

# **TOXNET® & Beyond**

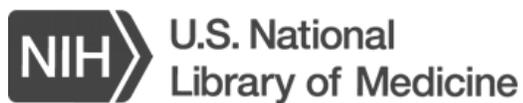
Using the National Library of Medicine®  
Environmental Health and Toxicology Portal



**Specialized Information Services**  
**National Library of Medicine**  
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**TOXNET & Beyond**  
Using the National Library of Medicine<sup>®</sup>  
Environmental Health & Toxicology Portal

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### Disclaimer

Every effort has been made to ensure that the screen graphics and the exercises in this document are up to date and accurate. However, because of the frequency of Web updates, they may have changed.

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## Preface

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Our lives are filled with chemical exposures. How do we discover more about these chemicals for ourselves and our organization? The National Library of Medicine® (NLM) Environmental Health and Toxicology Portal provides access to numerous databases that can help you explore environmental chemicals and risks. *TOXNET and Beyond: Using the National Library of Medicine Environmental Health and Toxicology Portal* conveys the fundamentals of searching the NLM Toxicology Data Network (TOXNET®) system of databases in chemistry, environmental health, toxicology, and related fields. In addition to TOXNET, the course will highlight various resources available through the Environmental Health and Toxicology Portal.

The NLM Toxicology Information Program was created in 1967 to serve as the Federal Government's centralized resource for environmental health and toxicology information. Throughout history, the effects and importance of poisons and exposure to toxic substances have been recognized. A history of congressional legislation and events contributed to the creation of the initial Toxicology and Environmental Health Information Program (TEHIP). Eventually, the program grew into what is now the NLM Environmental Health and Toxicology Program which is offered through an online portal.

### Historical Timeline

- ▶ Poisons and occupational risks recognized throughout time
- ▶ Brooklyn Papyrus (Egypt) (380–343 B.C.) — describes snake and scorpion bites
- ▶ Mithridates the Great (1st Century B.C.) — experimented with poisons looking for a universal antidote
- ▶ Paracelsus (1493–1541), Father of Toxicology — “The dose makes the poison.”
- ▶ Bernardino Ramazzini (17th Century) — *De Morbis Artificum Diatriba* (Diseases of Workers)
- ▶ Harvey W. Wiley's Poison Squad (1903)
- ▶ *The Jungle* (1906) Upton Sinclair — lack of hygiene in the meat-packing industry
- ▶ Federal Food and Drugs Act (1906) — prohibited adulterated or misbranded items
- ▶ Federal Food, Drug, and Cosmetic Act (1938) — enhanced safety requirements for drugs
- ▶ Drug Amendments (1962) — effectiveness required for drugs

- ▶ *Silent Spring* (1962) Rachel Carson — sparked public awareness about hazards of synthetic chemicals
- ▶ President's Science Advisory Committee (1966) — "Report on the Handling of Toxicological Information"
- ▶ NLM Toxicology Information Program (TIP) created (1967) to serve as the Federal Government's centralized resource for environmental health and toxicology information
- ▶ Situated within the NLM Division of Specialized Information Services (SIS)

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## Where to Start

Use this guide to identify relevant TOXNET and other NLM resources based on your role.

### ▶ Emergency Responders

- [CHEMM](#)
- [REMM](#)
- [WISER](#)
- [DIMRC](#)

### ▶ Health Care Professionals

- [REMM](#)
- [HSDB](#)
- [LactMed](#)
- [TOXLINE](#)
- [LiverTox](#)
- [Drug Information Portal](#)
- [CHEMM](#)

### ▶ The Public

- [Household Products Database](#)
- [Tox Town](#)
- [TOXMAP](#)
- [TRI](#)

### ▶ Public Health Professionals

- [TOXMAP](#)
- [Haz-Map](#)
- [HSDB](#)
- [TOXLINE](#)
- [Enviro-Health Links](#)
- [Disaster Web Bibliographies](#)

### ▶ Researchers & Scientists

- [TOXNET](#)
- [TOXLINE](#)
- [HSDB](#)
- [ChemIDplus](#)
- [LiverTox](#)
- [PillBox](#)

### ▶ Students & Educators

- [Environmental Health Student Portal](#)
- [Tox Town](#)
- [ToxMystery](#)
- [Toxicology Tutorials](#)
- [HPD](#)
- [TOXMAP](#)
- [TRI](#)
- [GeneEd](#)

### ▶ Toxicologists

- [TOXNET](#)
- [ALTBIB](#)
- [CHEMM](#)
- [Drug Information Portal](#)
- [Enviro-Health Links](#)
- [IUPAC Glossary of Terms](#)
- [LiverTox](#)
- [REMM](#)
- [TOXMAP & TRI](#)
- [Toxicology Tutorials](#)
- [WISER](#)

### ▶ Advocacy Groups

- [TOXMAP](#)
- [TRI](#)
- [HSDB](#)
- [Tox Town](#)
- [Enviro-Health Links](#)

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# Section 1: Introduction

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## Course Overview

### Purpose

The purpose of this training is to familiarize participants with reliable online environmental health and toxicology information from the National Library of Medicine® (NLM) and other reliable sources. Skills and knowledge acquired in this training class will enable participants to access, utilize, and refer others to environmental health and toxicology information.

### Objectives

After completing this course, participants will be able to:

- ▶ Identify quality, accurate, and authoritative online resources pertaining to environmental health, toxicology, and related medical information
- ▶ Demonstrate the ability to perform strategic search techniques to find relevant online information
- ▶ Apply the skills and knowledge obtained in this class to their organization's environmental health and toxicology information needs

### NLM Online Resources Covered in this Class

The following resources will be covered with time for hands-on practice:

- ▶ **ChemIDplus®**—access to structure and nomenclature authority databases for the identification of chemical substances cited in NLM databases
- ▶ **Hazardous Substances Data Bank (HSDB®)**—comprehensive, peer-reviewed toxicological data for more than 5,000 chemicals
- ▶ **Toxicology Literature Online (TOXLINE®)**—a bibliographic toxicology database covering more than 4 million bibliographic citations
- ▶ **Alternatives to Animal Testing (ALTBIB®)**—a bibliographic collection of resources for alternatives to the use of live vertebrates in biomedical research and testing
- ▶ **Developmental and Reproductive Toxicology Database (DART®)**—a bibliographic database containing more than 200,000 references to literature published since 1965
- ▶ **Drugs and Lactation Database (LactMed®)**—a database of more than 900 drugs and other chemicals to which breastfeeding mothers may be exposed
- ▶ **Chemical Carcinogenesis Research Information System (CCRIS)**—scientifically evaluated and fully referenced data on more than 9,000 chemicals

- ▶ **Carcinogenic Potency Database (CPDB)**—analyses of the results of 6,540 chronic, long-term animal cancer tests, conducted in support of cancer risk assessments for humans, on more than 1,500 chemicals
- ▶ **Genetic Toxicology Data Bank (GENE-TOX)**—genetic toxicology test data on more than 3,000 chemicals resulting from expert peer review of the open scientific literature
- ▶ **Comparative Toxicogenomics Database (CTD)**—curated scientific data describing relationships between chemicals, genes, and human diseases
- ▶ **Integrated Risk Information System (IRIS)**—carcinogenic and non-carcinogenic information on more than 500 chemicals
- ▶ **International Toxicity Estimates for Risk (ITER)**—side-by-side comparisons of international risk assessment information on more than 600 chemicals with links to source documentation
- ▶ **Toxics Release Inventory (TRI)**—information on annual environmental releases of more than 650 toxic chemicals by US facilities from the US Environmental Protection Agency (EPA)
- ▶ **TOXMAP**<sup>®</sup>—a Geographic Information System that uses maps of the United States to help users visually explore TRI and Superfund data
- ▶ **Household Products Database**—human health effects information on more than 14,000 brand-name consumer products
- ▶ **Haz-Map**<sup>®</sup>—an occupational toxicology database that links job tasks to occupational diseases and their symptoms
- ▶ **Enviro-Health Links**—selected links to Internet resources on environmental health and toxicology issues of special interest
- ▶ **Tox Town**<sup>®</sup>—an interactive guide to commonly encountered toxic substances and environmental health risks
- ▶ **Drug Information Portal**—current drug information for more than 53,000 drugs with links to additional online resources with potential drug information
- ▶ **LiverTox**—information about drug-induced liver injury caused by prescription and nonprescription drugs, herbals, and dietary supplements
- ▶ **Chemical Hazards Emergency Medical Management (CHEMM)**—guidance on quick chemical identification, acute patient guidelines, and initial event activities
- ▶ **Radiation Emergency Medical Management (REMM)**—guidance on clinical diagnosis and treatment during mass casualty radiological/nuclear events, primarily for physicians, but usable to those without formal radiation medicine expertise
- ▶ **Wireless Information System for Emergency Responders (WISER)**<sup>®</sup>—provides a wide range of information on hazardous substances, including substance identification support, physical characteristics, human health information, and containment and suppression advice

- ▶ **Disaster Information Management Research Center (DIMRC)**—health information resources and informatics research related to disasters of natural, accidental, or deliberate design

## Environmental Health & Toxicology Portal

The National Library of Medicine (NLM) **Environmental Health and Toxicology Portal** provides a starting point for seeking reliable information on environmental health, toxicology, hazardous chemicals, and toxic releases.

The screenshot shows the homepage of the Environmental Health & Toxicology Portal. The header includes the U.S. Department of Health & Human Services logo, the portal title, and the NLM logo. A navigation bar contains links for SIS Home, About Us, Site Map & Search, SIS News, and Contact Us. A search bar is located in the top right corner. The main content area is divided into several sections: a left sidebar with a 'Find Information About...' menu, a central 'Occupational Health Information' banner, a 'Search TOXNET' box, and a 'Search Our Web Site' box. The bottom section features 'For Information About...' with links to Haz-Map, International Toxicity Estimates for Risk Assessment, and Household Products Database. Callout boxes highlight: 'Find info by topic and intended audience' (pointing to the left sidebar), 'Reference tools and additional resources' (pointing to the search boxes), and 'Search all TOXNET databases, or click the TOXNET link for full search features' (pointing to the Search TOXNET box).

[sis.nlm.nih.gov/enviro.html](http://sis.nlm.nih.gov/enviro.html)

Browse the easy-to-navigate site by topic or audience. Explore related resources using the **A to Z Index of Resources**. The **Other Professional Resources** include database descriptions, fact sheets, list of NLM databases, and electronic resources. All TOXNET databases can be searched from this page.

## Staying Connected



NLM-Tox-Enviro-Health-L Listserv

- ▶ Keep informed about new and noteworthy environmental health and toxicology resources, services, and outreach activities from the NLM Division of Specialized Information Services (SIS)

**[sis.nlm.nih.gov/enviro/envirolistserv.html](http://sis.nlm.nih.gov/enviro/envirolistserv.html)**



Follow us on Twitter

- ▶ Follow Twitter to receive the latest information on NLM Environmental Health and Toxicology

**[twitter.com/NLM\\_SIS](https://twitter.com/NLM_SIS)**



News Updates

- ▶ News from the NLM Division of Specialized Information Services

**[sis.nlm.nih.gov/news.html](http://sis.nlm.nih.gov/news.html)**

## NLM Mobile

NLM Mobile is a Web-based application designed to run on mobile devices and is an authoritative guide to all NLM mobile sites and apps. The site allows browsing by type, device, or tags.



## Additional Resources

For further information, review these additional resources:

- ▶ Getting the Most from SIS's Environmental Health and Toxicology Resources  
[sis.nlm.nih.gov/getthemostfromsis.html](https://sis.nlm.nih.gov/getthemostfromsis.html)
- ▶ NLM Environmental Health and Toxicology Resources Quick Tour  
[sis.nlm.nih.gov/enviro/captivate/tehipoverview.htm](https://sis.nlm.nih.gov/enviro/captivate/tehipoverview.htm)
- ▶ Publications and Reference Materials  
[sis.nlm.nih.gov/enviro/enviropubs.html](https://sis.nlm.nih.gov/enviro/enviropubs.html)

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## Section 2: Toxicology Data Network (TOXNET<sup>®</sup>)

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## TOXNET® Overview

The National Library of Medicine® (NLM) **TOXNET** (Toxicology Data Network) is a free, Web-based system of databases on environmental health, toxicology, hazardous chemicals, toxic releases, chemical nomenclatures, and specialty areas such as occupational health and consumer products.

**[toxnet.nlm.nih.gov](http://toxnet.nlm.nih.gov)**

Types of information in the TOXNET databases include:

- ▶ Specific chemicals, mixtures, and products
- ▶ Unknown chemicals
- ▶ Special toxic effects of chemicals in humans and/or animals

The TOXNET Databases section of the page lists all the databases that make up TOXNET, along with a brief description of each. Click on a database name for a full description of the database, a link to the fact sheet, a sample record, and more information.

## The TOXNET Databases

The TOXNET databases covered in this course can be grouped in the following categories:

- ▶ Chemical Information—ChemIDplus<sup>®</sup>, HSDB<sup>®</sup>, TOXLINE<sup>®</sup>, and ALTBIB<sup>®</sup>
- ▶ Reproductive Health—DART<sup>®</sup> and LactMed<sup>®</sup>
- ▶ Carcinogenesis Research—CCRIS and CPDB (both are archived, no longer updated)
- ▶ Genetics and Genomics—GENE-TOX (archived, no longer updated) and CTD
- ▶ Risk Assessment—IRIS and ITER
- ▶ Environmental Health—TRI, TOXMAP<sup>®</sup>, Household Products, Haz-Map<sup>®</sup>, Environmental Health Links, and Tox Town<sup>®</sup>
- ▶ Drugs—Drug Information Portal and LiverTox
- ▶ Emergencies and Disasters—CHEMM, REMM, WISER, and DIMRC

## TOXNET Basic Searching

From the TOXNET homepage, all TOXNET databases can be searched simultaneously. Results will be displayed as links to the databases in which the search term(s) were found—and the number of records in each—under the headings: References from the Biomedical Literature (TOXLINE and DART) and Chemical, Environmental Health and Toxicological Data (all others).

The image displays two screenshots of the TOXNET website. The left screenshot shows the homepage with a search bar containing the text 'ammonia'. A red box highlights the search input field and the 'ALL DATABASES' dropdown menu. Below the search bar, there are sections for 'TOXNET Databases' and 'MOST VISITED BY TOXNET USERS'. The right screenshot shows the search results page for 'ammonia'. It features a table with columns for 'TOP RESULTS', 'DATABASE', and 'ADD TO MY LIST'. The results include references from TOXLINE, DART, HSDB, CCRIS, and GENETOX, each with a 'Select Record' button and a link to 'More Results'.

**Entering search term(s)**—Enter any combination of words, chemical names, and numbers, including Chemical Abstracts Service (CAS) Registry Numbers<sup>®</sup>. Common **stop words** such as **a**, **an**, **and**, **for**, **the**, and **it** will not be searched. When searching for terms other than chemicals, the system automatically searches for singular and plural forms of the term(s) entered.

