Control Center
NYC Bureau of Public Health Labs
455 First Avenue
Room 123, Box 81
New York, NY 10016
Emergency Phone: (800) 222-1222

Western New York Poison Center
Children's Hospital of Buffalo
219 Bryant Street
Buffalo, NY 14222
Emergency Phone: (800) 222-1222

NORTH CAROLINA
Carolinas Poison Center

Carolinas Medical Center
P.O. Box 32861
Charlotte, NC 28232
Emergency Phone: (800) 222-1222

NORTH DAKOTA
Hennepin Regional Poison Center
Hennepin County Medical Center
701 Park Avenue
Minneapolis, MN 55415
Emergency Phone: (800) 222-1222

OHIO
Central Ohio Poison Center
Nationwide Children's Hospital
700 Children's Drive
Columbus, OH 43205
Emergency Phone: (800) 222-1222

Cincinnati Drug and Poison Information Center
3333 Burnet Avenue
Vernon Place—3rd Floor
Cincinnati, OH 45229
Emergency Phone: (800) 222-1222

Greater Cleveland Poison Center
11100 Euclid Avenue
Cleveland, OH 44106-6007
Emergency Phone: (800) 222-1222

OKLAHOMA
Oklahoma Poison Control Center
Children's Hospital at OU Medical Center
940 NE 13th Street, Suite 3850
Oklahoma City, OK 73104
Emergency Phone: (800) 222-1222

OREGON
Oregon Poison Center
Oregon Health & Science University
3181 SW Sam Jackson Park Road, CB550
Portland, OR 97239
Emergency Phone: (800) 222-1222

PENNSYLVANIA
Pittsburgh Poison Center
Children's Hospital of Pittsburgh
200 Lothrop Street
Pittsburgh, PA 15213
Emergency Phone: (800) 222-1222

The Poison Control Center at The Children's Hospital of Philadelphia
34th & Civic Center Blvd.
Philadelphia, PA 19104-4303
Emergency Phone: (800) 222-1222

PUERTO RICO
Puerto Rico Poison Center
Administracion de Servicios Medicos de P.R. (ASEM), Centro Medico de Puerto Rico, Barrio
Monacillo Carr. #22, Paseo Dr. Jose Celso Barbosa
Rio Piedras Pu 935
Emergency Phone: (800) 222-1222

RHODE ISLAND
Regional Center for Poison Control and Prevention
Serving Massachusetts and Rhode Island
Children's Hospital
300 Longwood Avenue
Boston, MA 02115
Emergency Phone: (800) 222-1222

SOUTH CAROLINA
Palmetto Poison Center
College of Pharmacy
University of South Carolina
Columbia, SC 29208
Emergency Phone: (800) 222-1222

SOUTH DAKOTA
Sanford Poison Center
Hennepin Regional Poison Center
Sanford Health, 1305 West 18th Street
Sioux Falls, SD, 57117-5039
Emergency Phone: (800) 222-1222

TENNESSEE
Tennessee Poison Center
501 Oxford House
1161 21st Avenue South
Nashville, TN 37232-4632
Emergency Phone: (800) 222-1222

TEXAS
Central Texas Poison Center
Scott and White Memorial Hospital
2401 South 31st Street
Temple, TX 76508
Emergency Phone: (800) 222-1222

North Texas Poison Center
Parkland Memorial Hospital
5201 Harry Hines Blvd.
Dallas, TX 75235
Emergency Phone: (800) 222-1222

South Texas Poison Center
The University of Texas Health
Science Center—San Antonio
Cancer Therapy and Research Center
7979 Wurzbach Road
San Antonio, TX 78229-3900
Emergency Phone: (800) 222-1222

Southeast Texas Poison Center
The University of Texas Medical Branch
3.112 Trauma Center
301 University Blvd.
Galveston, TX 77555-1175
Emergency Phone: (800) 222-1222

Texas Panhandle Poison Center
1501 S. Coulter
Amarillo, TX 79106
Emergency Phone: (800) 222-1222
West Texas Regional Poison Center
Thomason Hospital
4815 Alameda Avenue
El Paso, TX 79905
Emergency Phone: (800) 222-1222

UTAH
Utah Poison Control Center
585 Komas Drive, Suite 200
Salt Lake City, UT 84108-1208
Emergency Phone: (800) 222-1222

VERMONT
Northern New England Poison Center
Serving Maine, New Hampshire,
and Vermont
22 Bramhall Street
Portland, ME 04102
Emergency Phone: (800) 222-1222