**Searching specific database(s)**—Select one or more databases from the drop-down menu next to the **Search** button to perform a basic search in the selected database(s).

**Synonym searching**—By default the system will search for the exact name, synonyms, and CAS number as derived from ChemIDplus. On the Search Results screen, uncheck the **Include Synonyms and CAS Numbers in Search** option to search only for the exact chemical term or CAS Registry Number entered. In LactMed, the CAS number refers to the parent compound (i.e., not the salt form).

The screenshot shows the TOXNET search interface. At the top, there are three tabs: 'TOXNET SEARCH RESULTS' (active), 'BROWSE TOXNET', and 'ADVANCED SEARCH'. Below the tabs is a search input field containing 'benzene'. To the right of the input field is a dropdown menu labeled 'ALL DATABASES' and a green 'Search' button. Below the search input field, there are two dropdown menus: 'Search Term' set to 'singular/plural' and 'Records with' set to 'all of the words'. To the right of these dropdowns is a checkbox labeled 'Include Synonyms and CAS Numbers in Search', which is checked and highlighted with a red rectangular box.

**Truncation**—The asterisk (\*) is the right-handed truncation symbol for any number of characters.

**Phrase searching**—Search phrases with quotation marks.

**Boolean searching**—Use the logical operators **AND**, **OR**, and **NOT** to limit a search of two or more terms to specific criteria. In searches with combinations of these operators, **AND** takes precedence, followed by **NOT** and then **OR**. This default precedence may be overridden with the use of parentheses, which may also be nested (i.e., parentheses within parentheses).

- ▶ **Pulmonary AND edema**—retrieves all records with the two words appearing together.
- ▶ **Liver OR kidney**—retrieves all records containing either of these words (or both of them).
- ▶ **Carcinoma NOT squamous**—retrieves records from which one or more terms have been excluded.

**Browse**—This feature provides a scannable index of all terms beginning with the search term entered and the number of records for each term. In the databases, selectable items indexed are **All Words**, **CAS Registry Number**, and **Chemical Name**. In the Toxicology Literature databases, selectable items indexed are **All Words**, **MeSH<sup>®</sup> Headings/Keywords**, **Authors**, and **CAS Registry Number**.

## Search Results Screen

Options on the Search Results screen allow users to:

1. **Modify Search**—use the fields at the top of the screen to make changes or perform a new search
2. **Search Details**—summarizes the strategy used by TOXNET to perform the search
3. **History**—view earlier search result sets or combine these sets if they are within the same database
4. **My List**—access your list of saved records (when you click the **Select Record** link next to a record, the record is added to this list)
5. **More Results**—display additional results from the specified database (only one record is initially displayed in the list)
6. **Select Record**—save the item to your list for displaying, sorting, and downloading

The screenshot shows the TOXNET Search Results interface. At the top, there are three tabs: TOXNET SEARCH RESULTS (active), BROWSE TOXNET, and ADVANCED SEARCH. Below the tabs is a search bar containing the text 'benzene'. To the right of the search bar is a dropdown menu set to 'ALL DATABASES' and a 'Search' button. Below the search bar are several options: 'Search Term' set to 'singular/plural', 'Records with' set to 'all of the words', and a checked checkbox for 'Include Synonyms and CAS Numbers in Search'. A red box labeled '1' points to the search bar area. Below the search options are links for 'Search Details', 'History', and 'My List', with a red box labeled '2' pointing to 'Search Details'. A message states: 'TOXNET databases use unique formats. Only one record from each of the selected resources appears below. Click on "More Results" to see all records retrieved for your search.' Below this is a table with columns 'TOP RESULTS', 'DATABASE', and 'ADD TO MY LIST'. The table contains four rows of results. A red box labeled '3' points to the 'Search Details' link, '4' to the 'History' link, and '5' to the 'More Results' link for the first result. A red box labeled '6' points to the 'Select Record' link for the first result.

TOP RESULTS	DATABASE	ADD TO MY LIST
1. Genetic damage in the sperm and blood of workers exposed to benzene ESKENAZI, BRENDA RePORTER Database National Institutes of Health [NIH RePORTER]	TOXLINE More Results (28,502)	Select Record
2. [Correlation between the fetotoxic effect of benzol inhalation in CFY rats and benzol concentration in the inhaled gas]. Hudák A; Tátrai E; Lőrincz M; Barcza G; Ungváry G Morphol Igazságügyi Orv Sz. 1980, Oct, 20(4):261-8. [Morphologiai es igazságügyi orvosi szemle] [Hungarian] [PubMed] PubMed Citation	DART More Results (701)	Select Record
3. BENZENE 71-43-2	HSDB More Results (1,951)	Select Record
4. BENZENE 71-43-2	CCRIS More Results (14)	Select Record

- **Download Records**—save the complete list of records, either in brief, full, abstract, or tagged format (this option only appears after selecting **More Results** for a database)

## Record Display Screen

Options when displaying a record allow users to:

1. Go to the **Previous Record** or **Next Record** in the search results
2. Go back to the **Search Results** screen
3. Modify the search or perform a new basic search in the same database
4. View **Search Details** (the algorithm used by TOXNET to perform the search)
5. Display search **History**
6. Display links to **Related Records** containing information on the substance
7. **Download** the record or portions of the record
8. **Print** the record
9. **Select Record** and add it to your list
10. View your list of selected records (**My List**)

The screenshot shows the TOXNET interface for a Benzene record. The top navigation bar includes the NIH logo, U.S. National Library of Medicine, and TOXNET TOXICOLOGY DATA NETWORK. A search bar contains 'benzene' and a 'Search' button. Navigation links for 'Search Details' and 'History' are visible. The record title 'TOXLINE' is displayed above a toolbar with options: 'Related Records', 'Download this Record', 'Print', 'Select Record', and 'My List'. The record details include 'Authors: Anonymous', 'Source: (1997)', and an 'Abstract' section. The abstract text describes benzene absorption and toxicity.

1. « Previous Record | Next Record »

2. TOXNET TOXICOLOGY DATA NETWORK

3. benzene Search

4. Search Details History

5. History

6. Related Records

7. Download this Record

8. Print

9. Select Record

10. My List

**Benzene**

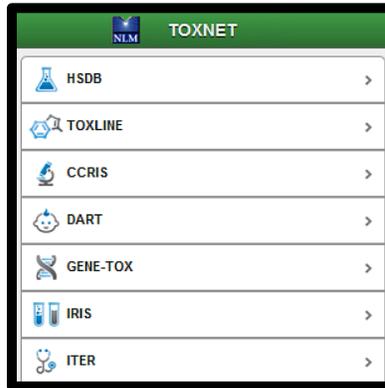
Authors:  
Anonymous

Source: (1997)

Abstract:  
**Benzene** is absorbed via ingestion, inhalation, and skin application. Experimental data indicate that animals can absorb up to 95% of oral doses and that humans can absorb up to 80% of inhaled **benzene** (after 5 minutes of exposure) (Sabourin et al., 1987; Srobova et al., 1950). Humans may absorb **benzene** vapors through the skin as well as the lungs; of the total dose absorbed by the two routes, an estimated 22-36% enters the body through the skin (Susten, 1985). Autopsy of a youth who

## TOXNET Mobile

A mobile-friendly version of the TOXNET Web site is available at [toxnet.nlm.nih.gov/pda](http://toxnet.nlm.nih.gov/pda). TOXNET Mobile automatically adapts to the size of your device or browser window.



## Section 3: Chemical Information and Research

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## ChemIDplus®

**ChemIDplus** is a free, Web-based search system that provides access to structure and nomenclature authority files used for the identification of chemical substances cited in the National Library of Medicine® (NLM) databases. It also provides structure searching and direct links to many biomedical resources at NLM and on the Internet for chemicals of interest. It contains more than 400,000 chemical records, including calculated, interactive, three-dimensional structure models for more than 300,000 chemicals and 645,000 variations.

Each record in ChemIDplus represents a single chemical or substance. Records can be displayed in either a summary or full-record view. A “browse” option allows quick “starts with” searches of a variety of data and A-Z index of chemical names.

The ChemIDplus database has two different applications: **ChemIDplus Lite** (for basic searching) and **ChemIDplus Advanced** (for more experienced users). ChemIDplus is mobile-friendly, supporting Apple iOS and Android devices.

NIH U.S. National Library of Medicine TOXNET TOXICOLOGY DATA NETWORK Help | FAQs | TOXNET Fact Sheet | Training Manual & Schedule

TOXNET Home > ChemIDplus Lite > Browse ChemIDplus > ChemIDplus Advanced

ChemIDplus A TOXNET DATABASE

SEARCH ChemIDplus BROWSE ChemIDplus ADVANCED SEARCH

Search

Synonym (e.g. formaldehyde) or Registry Number (e.g. 50-00-0)

Multiple synonyms or registry numbers can be concatenated with pipes (e.g. 50-00-0|50-01-1|50-02-2)

**Support**

**Resources**

- Help
- Fact Sheet
- Sample Record
- TOXNET FAQ

**Contact Us**

Email: [tehip@tehip.nlm.nih.gov](mailto:tehip@tehip.nlm.nih.gov)  
Telephone: (301) 496-1131  
Fax: (301) 480-3537

**About ChemIDplus**

**What is ChemIDplus?**

Chemical database is a dictionary of over 400,000 chemicals (names, synonyms, and structures). ChemIDplus includes links to NLM and other databases and resources, including links to federal, state and international agencies. ChemIDplus Lite is designed for simple searching on name or registry. ChemIDplus Advanced helps users draw their own structures and perform similarity and substructure searches.

**Updates:** ChemIDplus records are updated daily.

**Did you know**

**How do I lease/license the TOXNET databases?**

The following TOXNET databases are available for lease: ChemIDplus, DIRLINE, CCRIS, GENE-TOX, HSDB, and TOXLINE.

For further information visit [Leasing Data from the National Library of Medicine](#).

[More FAQs](#)

**Environmental Health & Toxicology**

Resources on environmental health and toxicology

[Visit Site](#)

[chem.sis.nlm.nih.gov/chemidplus/chemidlite.jsp](http://chem.sis.nlm.nih.gov/chemidplus/chemidlite.jsp)

## Content

Information in the ChemIDplus database includes:

- ▶ Systematic, generic, and trade names
- ▶ Synonyms
- ▶ Chemical Abstract Service (CAS) Registry Numbers
- ▶ Molecular formulas
- ▶ Classification codes
- ▶ Chemical structures (ChemIDplus Advanced)

## Searching ChemIDplus

Search ChemIDplus by name, synonym, CAS Registry Number, molecular formula, classification code, locator code, structure, toxicity, and/or physical properties within two distinct applications:

- ▶ **ChemIDplus Lite** (ChemIDplus homepage) is designed for simple searching on name or registry number to retrieve basic information about a chemical and provide locator links to other resources. It does not require special software applets or plugins. The Lite version displays structures, but does not allow drawing or searching on structures.

The screenshot displays the ChemIDplus website interface. At the top, there is a navigation bar with the NIH logo and the text "U.S. National Library of Medicine" and "TOXNET TOXICOLOGY DATA NETWORK". Below this, there are links for "Help", "FAQs", "TOXNET Fact Sheet", and "Training Manual & Schedule". The main content area features a search bar with a "Search" button and instructions: "Synonym (e.g. formaldehyde) or Registry Number (e.g. 50-00-0)" and "Multiple synonyms or registry numbers can be concatenated with pipes (e.g. 50-00-0|50-01-1|50-02-2)". There are three tabs: "SEARCH ChemIDplus", "BROWSE ChemIDplus", and "ADVANCED SEARCH". To the right, a "Support" section lists "Resources" (Help, Fact Sheet, Sample Record, TOXNET FAQ) and "Contact Us" (Email: tehip@tehl.nlm.nih.gov, Telephone: (301) 496-1131, Fax: (301) 480-3537). Below the search bar, there are two informational sections: "About ChemIDplus" and "Did you know". The "About ChemIDplus" section explains that the database is a dictionary of over 400,000 chemicals and includes links to NLM and other databases. The "Did you know" section lists available TOXNET databases for lease: ChemIDplus, DIRLINE, CCRIS, GENE-TOX, HSDB, and TOXLINE. At the bottom right, there is a banner for "Environmental Health & Toxicology" with a "Visit Site" button.

- **ChemIDplus Advanced** (see below) is designed for more advanced searching on any combination of name, registry number, molecular formula, classification code, locator code, toxicity, physical property, structure, or molecular weight. In addition, ChemIDplus Advanced allows users to draw their own structures and perform similarity and substructure searches.

The screenshot shows the ChemIDplus Advanced search interface. At the top, there is a navigation bar with the NIH logo, U.S. National Library of Medicine, TOXNET TOXICOLOGY DATA NETWORK, and links for Help, FAQs, TOXNET Fact Sheet, and Training Manual & Schedule. Below this is a breadcrumb trail: TOXNET Home > ChemIDplus Lite - Browse ChemIDplus - ChemIDplus Advanced. The main header includes a molecular structure icon, the ChemIDplus logo, and a search bar with buttons for Search, Clear, History, and Help. The search results are displayed as 'Display 5 results'.

The search interface is divided into several sections, each with a callout box explaining its function:

- Substance Identification:** Callout: "Enter basic search term". Fields include Name/Synonym, Equals, and a search input field. Note: "Data is available for 404,311 records."
- Toxicity:** Callout: "Qualify a toxicity search". Fields include Test (any), between, (mg/kg or ppm), Species (any), Route (any), and Effect (any). Note: "Toxicity data is available for 139,354 records."
- Physical Properties:** Callout: "Select and qualify a physical property". Fields include Melting Point, between, and Measurement Type. Note: "Physical property data is available for 25,461 records and was provided by Syracuse Research Corporation."
- Locator Codes:** Callout: "Qualify a search with specific 'locator' resources". Fields include (any), AND, and (any).
- Structure:** Callout: "Draw or import structures". Includes a Draw button, Powered by ChemAxon Marvin, Use: Marvin for JavaScript, and an Import MOL button.
- Structure Search Options:** Callout: "Select type of structure search". Options include Substructure Search, Similarity Search (80%), Exact (parent only), Flex (parent, salts, mixture), and Flexplus (parent, all variations). Note: "Structure data is available for 313,846 records."
- Molecular Weight:** Callout: "Search by molecular weight or range". Fields include between and a search input field. Note: "Molecular weight data is available for 313,846 records."

At the bottom of the search interface, there are buttons for Search, Clear, History, and Help, and a display of 'Display 5 results'.

## Search Results

The ChemIDplus Lite system displays the record with basic information for the chemical, including links to additional information. If multiple records were retrieved, a list of other names used for the chemical would be shown. Following is the ChemIDplus Lite record for diazepam. Use buttons on the left to retrieve categories of detailed information such as Names & Synonyms, Formulas, Classification Codes, Registry Numbers, and Notes. In the center of the page, lists of “locators” provide links to other resources in three categories:

- ▶ **File Locators**—point to a set of NLM-associated databases
- ▶ **Internet Locators**—point to a set of resources with biomedical data of interest for the chemical
- ▶ **Superlist Locators**—point to a set of regulatory and scientific lists that contain information about the chemical

### ChemIDplus Lite Record for Diazepam

**NAME: Diazepam [USAN:USP:INN:BAN:JAN]**  
**RN: 439-14-5**

For more information about this substance, you may select from the links below.

**Basic Information**

[Full Record](#)

[Names and Synonyms](#)

[Formulas](#)

[Classification Codes](#)

[Registry Numbers](#)

[Notes](#)

[Toxicity](#)

[Physical Properties](#)

**File Locator**

CCRS	<a href="#">NCI Chem Carcino Res Info Sys</a>
ClinicalTrials.gov	<a href="#">NIH ClinicalTrials.gov</a>
DART	<a href="#">Developmental and Reprod Tox.</a>
DailyMed	<a href="#">NLM/FDA Drug Labeling</a>
DrugPortal	<a href="#">NLM Drug Information Portal</a>
ENECS	<a href="#">EU Inv of Exist. Comm. Chem Sub</a>
EMIC	<a href="#">Env. Mutagen Info. Center</a>
GENETOX	<a href="#">EPA GENetic TOXicology</a>
HSDB	<a href="#">Hazardous Substances Data Bank</a>
LactMed	<a href="#">Drugs and Lactation Database</a>
LiverTox	<a href="#">Information on Drug-induced Liver Injury</a>
MeSH	<a href="#">Medical Subject Headings File</a>
MeSH Heading	<a href="#">Medical Subject Headings</a>
MedlinePlusAll	<a href="#">Search Consumer Health Info</a>
MedlinePlusDrug	<a href="#">Consumer Drug Information</a>
Pubbox	<a href="#">Drug Identification and Image Display</a>
PubChem	<a href="#">PubChem</a>
PubMed	<a href="#">Biomedical Citations From PubMed</a>
PubMed AIDS	<a href="#">AIDS Citations from PubMed</a>
PubMed Cancer	<a href="#">Cancer Citations from PubMed</a>
PubMed Health	<a href="#">PubMed Health</a>
PubMed Toxicology	<a href="#">Toxicology Citations From PubMed</a>
RTECS	<a href="#">Reg. of Toxic Eff. of Chem. Sub.</a>
TOXLINE	<a href="#">NLM TOXLINE on TOXNET</a>

**Internet Locator**

CAMEO	<a href="#">NOAA CAMEO Chemicals</a>
CPOB	<a href="#">Carcinogenic Potency Database</a>
CTD	<a href="#">Comparative Toxicogenomics Database</a>
CNEBI	<a href="#">Chem Entities of Biological Interest</a>
DrugDigest	<a href="#">Drug Digest</a>
Drugs@FDA	<a href="#">FDA Drug Database</a>
EPA ACToR	<a href="#">EPA Aggregated Comp. Tox. Resource</a>
EPA Envirofacts	<a href="#">EPA Master Chemical Integrator</a>
EPA PHS	<a href="#">EPA Pest. Prod. Info. System</a>
EPA SRS	<a href="#">EPA Substance Registry System</a>
NIAD ChemDB	<a href="#">NIAD Chemical Database</a>
NIST WebBook	<a href="#">NIST Chemistry WebBook</a>
NJ-HSFS	<a href="#">New Jersey Haz. Sub. Fact Sheets</a>
NTP DBS	<a href="#">NTP Database Search</a>
SRC DATALOG	<a href="#">Syracuse Res. Corp. DATALOG</a>
USA.gov	<a href="#">USA.gov Search Engine</a>

**Superlist Locator**

CA65	<a href="#">California Proposition 65 List</a>
DEA	<a href="#">DEA Controlled Substances</a>
DSL	<a href="#">Domestic Sub. List of Canada</a>
IARC	<a href="#">Int. Agency for Res. on Cancer</a>
MA	<a href="#">Massachusetts Right-to-know Sub.</a>
TSCAINV	<a href="#">EPA Chem. Sub. Inventory</a>

Search Navigation

[Main Query Page](#)

**Other names used for chemical** (points to Names and Synonyms)

**Links to PubMed articles** (points to PubMed, PubMed AIDS, PubMed Cancer, PubMed Health, PubMed Toxicology)

**Internet Locators** (points to Internet Locator section)

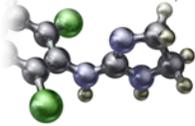
**Superlist Locators** (points to Superlist Locator section)

**File Locators** (points to File Locator section)

By default, the ChemIDplus Advanced record shows the full record with all information displayed. You can use the tabs to limit information to just show Classifications, Links to Resources, Names & Synonyms, Registry Numbers, Structure Descriptors, Toxicity, or Physical Properties.

### ChemIDplus Advanced Record, Full Record View for Diazepam

TOXNET Home > ChemIDplus Lite · Browse ChemIDplus · **ChemIDplus Advanced**



Start New Query   Modify Query   Search History   Show Query

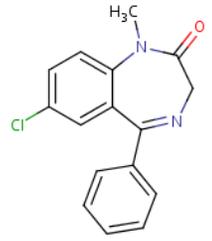
Switch to Summary View

**Substance Name: Diazepam [USAN:USP:INN:BAN:JAN]**  
 RN: 439-14-5  
 InChIKey: AAOVKJBEBIDNHE-UHFFFAOYSA-N

**Note**  
 ⓘ A benzodiazepine with anticonvulsant, anxiolytic, sedative, muscle relaxant, and amnesic properties and a long duration of action. Its actions are mediated by enhancement of GAMMA-AMINO BUTYRIC ACID activity.

**Molecular Formula**  
 ⓘ C<sub>16</sub>H<sub>13</sub>ClN<sub>2</sub>O

**Molecular Weight**  
 284.7447



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 Na +  
 🔍  
 3D

All   Classifications   Links to Resources   Names & Synonyms   Registry Numbers   Structure Descriptors   Toxicity   Physical Properties

**Classification Codes** ↔

**Classification Codes**

ⓘ Adjuvants, anesthesia	ⓘ Autonomic Agents	ⓘ Human Data	ⓘ Psychotropic Drugs
ⓘ Anesthetics	ⓘ Central Nervous System Agents	ⓘ Hypnotics and Sedatives	ⓘ Reproductive Effect
ⓘ Anesthetics, General	ⓘ Central Nervous System Depressants	ⓘ Muscle relaxants, central	ⓘ Sedative-hypnotic
ⓘ Anesthetics, intravenous	ⓘ Drug / Therapeutic Agent	ⓘ Mutation data	ⓘ Tranquillizing Agents
ⓘ Anti-anxiety agents	ⓘ GABA Agents	ⓘ Neuromuscular Agents	ⓘ Tumor data
ⓘ Anticonvulsants	ⓘ GABA modulators	ⓘ Neurotransmitter Agents	
ⓘ Antiemetics	ⓘ Gastrointestinal Agents	ⓘ Peripheral Nervous System Agents	

**Superlist Classification Codes**

ⓘ DEA Schedule IV	ⓘ Overall Carcinogenic Evaluation: Group 3
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**Links to Resources** ↔

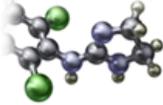
**NLM Resources (File Locators)**

ⓘ CCRIS	ⓘ EMIC	ⓘ MeSH Heading	ⓘ PubMed Toxicology
ⓘ ClinicalTrials.gov	ⓘ GENETOX	ⓘ Pillbox	ⓘ RTECS
ⓘ DailyMed	ⓘ HSDB	ⓘ PubChem	ⓘ TOXLINE
ⓘ DART	ⓘ LactMed	ⓘ PubMed	ⓘ PubMed Health

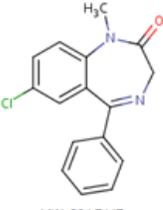
Clicking the **Switch to Summary View** button at the top of the record will display a summary of the record. This view shows the same locator lists and basic information as the ChemIDplus Lite record, with the addition of structures including structure navigation buttons.

## ChemIDplus Advanced Record, Summary View for Diazepam

TOXNET Home > ChemIDplus Lite · Browse ChemIDplus · **ChemIDplus Advanced**



**NAME:** Diazepam [USAN:USP:INN:BAN:JAN]  
**RN:** 439-14-5



MW: 284.7447

For more information about this substance, you may select from the links below.

**File Locator**

CCRIS	<a href="#">NCI Chem Carcino Res Info Sys</a>
ClinicalTrials.gov	<a href="#">NIH ClinicalTrials.gov</a>
DART	<a href="#">Developmental and Reprod.Tox.</a>
DailyMed	<a href="#">NLM/FDA Drug Labelling</a>
DrugPortal	<a href="#">NLM Drug Information Portal</a>
EINECS	<a href="#">EU Inv of Exist. Comm. Chem Sub</a>
EMIC	<a href="#">Env. Mutagen Info. Center</a>
GENETOX	<a href="#">EPA GENetic TOXicology</a>
HSDB	<a href="#">Hazardous Substances Data Bank</a>
LactMed	<a href="#">Drugs and Lactation Database</a>
LiverTox	<a href="#">Information on Drug-Induced Liver Injury</a>
MeSH	<a href="#">Medical Subject Headings File</a>
MeSH Heading	<a href="#">Medical Subject Headings</a>
MedlinePlusAll	<a href="#">Search Consumer Health Info</a>
MedlinePlusDrug	<a href="#">Consumer Drug Information</a>
Pillbox	<a href="#">Drug Identification and Image Display</a>
PubChem	<a href="#">PubChem</a>
PubMed	<a href="#">Biomedical Citations From PubMed</a>
PubMed AIDS	<a href="#">AIDS Citations from PubMed</a>

**Basic Information**

- Switch to Full Record View
- Structure
- Names and Synonyms
- Formulas
- Classification Codes
- Registry Numbers
- Notes
- Toxicity
- Physical Properties

**Search Navigation**

- Start New Query
- Modify Query
- Show Query
- Search History

Click to enlarge 2D or 3D and manipulate structure

## Additional Resources

For further information, review these additional resources:

- ▶ ChemIDplus Fact Sheet  
[nlm.nih.gov/pubs/factsheets/chemidplusfs.html](http://nlm.nih.gov/pubs/factsheets/chemidplusfs.html)
- ▶ ChemIDplus Help  
[chem.sis.nlm.nih.gov/chemidplus/html/help.jsp](http://chem.sis.nlm.nih.gov/chemidplus/html/help.jsp)

## ChemIDplus Search Exercises

 Go to [toxnet.nlm.nih.gov](http://toxnet.nlm.nih.gov).

 Click ChemIDplus.

**Exercise 1: Use ChemIDplus to answer the following questions about trifluralin.**

### 1a. What is trifluralin and what is it used for?

Suggested Solution:

Type **trifluralin** in the Search box

Click **Search**

Click the **Notes** button to the left

Review the information provided for a definition and uses of trifluralin

Scroll to the top and click the **Close (Return to Summary View)** button

### 1b. How many PubMed citations do you retrieve?

Suggested Solution (continued):

Review the other NLM databases under File Locator that contain information on the chemical

Click the **PubMed** link

Note the number of results returned on PubMed

Close the **PubMed** tab to return to ChemIDplus

### 1c. Do any household products contain trifluralin?

Suggested Solution (continued):

Click the **Household Products** link

Review the information provided to determine if any household products contain this ingredient

Close the **Household Products Database** tab to return to ChemIDplus

**1d. Do any US companies still produce herbicides that contain trifluralin?**

Suggested Solution (continued):

- Select **EPA PPIS** in the Internet Locator section
- Select **About Us > Search PPIS** in the navigation bar at the top of the page
- Type **trifluralin** in the Active Ingredient field
- Click **Search PPIS**
- Review the information provided to determine if any US companies still produce herbicides containing trifluralin
- Close the tab and return to ChemIDplus

**1e. Is trifluralin on the EPA Clean Air List (CAA1)?**

Suggested Solution (continued):

- Click **CAA1** under Superlist Locator
- Review the toxicology information provided by EPA
- Close the tab and return to ChemIDplus

**1f. Where can you find the full list of original air pollutants from EPA?**

Suggested Solution (continued):

- Click the **i** button () next to **EPA Toxic Air Pollutants** (CAA1)
-  As part of the Clean Air Act, EPA provides data on toxic air pollutants.
- Click the link in the pop-up window to access the full list of the original air pollutants from EPA
- Close the pop-up window
- Scroll to the top of the page
- Click the **Main Query Page** button at the right to prepare for a new search

**Exercise 2: Use the Browse feature to research chemicals that start with "hexachloro."****2a. How many results are found for names that begin with "hexachloro?"**

Suggested Solution:

- Select the **BROWSE ChemIDplus** tab at the top of the ChemIDplus homepage
- Select **Name** from the Browse drop-down menu

- Type **hexachloro** in the starts with text field
- Review the results to determine the number of names that begin with "hexachloro"

**2b. What is hexachlorodiphenyl ether used for? What are the adverse effects in animals and humans? What are the occupational exposure assessment values?**

Suggested Solution (continued):

- Select **hexachlorod** in the search results
- Select **hexachlorodiphenyl ether**
- Click the **Haz-Map** link under NLM Resources (File Locators)
- Use the information in Haz-Map to determine the use of this chemical, any adverse effects in animals and humans, and the occupational exposure assessment values
- Close the Haz-Map tab or window

**Exercise 3: Find the xylene record in ChemIDplus and use its structure to do substructure and 70% similarity searches, respectively. How many structures are in each category?**

Suggested Solution:

- Click the **ChemIDplus Advanced** tab
- Type **xylene** in the Substance Identification search box
- Click **Search** and review the information retrieved
- Click the **Transfer Structure** button () at the right
- Select the **Substructure Search** radio button in the Structure box to the right
- Click **Search**
- Review the results obtained, making note of the number of results
- Click the **Modify Query** button to the left of the search results
- Select **70%** from the Similarity Search drop-down menu under Structure Search Options on the right side of the page
- Click **Search** and review the information retrieved

## Scenario – Research Data

Dr. Stein is conducting research and has a need to examine the toxic effects of chemicals produced in high volumes in mice. Dr. Stein would like to focus on extremely toxic chemicals and chemicals with occupational health data available.