VIRGINIA
Blue Ridge Poison Center
University of Virginia Health System
1222 Jefferson Park Ave.
P.O. Box 800774
Charlottesville, VA 22908-0774
Emergency Phone: (800) 222-1222

National Capital Poison Center
3201 New Mexico Avenue NW, Suite 310
Washington, DC 20016
Emergency Phone: (800) 222-1222

Virginia Poison Center
Medical College of Virginia Hospitals
Virginia Commonwealth University
Medical Center
600 E. Broad Street, Suite 640
P.O. Box 980522
Richmond, VA 23298-0522
Emergency Phone: (800) 222-1222

WASHINGTON
Washington Poison Center
155 NE 100th Street, Suite 400
Seattle, WA 98125-8011
Emergency Phone: (800) 222-1222

WEST VIRGINIA
West Virginia Poison Center

3110 MacCorkle Ave SE
Charleston, WV 25304
Emergency Phone: (800) 222-1222

WISCONSIN
Wisconsin Poison Center
Children's Hospital of Wisconsin
P.O. Box 1997, Mail Station C660
Milwaukee, WI 53201-1997
Emergency Phone: (800) 222-1222

WYOMING
Nebraska Regional Poison Center
8401 West Dodge Road, Suite 115
Omaha, NE 68114
Emergency Phone: (800) 222-1222

Additional Resources

Websites

Agency for Toxic Substances and Disease Registry (ATSDR):
http://www.atsdr.cdc.gov/

American Association of Poison Control Centers:
http://www.aapcc.org

American College of Medical Toxicology:
http://www.acmt.net

Carcinogenic Potency Project:
http://toxnet.nlm.nih.gov/cpdb/cpdb.html

Centers for Disease Control and Prevention (CDC):
http://www.cdc.gov/

ChemFinder:
http://www.cambridgesoft.com/databases/login/?serviceid=128

Chemical Carcinogenesis Research Information System (CCRIS):
http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?CCRIS

ClinicalTrials:
http://www.clinicaltrials.gov/

Developmental & Reproductive Toxicology (DART/ETIC):
http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?DARTETIC

Environmental Protection Agency (EPA):
http://www.epa.gov/

EXTOXNET:
http://extoxnet.orst.edu/

Extremely Hazardous Substances (EHS):
http://www2.epa.gov/science-and-technology/substances-and-toxics

Food and Drug Administration (FDA):
http://www.fda.gov/

Genetic Toxicology (Mutagenicity) (GENE-TOX):
http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?GENETOX

Hazardous Materials:
http://www.usfa.fema.gov/citizens/home_fire_prev/hazmat.shtm

Hazardous Substances Data Bank (HSDB):
http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB

Healthy People 2020:
http://www.healthypeople.gov/2020/default.aspx

Integrated Risk Information System (IRIS):
http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?IRIS

International Toxicity Estimates for Risk (ITER):
http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?iter

IUPAC:
http://www.iupac.org

The Library of the Karolinska Institute of Sweden:
http://kib.ki.se/en

MEDLINEplus:
http://www.nlm.nih.gov/medlineplus/

Medwatch Homepage:
http://www.fda.gov/Safety/MedWatch/HowToReport/ucm085568.htm

National Institute for Occupational Safety and Health (NIOSH):
http://www.cdc.gov/niosh

National Institute of Environmental Health Sciences (NIEHS):
http://www.niehs.nih.gov/

National Institutes of Health (NIH):
http://www.nih.gov/

National Institute of Standards and Technology:
http://webbook.nist.gov/chemistry/

National Report on Human Exposure to Environmental Chemicals:
http://www.cdc.gov/exposurereport/

National Toxicology Program:
http://ntp-server.niehs.nih.gov/

Occupational Safety and Health Administration (OSHA):
http://www.osha.gov/

Poisonous Plants Informational Database:
http://www.ansci.cornell.edu/plants/

Recognition and Management of Pesticide Poisonings:
http://npic.orst.edu/rmpp.htm

Registry of Toxic Effects of Chemical Substances:
http://www.cdc.gov/niosh/97-119.html

Right to Know Hazardous Substance Fact Sheets:
http://web.doh.state.nj.us/rtkhsfs/indexfs.aspx

Toxicon Multimedia Project:
http://www.biologydir.com/toxikon-multimedia-project-info-7167.html

TOXLINE:
http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?TOXLINE

Toxics Release Inventory (TRI):
http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?TRI

U.S. Department of Agriculture:
http://www.usda.gov/

World Health Organization:
http://www.who.int