**Search ChemIDplus Advanced to form a list of chemicals and view some of the effects listed in literature. Enter toxicity criteria for extremely toxic chemicals. Qualify the type of chemical by using Locator Codes. View the effects in the toxicity table.**

Suggested Solution:

- Click the **Advanced Search** tab
- Select **LD50** from the Test drop-down menu under the **Toxicity** input area
- Select **less than** from the second drop-down menu beside **Test**
- Type **50** in the (mg/kg or ppm) box under **Test**
- Select **mouse** from the Species: drop-down menu
- Select **oral** from the Route: drop-down menu
- Select **EPA HPVIS** from the first drop-down menu under the **Locator Codes** search box
-  The EPA HPVIS locator is the resource for High Production Volume Chemical Information System from the US Environmental Protection Agency (EPA).
- Select **AND** from the second drop-down menu under **Locator Codes**
- Select **Haz-Map** from the last drop-down menu under **Locator Codes**
- Click **Search** and view the list of results
- Select a record to confirm search criteria
-  Search terms are in a red font in the Toxicity table and **Haz-Map** is listed under the **NLM Resources (File Locators)**.
- Click the **Toxicity** tab at the top of the page
- View the **Effect** column

## Hazardous Substance Database (HSDB<sup>®</sup>)

**HSDB** (Hazardous Substances Data Bank) contains comprehensive toxicology data on more than 5,000 chemicals, organized into individual records. The average record is about 25 printed pages. Content is peer-reviewed by the Scientific Review Panel, a committee of experts in the major subject areas within the data bank's scope. HSDB is enhanced with information on human exposure, industrial hygiene, emergency handling procedures, environmental fate, regulatory requirements, and related areas.

The screenshot displays the HSDB website interface. At the top, the NIH logo and 'U.S. National Library of Medicine' are on the left, and 'TOXNET TOXICOLOGY DATA NETWORK' is in the center. Navigation links for 'Mobile', 'Help', 'FAQs', 'TOXNET Fact Sheet', and 'Training Manual & Schedule' are on the right. Below the header, the breadcrumb 'TOXNET Home > HSDB' and a 'Share' button are visible. The main content area features a search bar with the example text 'e.g. benzene, endocrine disruptor' and a 'Search' button. Below the search bar are dropdown menus for 'Search Term' (set to 'singular/plural') and 'Records with' (set to 'all of the words'), along with a checked checkbox for 'Include Synonyms and CAS Numbers in Search'. To the right of the search area is a 'Support' section with links for 'Resources' (Help, Fact Sheet, Sample Record, Recent Updates, HSDB Scientific Review Panel, List of Chemicals in HSDB, TOXNET FAQ) and 'Contact Us' (Email: tehip@tehl.nlm.nih.gov, Telephone: (301) 496-1131, Fax: (301) 480-3537). Below the search area are two informational boxes: 'About HSDB' which describes the database's focus on toxicology and provides update information, and 'Did you know' which offers information on leasing TOXNET databases and provides a link to 'More FAQs'. At the bottom right, there is a banner for 'Environmental Health & Toxicology' with a 'Visit Site' button.

[toxnet.nlm.nih.gov/newtoxnet/hsdb.htm](http://toxnet.nlm.nih.gov/newtoxnet/hsdb.htm)

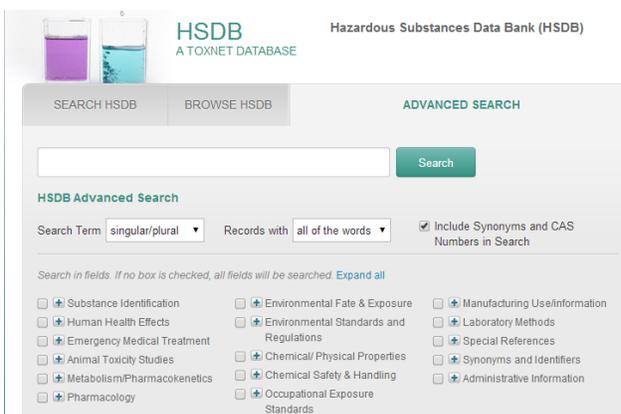
### Searching HSDB

Search HSDB by chemical or other name, chemical name fragment, Chemical Abstracts Service (CAS) Registry Number, and/or subject terms (basic searching). By default, the system searches for synonyms and CAS numbers of chemicals.

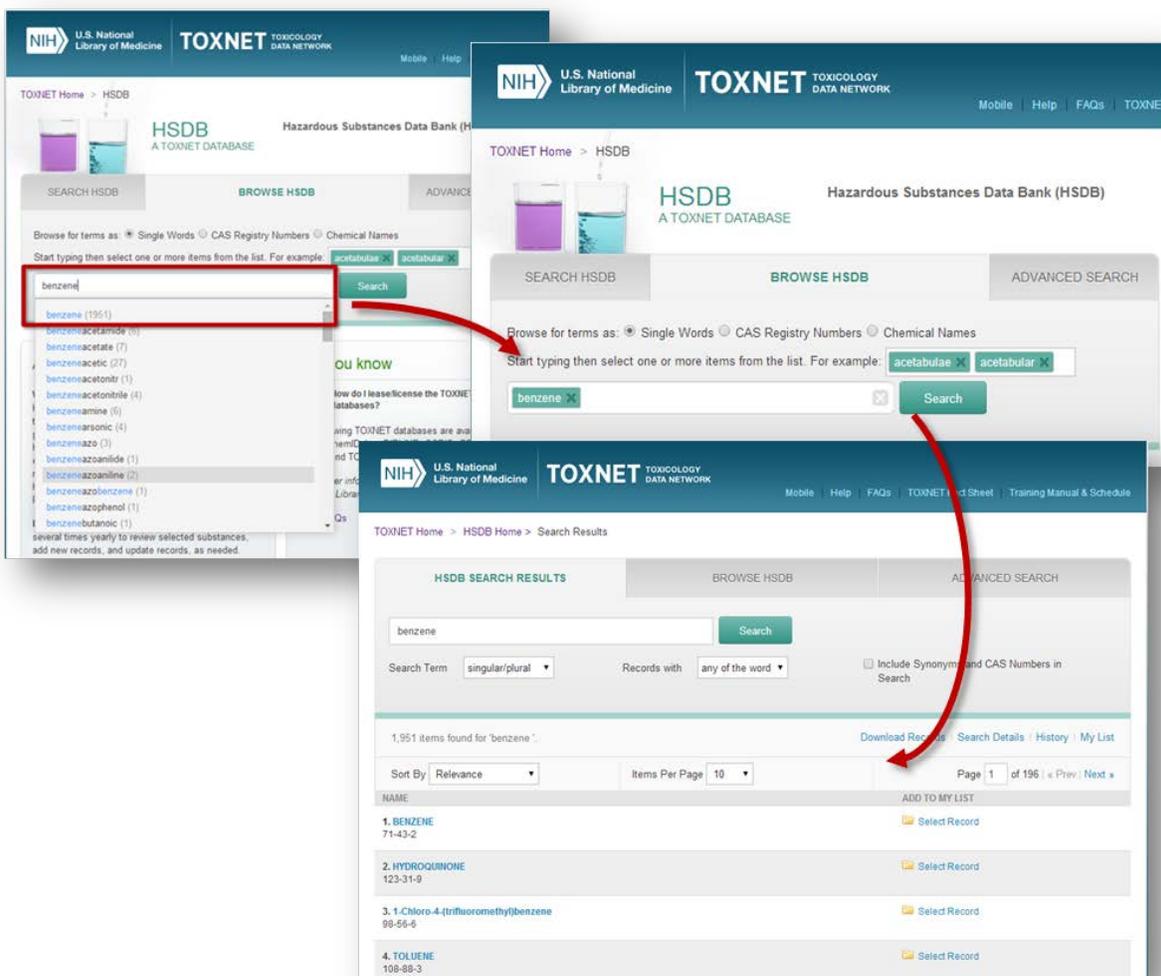
Use truncation (\*), Boolean operators (AND, OR, NOT), phrase searching, nested parentheses, limits, and index browsing to refine the search results.

Click the **Advanced Search** tab to search:

- ▶ Exact words, singular and plural forms, or word variants
- ▶ All the words, any of the words, or as a phrase
- ▶ In specific fields or categories of fields (see "HSDB Search Fields" in this section)



Click the **Browse HSDB** tab to search a list of index terms related to the search term entered and the number of records containing that term. Select the record(s) to be viewed by clicking the appropriate term in the drop-down list and clicking **Search**.



## Search Results

The initial retrieval is displayed as a list of substance names in blue and their CAS Registry Numbers<sup>®</sup>. Substances are listed in **relevancy ranked order**. Relevancy ranking is based on the number of individual search terms occurring in a document, the number of times each search term occurs in a document, the rarity of the search terms within the database, and the nearness of search terms to each other. Records containing combinations of search terms tend to be ranked higher than records with isolated occurrences of search terms.

When searching for a chemical, the initial matching chemical record (the **Primary Record**) may be followed by additional chemical records that contain the chemical name or search term entered.

The screenshot displays the TOXNET search results for 'benzene'. The search results are sorted by Relevance, showing 1,957 items found. The first result is highlighted as the Primary Record, and the following five results are highlighted as Additional Chemical Records.

NAME	ADD TO MY LIST
The following is the primary record for the chemical. All of the query terms were found.	
1. BENZENE 71-43-2	Select Record
The following 1956 records contain one or more of the requested chemical name(s) and all of the query terms anywhere in the record.	
2. ALPHA-METHYL STYRENE 98-83-9	Select Record
3. HYDROQUINONE 123-31-9	Select Record
4. 2,4,6-TRINITROTOLUENE 118-96-7	Select Record
5. o-Phenylphenol 90-43-7	Select Record

If the primary record is selected, the system displays the **Human Health Effects**. An additional chemical record, or if the search was for a term other than a chemical, the system will display the sections of the record best matching the query terms (**Closest Match to Search Terms**), those where the chemical search term(s) appears with greatest frequency.

Click on a substance name on the search results screen to retrieve the record for that substance. The **Record** screen is organized into three sections:

1. Navigation buttons at the top of the record allow you to **View record in another database** (NLM databases), **Download Record**, **Print** the record, **Select Record** (adding it to your list), and view your list of selected records (**My List**).
2. A **Table of Contents** in the left frame allows users to choose categories and fields for display.
3. Chemical data is shown in the right frame. Search term(s) are highlighted in yellow.

## Primary Record

The screenshot shows the TOXNET record for Benzene (CASRN: 71-43-2). The interface includes a search bar at the top with 'benzene' entered and a 'Search' button. Below the search bar are navigation links for 'Search Details', 'History', and 'Previous Record' / 'Next Record'. The main record area is titled 'HSDDB: BENZENE' and includes a 'View record in another database' dropdown menu (annotated with a red box and '1'), 'Download this Record', 'Print', 'Select Record', and 'My List' buttons. On the left, a 'TABLE OF CONTENTS' sidebar (annotated with a red box and '2') lists various categories such as 'Overview', 'Human Health Effects', and 'Environmental Fate & Exposure'. The main content area (annotated with a red box and '3') displays the chemical name 'BENZENE', its CASRN, and a chemical structure. Below this is the 'FULL RECORD DISPLAY' section, which includes an 'Overview' and 'IDENTIFICATION' section. The text in the 'Overview' and 'IDENTIFICATION' sections has 'Benzene' highlighted in yellow (annotated with a red box and '3'). A callout box with a red border and white text says 'Search terms are bolded and highlighted in yellow' with an arrow pointing to the highlighted text.

## Additional Chemical Record

Search Details | History « Previous Record | Next Record »

**HSDB: HYDROQUINONE** CASRN: 123-31-9 This record appears in multiple databases.

View record in another database:  [Download this Record](#) [Print](#) [Select Record](#) [My List](#)

**TABLE OF CONTENTS**

[Show Selected Items](#) [Clear](#) Expand all  
Collapse all

[Closest Match to Search Terms](#)

[Full Record](#)

[Human Health Effects](#)

[Emergency Medical Treatment](#)

[Animal Toxicity Studies](#)

[Metabolism/ Pharmacokinetics](#)

[Pharmacology](#)

[Environmental Fate & Exposure](#)

[Environmental Standards & Regulations](#)

[Chemical/Physical Properties](#)

[Chemical Safety & Handling](#)

[Occupational Exposure Standards](#)

[Manufacturing/Use Information](#)

[Laboratory Methods](#)

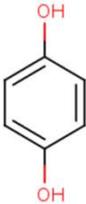
[Special References](#)

[Synonyms and Identifiers](#)

[Administrative Information](#)

[Show Selected Items](#) [Clear](#)

**HYDROQUINONE**  
CASRN: 123-31-9



**FULL RECORD DISPLAY**  
*Displays all fields in the record.  
For other data, click on the Table of Contents*

**Human Health Effects:**

**Toxicity Summary:**

Hydroquinone (HQ) is a high-volume commodity chemical used as a reducing agent, antioxidant, polymerization inhibitor, and chemical intermediate. It is also used in over-the-counter (OTC) drugs as an ingredient in skin lighteners and is a natural ingredient in many plant-derived products, including vegetables, fruits, grains, coffee, tea, beer, and wine. While there are few reports of adverse health effects associated with the production and use of HQ, a great deal of research has been conducted with HQ because it is a metabolite of **benzene**. Physicochemical differences between HQ and **benzene** play a significant role in altering the pharmacokinetics of HQ directly administered when compared with **benzene**-derived HQ. HQ is only weakly positive in in vivo chromosomal assays when expected human exposure routes are used. Chromosomal effects are increased significantly when parenteral or in vitro assays are used. In cancer bioassays, HQ has reproducibly produced renal adenomas in male F344 rats. The mechanism of tumorigenesis is unclear but probably involves oxidative stress and DNA damage.

## Additional Resources

For further information, review these additional resources:

- ▶ HSDB Skill Kit  
[nlm.nih.gov/pubs/techbull/ma07/ma07\\_hsdbskillkit.html](http://nlm.nih.gov/pubs/techbull/ma07/ma07_hsdbskillkit.html)
- ▶ HSDB Animated Tutorial  
[sis.nlm.nih.gov/enviro/captivate/basicsearchinghsdb\\_skin.swf](http://sis.nlm.nih.gov/enviro/captivate/basicsearchinghsdb_skin.swf)
- ▶ TOXNET Help Text – HSDB  
[toxnet.nlm.nih.gov/help/HSDBhelp.htm](http://toxnet.nlm.nih.gov/help/HSDBhelp.htm)

## HSDB® Search Fields

The Advanced Search tab allows users to specify a particular field or category of fields to search. By default, the system will search all fields in all categories. To see all fields within a specific category, click the "+" beside that category.

**Search fields in specific categories**

**Expand all categories**

**HSDDB Advanced Search**

Search Term:  Records with:   Include Synonyms and CAS Numbers in Search

Search in fields. If no box is checked, all fields will be searched. [Expand all](#)

<input type="checkbox"/> Overview	<input type="checkbox"/> Environmental Fate & Exposure	<input type="checkbox"/> Manufacturing Use/Information
<input type="checkbox"/> Substance Identification	<input type="checkbox"/> Environmental Standards and Regulations	<input type="checkbox"/> Laboratory Methods
<input type="checkbox"/> Human Health Effects	<input type="checkbox"/> Chemical/ Physical Properties	<input type="checkbox"/> Special References
<input type="checkbox"/> Emergency Medical Treatment	<input type="checkbox"/> Chemical Safety & Handling	<input type="checkbox"/> Synonyms and Identifiers
<input type="checkbox"/> Animal Toxicity Studies	<input type="checkbox"/> Occupational Exposure Standards	<input type="checkbox"/> Administrative Information
<input type="checkbox"/> Metabolism/Pharmacokinetics		
<input type="checkbox"/> Pharmacology		

## Expanded Categories (All Fields)

### Substance Identification

- Chemical Names
- CAS Registry Number
- Overview

### Human Health Effects

- Toxicity Summary
- Evidence for Carcinogenicity
- Human Toxicity Excerpts
- Human Toxicity Values
- Skin, Eye, and Respiratory Irritations
- Drug Warnings
- Medical Surveillance
- Populations at Special Risk
- Probable Routes of Human Exposure
- Body Burden
- Average Daily Intake
- Reported Fatal Dose

### Emergency Medical Treatment

- Emergency Medical Treatment
- Antidote and Emergency Treatment

### Animal Toxicity Studies

- Toxicity Summary

- Evidence for Carcinogenicity
- Non-Human Toxicity Excerpts
- Ecotoxicity Excerpts
- National Toxicology Program Studies
- Non-Human Toxicity Values
- Ecotoxicity Values
- Ongoing Test Status
- TSCA Test Submissions

### Metabolism/Pharmacokinetics

- Metabolism/Metabolites
- Absorption, Distribution & Excretion
- Biological Half-Life
- Mechanism of Action
- Interactions

### Pharmacology

- Therapeutic Uses
- Drug Warnings
- Interactions
- Drug Idiosyncrasies
- Drug Tolerance
- Reported Fatal Dose
- Maximum Drug Dose
- Biorecessity

## Environmental Fate & Exposure

-  Environmental Fate/Exposure Summary
-  Probable Routes of Human Exposure
-  Body Burden
-  Average Daily Intake
-  Natural Pollution Sources
-  Artificial Pollution Sources
-  Environmental Fate
-  Environmental Biodegradation
-  Environmental Abiotic Degradation
-  Environmental Bioconcentration
-  Soil Adsorption/Mobility
-  Volatilization from Water/Soil
-  Environmental Water Concentrations
-  Effluent Concentrations
-  Sediment/Soil Concentrations
-  Atmospheric Concentrations
-  Food Survey Values
-  Plant Concentrations
-  Fish/Seafood Concentrations
-  Animal Concentrations
-  Milk Concentrations
-  Other Environmental Concentrations

## Environmental Standards & Regulations

-  FIFRA Requirements
-  Acceptable Daily Intakes
-  TSCA Requirements
-  CERCLA Reportable Quantities
-  RCRA Requirements
-  Atmospheric Standards
-  Clean Water Act Requirements
-  Federal Drinking Water Standards
-  Federal Drinking Water Guidelines
-  State Drinking Water Standards
-  State Drinking Water Guidelines
-  Soil Standards
-  FDA Requirements
-  Allowable Tolerances

## Chemical/Physical Properties

-  Molecular Formula
-  Molecular Weight
-  Color/Form
-  Odor

-  Taste
-  Boiling Point
-  Melting Point
-  Corrosivity
-  Critical Temperature & Pressure
-  Density/Specific Gravity
-  Dissociation Constants
-  Heat of Combustion
-  Heat of Vaporization
-  Octanol/Water Partition Coefficient
-  pH
-  Solubilities
-  Spectral Properties
-  Surface Tension
-  Vapor Density
-  Vapor Pressure
-  Relative Evaporation Rate
-  Viscosity
-  Other Chemical/Physical Properties

## Chemical Safety & Handling

-  Hazards Summary
-  DOT Emergency Guidelines
-  Globally Harmonized System (GHS)
-  Odor Threshold
-  Skin, Eye and Respiratory Irritations
-  Fire Potential
-  NFPA Hazard Classification
-  Flammable Limits
-  Flash Point
-  Autoignition Temperature
-  Fire Fighting Procedures
-  Toxic Combustion Products
-  Firefighting Hazards
-  Explosive Limits & Potential
-  Hazardous Reactivities & Incompatibilities
-  Hazardous Decomposition
-  Hazardous Polymerization
-  Other Hazardous Reaction
-  Immediately Dangerous to Life or Health
-  Protective Equipment & Clothing
-  Preventive Measures
-  Stability/Shelf Life
-  Shipment Methods and Regulations
-  Storage Conditions
-  Cleanup Methods
-  Disposal Methods

-  Radiation Limits & Potential
-  **Occupational Exposure Standards**
  -  OSHA Standards
  -  Threshold Limit Values
  -  NIOSH Recommendations
  -  Immediately Dangerous to Life or Health
  -  Other Standards Regulations and Guidelines
-  **Manufacturing Use/Information**
  -  Major Uses
  -  Manufacturers
  -  Methods of Manufacturing
  -  General Manufacturing Information
  -  Formulations/Preparations
  -  Impurities
  -  Consumption Patterns
  -  U. S. Production
  -  U. S. Import
  -  U. S. Exports
-  **Laboratory Methods**
  -  Clinical Laboratory Methods
-  Analytic Laboratory Methods
  -  Sampling Procedures
-  **Special References**
  -  Special Reports
  -  History and Incidents
-  **Synonyms and Identifiers**
  -  Related HSDB Records
  -  Synonyms
  -  Associated Chemicals
  -  Formulations/Preparations
  -  Shipping Name/Number  
DOT/UN/NA/IMO
  -  Standard Transportation Number
  -  EPA Hazardous Waste Number
  -  Wiswesser Line Notation
  -  RTECS Number
-  **Administrative Information**
  -  Hazardous Substances Databank  
Number
  -  Last Review Date

## HSDB Search Exercises

### Exercises



Go to [toxnet.nlm.nih.gov](http://toxnet.nlm.nih.gov).



Click **HSDB**.

### Exercise 1: What are the concerns of bisphenol A residue in baby bottles?

Suggested Solution:

Type **bisphenol a baby bottles** in the [Search](#) box

Click **Search**

Click **BISPHENOL A**

Click **Closest Match to Search Terms** in the [Table of Contents](#)

Review the **Closest Match to Search Terms** information in the right frame

Click **HSDB Home** at the top of the page to prepare for the next search

### Exercise 2: What is the average daily intake of mercury?

Suggested Solution:

Type **mercury** in the [Search](#) box

Click **Search**

Click **MERCURY COMPOUNDS**

Review the **Toxicity Summary** information at the beginning of the record for an overview of the substance.

Click the + next to **Human Health Effects** in the [Table of Contents](#)

Click **Average Daily Intake**

Review the information retrieved

Click **HSDB Home** at the top of the page to prepare for the next search

### Exercise 3: Using the CAS Registry Number 298-00-0, identify the name of the chemical and find information on the occurrence and activity in soil.

Suggested Solution:

- Type **298-00-0** in the [Search](#) box
- Click **Search**
- Click **METHYL PARATHION**
- Click the **Environmental Fate & Exposure** link in the [Table of Contents](#)
- Review the Summary for soil information

### Scenario 1 – Regulatory Information

A health and science news reporter is writing an article related to workers in the lead compounds manufacturing industry. The reporter uses HSDB to obtain some regulatory information on occupational exposure.

**Search HSDB to find the Permissible Exposure Limit (PEL), Time Weighted Average (TWA), and NIOSH recommended worker blood level. What level is considered immediately dangerous to life or health (IDLH) by NOISH?**

Suggested Solution:

- Type **lead** in the [Search](#) box
- Click **Search**
- Click **LEAD COMPOUNDS** in the [Search Results](#) list
- Click **Occupational Exposure Standards** in the [Table of Contents](#)
- Review the Permissible Exposure Limit, Time Weighted Average, NIOSH recommended worker blood levels, and the amount immediately dangerous to life or health.

### Scenario 2 – Chemical Toxicity / Testing

A researcher reads an FDA consumer update on Bisphenol A (BPA), a compound used in plastic food and beverage packaging, including baby bottles. The article states that “current evidence indicates that exposure levels to BPA from food contact materials...are below those that may cause health effects.” The researcher decides to take a look at completed and/or ongoing studies that may be included in the “current evidence.”

**Search HSDB to examine studies: Locate the Bisphenol A record. Open the Bisphenol A record. Navigate the table of contents to locate information on scientific testing and toxicity.**

Suggested Solution:

- |        |  |
|--------|--|
| Type   | <b>bisphenol a</b> in the <u>Search</u> box  |
| Click  | <b>Search</b>  |
| Click  | the primary record for <b>Bisphenol A</b>  |
| Scroll | through <b>Human Health Effects</b> to examine case reports, surveillance, biomonitoring, and in vitro tests |
| Click  | the + next to <b>Animal Toxicity Studies</b> to expand it (in the Table of Contents)                         |
| Click  | <b>National Toxicology Program Studies</b> and <b>Ongoing Test Status</b> to view NTP study results          |

### Scenario 3 – Environmental Fate & Exposure

An environmental scientist is interested in examining current information on how ethylene glycol behaves in the environment based on the chemical's physical properties.

**Search HSDB to find the information: Locate the ethylene glycol record in HSDB. Open the ethylene glycol record. Navigate the table of contents to locate the Environmental Fate & Exposure section.**

Suggested Solution:

- |   |   |
|---|---|
| Type  | <b>ethylene glycol</b> in the <u>Search</u> box   |
| Click   | <b>Search</b>   |
| Click   | the primary record for <b>Ethylene Glycol</b>   |
| Click   | <b>Environmental Fate &amp; Exposure</b> in the <u>Table of Contents</u>  |
|  | The Environmental Fate & Exposure Summary provides information on how a chemical behaves in air, soil, and water; routes of human occupational exposure; and more.  |
| Scroll  | through the <b>Summary</b> and other subsections  |
|  | Notice the physical properties provided to support statements within the summary (vapor pressure, octanol-water partition coefficient (Koc), and Henry's Law constant). Ethylene glycol is used in antifreeze and various other automotive and consumer products. |

## Scenario 4 – Advanced Search

A Department of Homeland Security employee is interested in finding out what chemical warfare agents have a record in HSDB.

**Search HSDB with advanced options: Pull up the HSDB Advanced Search tab. Limit the search to major uses under Manufacturing/Use Information. Enter the specified use query.**

Suggested Solution:

Return to the **HSDB Home**

Select the **Advanced Search** tab

Click the **+ icon** (⊕) to expand the Manufacturing Use/Information field

Click the box next to **Uses**

Type **chemical warfare** in the Search box

Select **exact words** from the Search Term drop-down menu

Select **the phrase** from the Records with drop-down menu

Click **Search**



Note: The results may contain chemicals used against chemical warfare agent exposure.

## Toxicology Literature Online (TOXLINE®)

**TOXLINE** (Toxicology Literature Online) is the National Library of Medicine® (NLM) bibliographic database for toxicology, providing information covering the biochemical, pharmacological, physiological, and toxicological effects of drugs and other chemicals. It contains more than 4 million bibliographic citations from the 1840s to the present, most with abstracts and/or indexing terms and Chemical Abstracts Service (CAS) Registry Numbers.

The screenshot displays the TOXLINE website interface. At the top, the NIH logo and 'U.S. National Library of Medicine' are on the left, and 'TOXNET TOXICOLOGY DATA NETWORK' is in the center. Navigation links for 'Mobile', 'Help', 'FAQs', 'TOXNET Fact Sheet', and 'Training Manual & Schedule' are on the right. Below the header, the breadcrumb 'TOXNET Home > TOXLINE' and a 'Share' button are visible. The main content area features a search bar with the placeholder text 'e.g. benzene, endocrine disruptor' and a 'Search' button. Below the search bar are dropdown menus for 'Search Term' (set to 'singular/plural') and 'Records with' (set to 'all of the words'). There are also two checked checkboxes: 'Include Synonyms and CAS Numbers in Search' and 'Include PubMed Records'. To the right of the search area is a 'Support' section with links for 'Resources', 'Help', 'Fact Sheet', 'Sample Record', 'Recent Updates', 'TOXNET FAQ', 'Importing Citations into Reference Manager', and 'Contact Us'. The 'Contact Us' section provides an email address (tehip@tehl.nlm.nih.gov), a telephone number (301) 496-1131, and a fax number (301) 480-3537. Below the search area are two informational boxes: 'About TOXLINE' and 'Did you know'. The 'About TOXLINE' box explains that TOXLINE is a bibliographic database with citations from specialized journals and other sources, covering biochemical, pharmacological, physiological, and toxicological effects. It notes that most citations contain abstracts and/or indexing terms and CAS Registry Numbers. The 'Years covered and Updates' section states that TOXLINE references date from the 1840s to the present and are added weekly. The 'Did you know' box asks 'How do I lease/license the TOXNET databases?' and lists available databases: ChemIDplus, DIRLINE, CCRIS, GENE-TOX, HSDB, and TOXLINE. It provides a link to 'Leasing Data from the National Library of Medicine' and a 'More FAQs' link. At the bottom right, there is a banner for 'Environmental Health & Toxicology' with a 'Visit Site' button and an image of a child holding a plant.

[toxnet.nlm.nih.gov/newtoxnet/toxline.htm](http://toxnet.nlm.nih.gov/newtoxnet/toxline.htm)

## TOXLINE Components

TOXLINE references come from various sources organized into components. These components are searched together but may be used to limit searches.

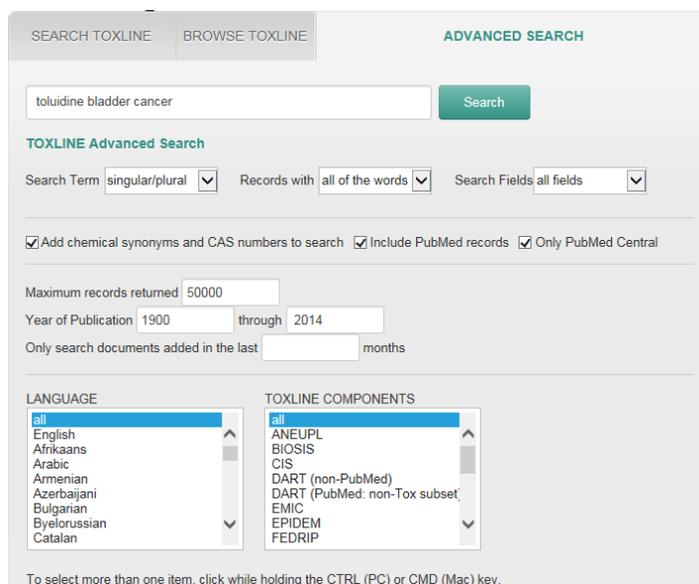
- ▶ **Standard Biomedical/Toxicology Journal Literature:**
  - MEDLINE®/PubMed®
- ▶ **Special Journal and Other Research Literature:**
  - Developmental and Reproductive Toxicology (DART®)
- ▶ **Technical Reports and Research Projects:**
  - NIH RePORTER (RePORTERTOx)
  - National Technical Information Service (NTIS)
- ▶ **Archival Collections (material is no longer being added to these components):**
  - Aneuploidy (ANEUPL)
  - Environmental Mutagen Information Center File (EMIC)
  - Environmental Teratology Information Center File (ETIC)
  - Epidemiology Information System (EPIDEM)
  - Federal Research in Progress (FEDRIP)
  - HEEP Abstracts on health effects of environmental pollutants
  - Hazardous Materials Technical Center (HMTc)
  - International Labour Office (CIS)
  - International Pharmaceutical Abstracts (IPA)
  - MTGABS Meeting Abstracts
  - NIOSHTIC (NIOSH)
  - Pesticides Abstracts (PESTAB)
  - Poisonous Plants Bibliography (PPBIB)
  - Swedish National Chemicals Inspectorate (RISKLINE or KEMI RISKLINE)
  - Toxic Substances Control Act Test Submissions (TSCATS)
  - Toxicological Aspects of Environmental Health (BIOSIS)

## Searching TOXLINE

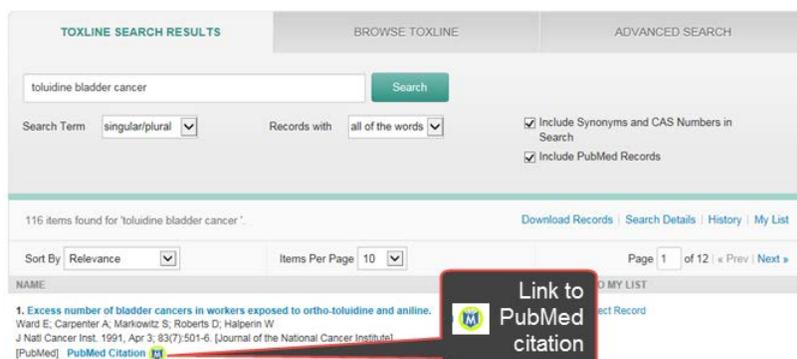
Any terms entered in the query box will be searched automatically against both the keyword and MeSH<sup>®</sup> fields, in addition to other fields such as title, abstract, and author. Chemical names are mapped to names, synonyms, and CAS Registry Numbers<sup>®</sup> derived from ChemIDplus<sup>®</sup>. Words such as **a**, **an**, **and**, **for**, **the**, and **it** will not be searched.

An **Advanced Search** may be applied to narrow the search to:

- ▶ Titles or authors
- ▶ Exact words or word variants
- ▶ Year of publication
- ▶ Documents added within a specified number of months
- ▶ TOXLINE components (more than one component can be selected)
- ▶ Language
- ▶ A maximum number of records
- ▶ Articles found in PubMed Central, the NLM free digital archive of biomedical and life sciences journal literature (**Include PubMed records** must also be checked)



## Search Results



The initial retrieval is displayed as a list—in relevancy ranked order—of bibliographic references with the titles in blue. Each reference is followed by the acronym in brackets of the component from which the article was retrieved. References coming from PubMed/MEDLINE will be marked PubMed Citation with a green and blue M-encircled icon (M) and linked to the same reference in PubMed. Click this icon for access to PubMed functions such as LinkOut<sup>®</sup>, Related Links, and document ordering.

## Selected Record Screen

TOXNET Home > TOXLINE Home > TOXLINE Search Results > Full Record

toluidine bladder cancer

Search Details | History « Previous Record | Next Record »

**TOXLINE**

[Related Records](#) |
 [PubMed Citation](#)  |
 [PMC Full text](#)  |
 [Download this Record](#) |
 [Print](#) |
 [Select Record](#) |
 [My List](#)

A further cohort study of workers employed at a factory manufacturing chemicals for the rubber industry, with special reference to the chemicals 2-mercaptobenzothiazole (MBT), aniline, phenyl-beta-naphthylamine and **o-toluidine**.

Authors:

[Sorahan T](#)  
[Hamilton L](#)  
[Jackson JR](#)

Source: Occup Environ

Linked terms are in blue

Search terms are bolded and highlighted in yellow

The record screen displays the complete record for the item selected on the results screen. Individual author names, MeSH headings, keywords, and CAS Registry Numbers are in blue and linked to similar records in the database. Click an author link to find other articles by that author. Click a keyword to find other articles indexed with that keyword. Click **PubMed Citation** to access PubMed. Click **PMC Full text** to access the free, full text version of the article.

Other information appearing includes the article language, the month it was entered into the system, the year of publication, and a secondary source ID—a unique identifying number for the record and tagged to its component.

## Additional Resources

For further information, review these additional resources:

- ▶ PubMed  
[pubmed.gov](http://pubmed.gov)
- ▶ TOXLINE Help  
[sis.nlm.nih.gov/toxnethelp/toxlinehelp.html](http://sis.nlm.nih.gov/toxnethelp/toxlinehelp.html)
- ▶ TOXLINE Fact Sheet  
[nlm.nih.gov/pubs/factsheets/toxlinfs.html](http://nlm.nih.gov/pubs/factsheets/toxlinfs.html)
- ▶ Importing citations into reference management programs  
[toxnet.nlm.nih.gov/newtoxnet/faq.html#references](http://toxnet.nlm.nih.gov/newtoxnet/faq.html#references)
- ▶ Free Full-Text Health Science/Medical Journals  
[sis.nlm.nih.gov/enviro/findingfreefulltext.html](http://sis.nlm.nih.gov/enviro/findingfreefulltext.html)

## TOXLINE Search Exercises

### Search Exercises

 Go to [toxnet.nlm.nih.gov](http://toxnet.nlm.nih.gov).

 Click **TOXLINE**.

**Exercise 1: Search for the chemical of concern in baby bottles, bisphenol A (BPA). Explore navigating through the retrieval, examining individual records, and going to linked records.**

Suggested Solution:

Type bisphenol a baby bottles in the Search box

Click **Search**

Review record(s) of choice

Click **TOXLINE Home** at the left to prepare for the next search

**Exercise 2: Find citations on the salmonella contamination in eggs. Limit the results to citations since 2010.**

Suggested Solution:

Click the **Advanced Search** tab

Type **salmonella eggs** in the Search box

Type **2010** in the first Year of Publication box

Click **Search**

Review the citation(s)

### Scenario 1 – General Search

Michelle, a graduate student, is aware that many studies on pesticides have been conducted. She is also aware that pesticides are regulated in the United States. Michelle would like to get an idea of how much literature exists on cancer among agricultural workers because they may experience higher exposure to pesticides than the general public.

Suggested Solution:

Type **cancer agricultural workers** in the Search box

Click **Search**

Review the citation(s)

Click **TOXLINE Home** to prepare for the next search

## Scenario 2 – Limiting Search Results

Thomas, a principal investigator, is designing a new breast cancer study for women. He would like to perform a literature search for recent articles focused on the effects of diet on breast cancer. Thomas would like articles published since 2010.

Suggested Solution:

- Click the **Advanced Search** tab
- Type **diet breast cancer** in the Search box
- Select **Titles** from the Search fields drop-down menu
- Type **2010** in the first Year of Publication box (replacing **1900**)
- Click **Search**
- Review record(s) of choice
- Click **TOXLINE Home** at the top left of the page to prepare for the next search

## Scenario 3 – Sorting Search Results

Jean, an industrial hygienist, would like to examine articles on worker exposure to caprolactam. She is interested in how studies have changed over time, beginning with older articles and ending with the most recent. Jean would also like to retrieve only English citations.

Suggested Solution:

- Click the **Advanced Search** tab
- Type **occupational exposure caprolactam** in the Search box
- Select **English** in the Language box
- Click **Search**
- Select **Title** from the **Sort By** drop-down menu
- Review the citation(s)

## Alternatives to Animal Testing (ALTBIB®)

**ALTBIB** (Alternatives to Animal Testing) provides access to PubMed®/MEDLINE® citations relevant to alternatives to the use of live vertebrates in biomedical research and testing. Many citations provide access to free full text.

**Search Animal Alternatives Literature**

[Links to PubMed citations](#) on more than seventeen alternative methods categories

**Search PubMed using ALTBIB animal alternatives search strategy**

(e.g. Corrositex, "androgen receptor binding assay")

**Limit search:**

Citations from 2000 to present

Citations with [Animal Use Alternatives](#) as the main topic

Citations from the PubMed [Toxicology Subset](#)

[View/Edit PubMed Search Strategy](#)

**Search ALTBIB 1980-2000**

ALTBIB citations have been selected from articles, books, book chapters, and technical reports published from 1980 to 2000. These citations examine methods, tests, assays, and procedures that may be useful in establishing alternatives to the use of intact vertebrates.

**Animal Alternatives News**

News from...

- [ICCVAM/NIEHS](#): Interagency Coordinating Committee for the Validation of Alternative Methods
- [Altweb News](#): Johns Hopkins University

**Additional Resources**

- [AltTox.org](#) - Non-animal Methods for Toxicity Testing
- [Altweb](#) - Alternatives to Animal Testing on the Web
- [Animal Welfare Information Center \(USDA\)](#)
- [EURL ECVAM](#) - European Reference Laboratory for Alternatives to Animal Testing
- [FRAME](#) - Fund for the Replacement of Animals in Medical Experiments
- [NTP Interagency Center for the Evaluation of Alternative Toxicological Methods \(HHS/NIH/NIEHS\)](#)
- [Center for Alternatives to Animal Testing \(Johns Hopkins University\)](#)
- [Center for Animal Alternatives \(UC Davis\)](#)

[toxnet.nlm.nih.gov/altbib.html](http://toxnet.nlm.nih.gov/altbib.html)

Topic area searches include:

- ▶ General Topics on Alternatives to Animal Testing
- ▶ Hepatic/Renal Toxicity
- ▶ Pulmonary Toxicity
- ▶ Biologics and Vaccines
- ▶ Immunotoxicity/Immunology
- ▶ Quantitative Structure Activity Relationship (QSAR)
- ▶ Carcinogenesis
- ▶ Neurotoxicity
- ▶ Reproductive and Developmental Toxicity
- ▶ Cytotoxicity

- ▶ Ocular Toxicity
- ▶ Skin Toxicity
- ▶ Ecotoxicity
- ▶ Pharmacokinetic/Mechanistic Studies
- ▶ Welfare (Animal)
- ▶ Genotoxicity
- ▶ Pyrogenicity

In addition to the topic area PubMed searches, the ALTBIB portal includes a searchable bibliographic collection on alternatives to animal testing. This collection provides citations from published articles, books, book chapters, and technical reports published from 1980 to 2000. The bibliography features citations concerning methods, tests, assays, and procedures that may prove useful in establishing alternatives to the use of intact vertebrates. The ALTBIB bibliographic collection has not been updated since 2001, when the preformulated searches of PubMed were substituted for collecting a formal bibliography.

ALTBIB provides access to animal alternatives news sources, such as the Interagency Coordinating Committee on the Validation of Alternative Methods (ICCVAM). The portal has an extensive collection of links to key organizations providing information on alternatives to animal testing. ALTBIB also offers access to ICCVAM's "International Acceptance of Alternative Methods, 1998-2012" and "US and International Milestones in Alternative Test Method Development and Evaluations."

## ALTBIB Search Exercises



Go to [toxnet.nlm.nih.gov](http://toxnet.nlm.nih.gov).



Click **ALTBIB**.

### Exercise 1: Locate PubMed publications available for the Comet assay.

Suggested Solution:

- Click **Links to PubMed citations** at the top of the page
- Scroll to **Genotoxicity** (section 6)
- Click **TK6 Alkaline Comet Assay**
- Review the list of PubMed links returned
- Click the browser's back button to prepare for the next search

### Exercise 2: Search for "Draize test" with Animal Use Alternatives as the main topic.

Suggested Solution:

- Select the **Citations with Animal Use Alternatives as the main topic** checkbox under the Limit search section (if it is not already selected)
- Type "**Draize test**" in the Search field
- Click **Search**
- Review the list of search results (appears in a new tab)
- Close the search results tab to return to ALTBI

### Exercise 3: Search for "Zebrafish" with citations from the PubMed Toxicology Subset.

Suggested Solution:

- Select the **Citations from the PubMed Toxicology Subset** checkbox under the Limit search section
- Type **zebrafish** in the Search field
- Click **Search**
- Review the list of search results (appears in a new tab)
- Close the search results tab to return to ALTBI

### Exercise 4: Locate records for in silico studies of Alzheimer's disease treatments.

Suggested Solution:

- Select **Citations from 2000 to present** under Limit Search (ensure the other checkboxes are unchecked)
- Type **in silico alzheimers** in the Search field
- Click **Search**
- Review the list of search results (appears in a new tab)
- Close the search results tab to return to ALTBIB

### Additional Resources

For further information, review these additional resources:

- ▶ Center for Alternatives to Animal Testing (Johns Hopkins University)  
[caat.jhsph.edu](http://caat.jhsph.edu)
- ▶ ICCVAM/NIEHS: Interagency Coordinating Committee for the Validation of Alternative Methods  
[ntp.niehs.nih.gov/pubhealth/evalatm/iccvam/](http://ntp.niehs.nih.gov/pubhealth/evalatm/iccvam/)

# Section 4: Reproductive Health

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## Developmental and Reproductive Toxicology (DART®)

**DART** (Developmental and Reproductive Toxicology Database) is a bibliographic database that covers teratology and other aspects of developmental and reproductive toxicology. It contains more than 200,000 references to literature published since the early 1900s.

The screenshot shows the DART website interface. At the top, there is a navigation bar with the NIH logo and the text 'U.S. National Library of Medicine TOXNET TOXICOLOGY DATA NETWORK'. Below this, there are links for 'Mobile', 'Help', 'FAQs', 'TOXNET Fact Sheet', and 'Training Manual & Schedule'. The main content area includes a breadcrumb trail 'TOXNET Home > DART', a 'Share' button, and a header for 'DART Developmental and Reproductive Toxicology Database (DART) A TOXNET DATABASE'. The search interface has three tabs: 'SEARCH DART', 'BROWSE DART', and 'ADVANCED SEARCH'. The search bar contains the text 'e.g. benzene, endocrine disruptor' and a 'Search' button. Below the search bar, there are dropdown menus for 'Search Term' (set to 'singular/plural') and 'Records with' (set to 'all of the words'). There are also two checked checkboxes: 'Include Synonyms and CAS Numbers in Search' and 'Include PubMed Records'. On the right side, there is a 'Support' section with a 'Resources' sub-section containing links to 'Help', 'Fact Sheet', 'Sample Record', 'Recent Updates', 'TOXNET FAQ', and 'Importing Citations into Reference Manager'. Below this is a 'Contact Us' section with email, telephone, and fax information. At the bottom of the main content area, there are two columns: 'About DART' and 'Did you know'. The 'About DART' section explains that DART provides more than 200,000 journal references covering teratology and other aspects of developmental and reproductive toxicology, funded by the U.S. Environmental Protection Agency, the National Institute of Environmental Health Sciences, the National Center for Toxicological Research, and the NLM. It also mentions that DART has references from the early 1900s to the present, with new references added weekly. The 'Did you know' section includes a question mark icon and asks 'How do I lease/license the TOXNET databases?'. It lists several TOXNET databases available for lease: ChemIDplus, DIRLINE, CCRIS, GENE-TOX, HSDB, and TOXLINE. It also provides a link to 'Leasing Data from the National Library of Medicine' and a 'More FAQs' link. On the far right, there is a 'Environmental Health & Toxicology' section with a 'Visit Site' button and an image of a child holding a plant.

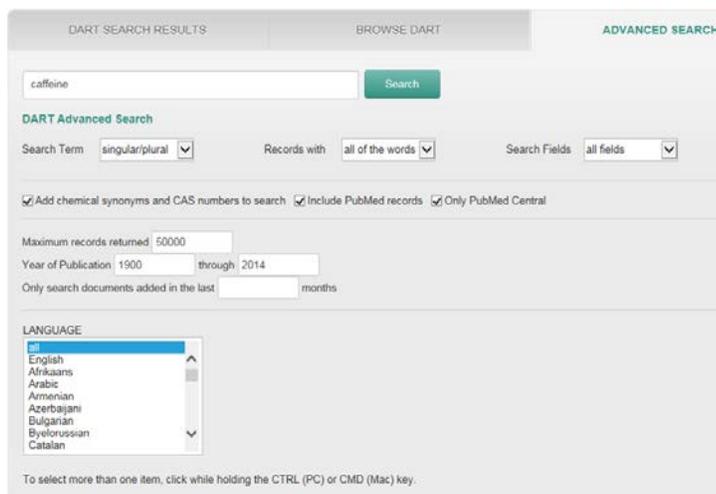
[toxnet.nlm.nih.gov/newtoxnet/dart.htm](http://toxnet.nlm.nih.gov/newtoxnet/dart.htm)

## Searching DART

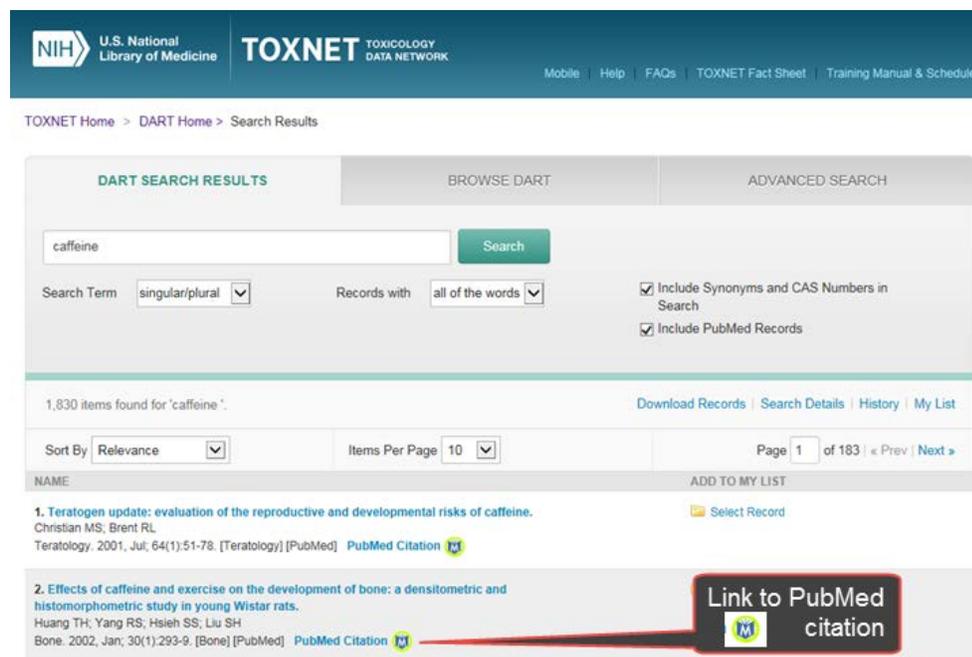
Any term(s) entered in the query box will automatically be searched against both the keyword and MeSH fields, in addition to other fields such as title, abstract, and author. Chemical names are mapped to names, synonyms, and Chemical Abstracts Service (CAS) Registry Numbers derived from ChemIDplus<sup>®</sup>. Words such as **a**, **an**, **and**, **for**, **the**, and **it** will not be searched.

An **Advanced Search** may be applied to narrow the search to:

- ▶ Titles
- ▶ Authors
- ▶ Exact words or word variants
- ▶ Year of publication
- ▶ Documents added within a specified number of months
- ▶ Language
- ▶ A maximum number of records
- ▶ Articles found in PubMed Central, the NLM free digital archive of biomedical and life sciences journal literature (**Include PubMed records** must also be checked)



## Search Results



The initial retrieval is displayed as a list—in relevancy ranked order—of bibliographic references with the titles in blue. References that come from PubMed/MEDLINE have PubMed Citation in blue and a green and blue M-encircled icon (M). This icon is linked to the same citation as it appears in PubMed. Click this icon for access to PubMed functions such as LinkOut and document ordering.

## Selected Record Screen

The screenshot shows the TOXNET DART record screen for a study on caffeine. The page includes a search bar with 'caffeine' entered, navigation links, and a record summary. The title is 'Relation of caffeine intake and blood caffeine concentrations during pregnancy to fetal growth: prospective population based study.' The authors listed are Cook DG, Peacock JL, Feyerabend C, Carey IM, Jarvis MJ, Anderson HR, and Bland JM. The source is 'BMJ. 1996, Nov 30; 313(7069):135'. The abstract discusses the association of plasma caffeine concentrations during pregnancy with fetal growth. Two callouts highlight that search terms are bolded and highlighted in yellow, and that linked terms (author names and MeSH headings) are in blue.

This screen displays the complete record for the item selected on the Results Screen. The search terms are highlighted in yellow. Individual author names, MeSH headings/keywords, and CAS Registry Numbers are in blue and linked to related records in the database. Click an author link to find other articles by that author. Click a keyword to find other articles indexed with that keyword. Click **PubMed Citation** to access PubMed. Click **PMC Full text** to access the free, full text version of the article.

Other information appearing includes the article language, the month it was entered into the system, the year of publication, and a secondary source ID—a unique identifying number for the record and tagged to its component.

## Additional Resources

For further information, review these additional resources:

- ▶ DART Fact Sheet  
[nlm.nih.gov/pubs/factsheets/dartfs.html](https://nlm.nih.gov/pubs/factsheets/dartfs.html)
- ▶ PubMed  
[pubmed.gov](https://pubmed.gov)
- ▶ Importing citations into reference management programs  
[toxnet.nlm.nih.gov/newtoxnet/faq.html#references](https://toxnet.nlm.nih.gov/newtoxnet/faq.html#references)
- ▶ TOXNET® Help-DART  
[toxnet.nlm.nih.gov/help/DARThelp.htm](https://toxnet.nlm.nih.gov/help/DARThelp.htm)

## DART Search Exercises

 Go to [toxnet.nlm.nih.gov](http://toxnet.nlm.nih.gov).

 Click **DART**.

**Exercise 1: Find the latest citations pertaining to food allergies and prevention. Sort the citations by author in descending order.**

Suggested Solution:

Type **food allergies prevention** in the Search box  
Click **Search**  
Review the citation(s)  
Select **Author** from the **Sort By** drop-down menu  
Review the citation(s) as they now appear  
Click **DART Home** in the upper left to prepare for the next search

**Exercise 2: Locate articles on psychomotor stimulants.**

Suggested Solution:

Type **psychomotor stimulants** in the Search box  
Click **Search**  
Review the citation(s)  
Click **DART Home** in the upper left to prepare for a new search

**Exercise 3: Find information on the effects of alcohol on the fetus.**

Suggested Solution:

Type **alcohol fetus** in the Search box  
Click **Search**  
Click the record of choice to view the abstract  
Click **DART Home** in the upper left to prepare for a new search

**Exercise 4: Find articles on the adverse effect of citalopram. Download the first three records to full format.**

Suggested Solution:

- Type **adverse effect citalopram** in the Search box
- Click **Search**
- Review the citation(s)
- Click the **Select Record** option to the right of the first three records
- Click the **My List** link in the upper right of the search results list
-  This opens your list of saved records
- Click **Download Records**
- Select **Full Format**
- Click the **Download** button
- Open the downloaded text file and review the full format records
- Close the text file and return to DART
- Close the pop-up windows
- Click the **Deselect Record** link to the right of the first three records

## Drugs and Lactation Database (LactMed®)

**LactMed (Drugs and Lactation Database)** is a database that contains information on more than 900 drugs and other chemicals to which breastfeeding mothers may be exposed. It includes information on the levels of such substances in breast milk and infant blood, and the possible adverse effects in the nursing infant. All data are derived from the scientific literature and fully referenced. Data are organized into substance-specific records, which provide a summary of the pertinent reported information and include links to other National Library of Medicine® (NLM) databases.

TOXNET Home > LactMed Share

**LactMed**  
A TOXNET DATABASE

Drugs and Lactation Database (LactMed)

SEARCH LACTMED | BROWSE LACTMED | ADVANCED SEARCH

e.g. sertraline, SSRIs Search

Search Term: singular/plural | Records with: all of the words |  Include Synonyms and CAS Numbers in Search

**About LactMed**

**What is LactMed?**  
The LactMed® database contains information on drugs and other chemicals to which breastfeeding mothers may be exposed. It includes information on the levels of such substances in breast milk and infant blood, and the possible adverse effects in the nursing infant. Suggested therapeutic alternatives to those drugs are provided, where appropriate. All data are derived from the scientific literature and fully referenced. A peer review panel reviews the data to assure scientific validity and currency.

**Updates:** LactMed is updated monthly.

**Did you know**

**How do I lease/license the TOXNET databases?**

The following TOXNET databases are available for lease: ChemDplus, DIRLINE, CCRIS, GENE-TOX, HSDB, and TOXLINE.

For further information visit [Leasing Data](#) from the National Library of Medicine.

[More FAQs](#)

**Support**

**Resources**

- LactMed App
- LactMed Record Format
- Database Creation & Peer Review Process
- Help
- Fact Sheet
- Sample Record
- TOXNET FAQ
- Glossary
- About Dietary Supplements
- Breastfeeding Links
- Get LactMed Widget

**Contact Us**

Email: [tehip@tehl.nlm.nih.gov](mailto:tehip@tehl.nlm.nih.gov)  
Telephone: (301) 496-1131  
Fax: (301) 480-3537

**Environmental Health & Toxicology**  
Resources on environmental health and toxicology

[Visit Site](#)

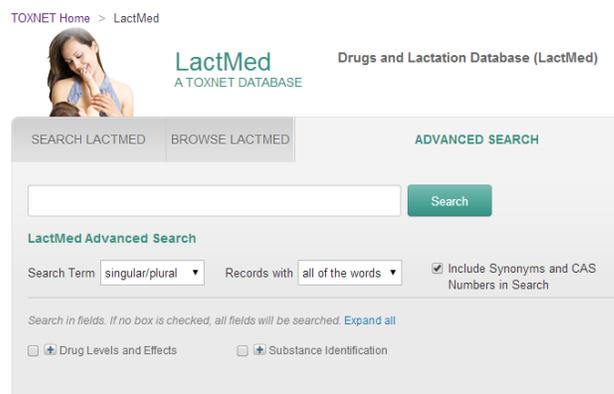
[lactmed.nlm.nih.gov](http://lactmed.nlm.nih.gov)

## Searching LactMed

Search LactMed by chemical, brand name, Chemical Abstracts Service (CAS) Registry Number, pharmacologic category, and/or subject terms. By default, the system adds synonyms and CAS numbers to chemical searches. Search results, displayed in relevancy ranked order, can easily be viewed, printed, or downloaded.

Click the **Advanced Search** tab to search:

- ▶ Exact words, singular and plural forms, or words variants
- ▶ Records with the phrase, all words, or any words
- ▶ In specific fields or categories of fields: LactMed contains ten search fields organized under two broad categories. Click the plus sign (+) to the left of a category to show all fields in that category. Use the **Expand All** link above the categories to display all contents.



Click the **Browse LactMed** tab to search a list of index terms related to the search term entered and the number of records containing that term. Select the record(s) to be viewed by clicking the appropriate term in the drop-down list and clicking **Search**.

## Search Results

The initial retrieval is displayed as a list of chemical names, highlighted in blue and underlined, and their CAS Registry Numbers. If the search was for a chemical or drug (e.g., codeine) and there is a match for it in the database, the record for this chemical—referred to as the primary chemical record—will display first, followed by a list of other chemical records which also contain some mention of the chemical entered. This latter list of chemicals is displayed according to a Relevancy Ranking algorithm. Clicking directly on any of the items will provide a display of the Selected Record Screen, containing all the data for that item. If the query consists of words that are not chemical or drug terms, this same Relevancy Ranking algorithm determines the order of display of all the search results.

When searching for a chemical, the retrieval may include other chemical records in addition to the initial matching chemical record (the **Primary Record**).

The screenshot displays the LACTMED Search Results interface. At the top, there are tabs for "LACTMED SEARCH RESULTS", "BROWSE LACTMED", and "ADVANCED SEARCH". A search bar contains the term "paroxetine" and a "Search" button. Below the search bar, there are filters for "Search Term" (singular/plural), "Records with" (all of the words), and a checkbox for "Include Synonyms and CAS Numbers in Search". The results section shows "34 items found for 'paroxetine'". Below this, there are options for "Sort By" (Relevance), "Items Per Page" (10), and "Page 1 of 4". The results table has a header "NAME" and "ADD TO MY LIST". The first record is highlighted in blue and underlined, and is identified as the "Primary Record" by a callout box. The text above it states: "The following is the primary record for the chemical. All of the query terms were found." The record is: "1. Paroxetine 61969-09-7" with a "Select Record" button. Below this, a callout box identifies the following records as "Additional Chemical Records". The text above them states: "The following 33 records contain one or more of the requested chemical name(s) and all of the query terms anywhere in the record." The records are: "2. Fluvoxamine 54739-18-3", "3. Fluoxetine 54910-89-3", and "4. Citalopram 59729-33-8", each with a "Select Record" button.

These additional records appear if they contain the chemical name or search term. Click any of these non-primary chemicals on the **Search Results** screen to display the sections of the record best matching the query terms (**Closest Match to Search Terms**), those where the chemical search term(s) appear with greatest frequency. The search term(s) are bolded and highlighted in yellow.

The **Record** screen is organized into three sections:

1. Navigation buttons at the top of the record allow you to **View record in another database** (NLM databases), **Download Record**, **Print** the record, **Select Record** (adding it to your list), and view your list of selected records (**My List**).
2. A **Table of Contents** in the left frame allows users to choose categories and fields for display.
3. Chemical Data is shown in the right frame.

## Primary Record

U.S. National Library of Medicine **TOXNET** TOXICOLOGY DATA NETWORK

Mobile | Help | FAQs | TOXNET Fact Sheet | Training Manual & Schedule

TOXNET Home > LACTMED Home > LACTMED Search Results > Full Record

paroxetine Search

Search Details | History < Previous Record | Next Record >

**LACTMED: PAROXETINE** CASRN: 61869-08-7 This record appears in multiple databases.

1 View record in another database: LACTMED [v] Download this Record Print Select Record

**TABLE OF CONTENTS**

Show Selected Items Clear Expand all Collapse all

2  Closest Match to Search Terms

Full Record

Drug Levels and Effects

Substance Identification

Administrative Information

Show Selected Items Clear

**Paroxetine** CASRN: 61869-08-7 3

**FULL RECORD DISPLAY**

Displays all fields in the record.

For other data, click on the Table of Contents

**Drug Levels and Effects:**

**Summary of Use during Lactation:**

Because of the low levels of **paroxetine** in breastmilk, amounts ingested by the infant are small and **paroxetine** has not been detected in the serum of most infants tested. Occasional mild side effects have been reported, especially in the infants of mothers who took **paroxetine** during the third trimester of pregnancy, but the contribution of the drug in breastmilk is not clear. Most authoritative reviewers consider **paroxetine** one of the preferred antidepressants during

Because of the low levels of **paroxetine** in breastmilk, amounts ingested by the infant are small and **paroxetine** has not been detected in the serum of most infants tested. Occasional mild side effects have been reported, especially in the infants of mothers who took **paroxetine** during the third trimester of pregnancy, but the contribution of the drug in breastmilk is not clear. Most authoritative reviewers consider **paroxetine** one of the preferred antidepressants during

Search terms are bolded and highlighted in yellow

## Additional Chemical Record

The screenshot shows the TOXNET LACTMED search results for Fluvoxamine. The page header includes the NIH logo and navigation links. The search term 'paroxetine' is entered in the search box. The results show 'LACTMED: FLUVOXAMINE' with CASRN 54739-18-3. A table of contents on the left lists sections like 'Drug Levels and Effects', 'Substance Identification', and 'Administrative Information'. The main content area displays the chemical structure of Fluvoxamine and a summary of use during lactation, which notes that maternal doses up to 300 mg daily produce low levels in breastmilk.

## LactMed Mobile

A mobile version of LactMed is available as an app download for both Android and Apple iOS devices. To find the app, access [toxnet.nlm.nih.gov/help/lactmedapp.htm](http://toxnet.nlm.nih.gov/help/lactmedapp.htm) on your device and select the appropriate option on the page.



## Additional Resources

For further information, review these additional resources:

- ▶ Drugs and Lactation Database (LactMed) Fact Sheet  
[nlm.nih.gov/pubs/factsheets/lactmedfs.html](https://nlm.nih.gov/pubs/factsheets/lactmedfs.html)
- ▶ LactMed App  
[toxnet.nlm.nih.gov/help/lactmedapp.htm](https://toxnet.nlm.nih.gov/help/lactmedapp.htm)
- ▶ LactMed Basics Brochure  
[nmlm.gov/mcr/resources/consumer/LactMed.pdf](https://nmlm.gov/mcr/resources/consumer/LactMed.pdf)
- ▶ Pregnancy Riskline (University of Arizona College of Pharmacy)  
[pharmacy.arizona.edu/centers/pregnancy-riskline](https://pharmacy.arizona.edu/centers/pregnancy-riskline)
- ▶ Organization of Teratology Information Specialists  
[otispregnancy.org](https://otispregnancy.org)

## LactMed Search Exercises

 Go to [toxnet.nlm.nih.gov](http://toxnet.nlm.nih.gov).

 Click **LactMed**.

### Search Exercises

#### Exercise 1: To which class of drugs does clomipramine belong?

Suggested Solution:

- Type **clomipramine** in the Search box
- Click **Search**
- Click **Clomipramine**
- Click the + next to **Substance Identification** in the Table of Contents
- Click **Drug Class** in the Table of Contents
- Review the information
- Click **LACTMED Home** in the upper left to prepare for the next search

#### Exercise 2: Is there a substitute for the use of hydrocodone during lactation?

Suggested Solution:

- Type **hydrocodone** in the Search box
- Click **Search**
- Click **Hydrocodone**
- Click the + next to **Drug Levels and Effects** in the Table of Contents
- Click **Alternate Drugs to Consider**
- Review the information

## Scenario 1 – Summary Information

Carolyn, a nursing mother, has been prescribed methotrexate because of an early onset of rheumatoid arthritis. Her doctor has told her that she may continue to nurse her baby because he has prescribed a low dose of the medication. Carolyn would like to do some research herself to confirm her doctor's statements.

**Search LactMed to gather information: Locate the methotrexate record in LactMed. Open the methotrexate record. Browse the record for information.**

Suggested Solution:

- |   |   |
|---|---|
| Type  | <b>methotrexate</b> in the <u>Search</u> box                          |
| Click   | <b>Search</b>   |
| Click   | <b>Methotrexate</b> record in the <u>Search Results</u> list          |
| Scroll  | through the record or use the <b>Table of Contents</b>                |
|  | The Summary of Use during Lactation supports the doctor's statements. |

## Scenario 2 – Alternative Drug Field

While browsing the methotrexate record, Carolyn (Scenario 1) notices auranofin listed as an alternate drug to consider. Have any effects in infants been reported after use of auranofin by a nursing mother?

**Use links within the methotrexate record to find information: Locate the alternate drugs within the methotrexate record. Open the auranofin record. Locate the infant effects section of the record.**

Suggested Solution:

- |        |  |
|--------|--|
| Click  | the + next to <b>Drug Levels and Effects</b> in the <u>Table of Contents</u>     |
| Click  | <b>Alternate Drugs to Consider</b> in the <u>Table of Contents</u>               |
| Click  | <b>(Rheumatoid Arthritis) Auranofin</b> under <u>Alternate Drugs to Consider</u> |
| Click  | <b>Auranofin</b>   |
| Click  | the + next to <b>Drug Levels and Effects</b> in the <u>Table of Contents</u>     |
| Click  | <b>Effects in Breastfed Infants</b> in the <u>Table of Contents</u>              |
| Review | the information  |
| Click  | <b>LACTMED Home</b> in the upper left to prepare for the next search             |

## Section 5: Carcinogenesis Research

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## Chemical Carcinogenesis Research Information System (CCRIS) – Archived and no longer updated

**CCRIS** (Chemical Carcinogenesis Research Information System) provides historical information from the years 1985–2011. It is no longer updated.

CCRIS contains chemical records with carcinogenicity, mutagenicity, tumor promotion, and tumor inhibition test results. It was developed by the National Cancer Institute (NCI). Data are derived from studies cited in primary journals, current awareness tools, NCI reports, and other sources. Test results have been reviewed by experts in carcinogenesis and mutagenesis.

TOXNET Home > CCRIS Share

**CCRIS**  
A TOXNET DATABASE

Chemical Carcinogenesis Research Information System (CCRIS)

**SEARCH CCRIS**    BROWSE CCRIS    ADVANCED SEARCH

e.g. benzene, endocrine disruptor    **Search**

Search Term:     Records with:      Include Synonyms and CAS Numbers in Search

**About CCRIS**

**What is CCRIS?**  
The CCRIS database contains chemical records with carcinogenicity, mutagenicity, tumor promotion, and tumor inhibition test results. It was developed by the [National Cancer Institute \(NCI\)](#). Data are derived from studies cited in primary journals, current awareness tools, NCI reports, and other sources. Test results have been reviewed by experts in carcinogenesis and mutagenesis.

**Years covered:** CCRIS provides historical information from the years 1985 - 2011. It is no longer updated.

**Did you know**

**How do I lease/license the TOXNET databases?**

The following TOXNET databases are available for lease: ChemIDplus, DIRLINE, CCRIS, GENE-TOX, HSDB, and TOXLINE.

For further information visit [Leasing Data from the National Library of Medicine](#).

[More FAQs](#)

**Support**

**Resources**  
[Help](#)  
[Fact Sheet](#)  
[Sample Record](#)  
[TOXNET FAQ](#)

**Contact Us**  
Email: [tehip@tehl.nlm.nih.gov](mailto:tehip@tehl.nlm.nih.gov)  
Telephone: (301) 496-1131  
Fax: (301) 480-3537

**Environmental Health & Toxicology**  
Resources on environmental health and toxicology  
[Visit Site](#)

[toxnet.nlm.nih.gov/newtoxnet/ccris.htm](http://toxnet.nlm.nih.gov/newtoxnet/ccris.htm)

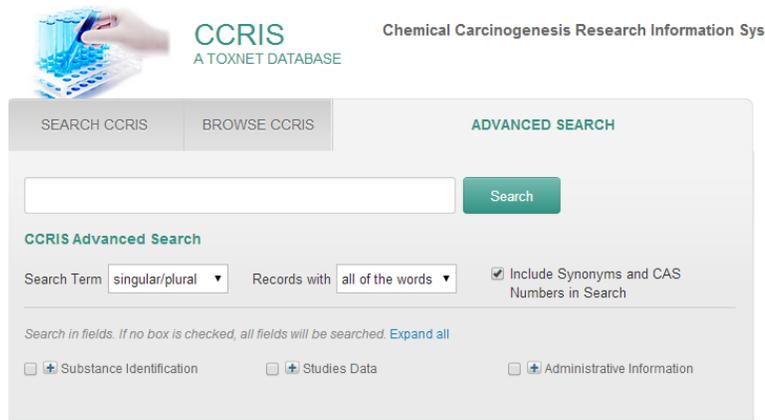
### Searching CCRIS

Search CCRIS by any combination of words, chemical names, and numbers, including Chemical Abstracts Service (CAS) Registry Numbers. By default, the system adds synonyms and CAS numbers to chemical searches.

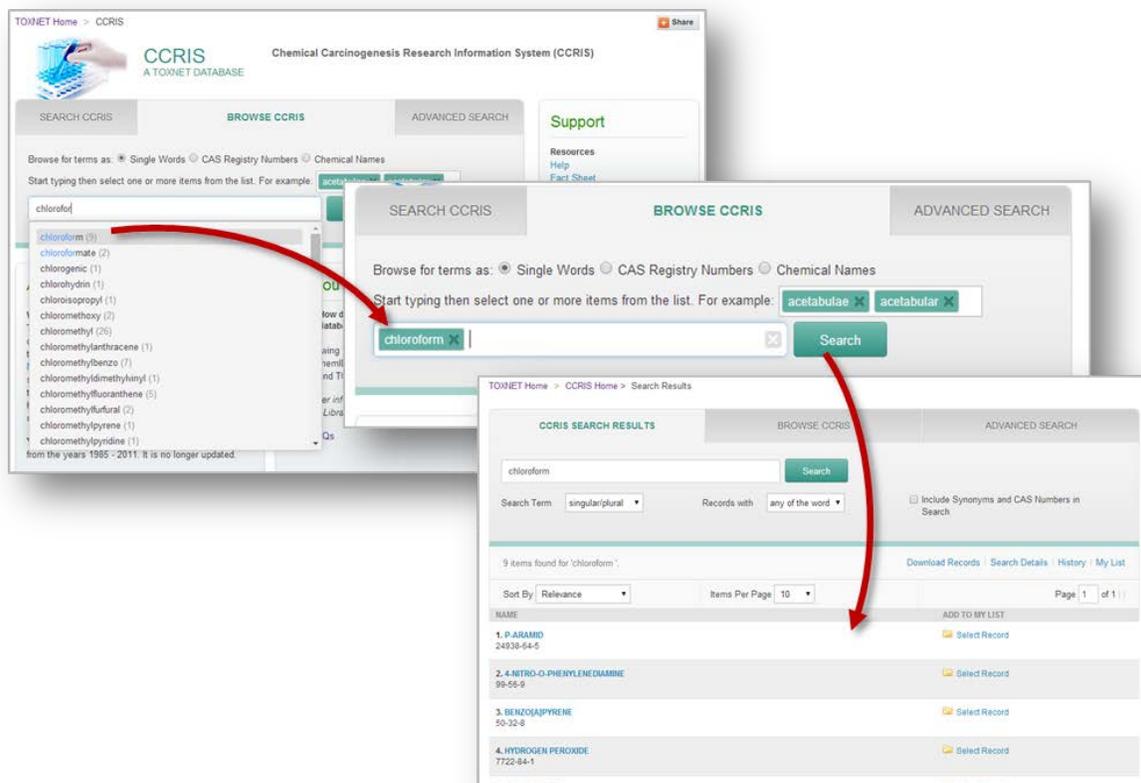
Use truncation (\*), Boolean operators (AND, OR, NOT), nested parentheses, limits, and index browsing to refine the search results.

Click the **Advanced Search** tab to search:

- ▶ Exact words, singular and plural forms, or word variants
- ▶ Records with the phrase, all words, or any words
- ▶ In specific fields or categories of fields, click the plus sign (+) to the left of a category to show all fields in that category. Use the **Expand all** link to expand all categories



With the **Browse CCRIS** feature, the system returns a list of index terms related to the search term entered and the number of records containing that term. Select the record(s) to be viewed by clicking the appropriate term in the drop-down list and clicking **Search**.



## Search Results

The initial retrieval is displayed as a list of substance names in blue and their CAS Registry Numbers. Substances are listed in **relevancy ranked order**, based on the number of individual search terms occurring in a document, the number of times each search term occurs in a document, the rarity of the search terms within the database, and the nearness of search terms to each other. Records containing combinations of search terms tend to be ranked higher than records with isolated occurrences of search terms. Click the substance name to retrieve the record for that substance.

When searching for a chemical, the retrieval may include other chemical records in addition to the initial matching chemical record (the **Primary Record**). These additional records appear if they contain the chemical name or search term.

The screenshot displays the CCRIS Search Results interface. At the top, there are navigation tabs for "CCRIS SEARCH RESULTS", "BROWSE CCRIS", and "ADVANCED SEARCH". A search bar contains the term "chloroform" and a "Search" button. Below the search bar, there are filters for "Search Term" (singular/plural), "Records with" (all of the words), and a checkbox for "Include Synonyms and CAS Numbers in Search". The results section shows "9 items found for 'chloroform'". A "Sort By" dropdown is set to "Relevance", and "Items Per Page" is set to "10". The page is "Page 1 of 1".

Two callouts are present:
 

- Primary Record:** Points to the first result, "1. CHLOROFORM 67-66-3". A red box highlights the text: "The following is the primary record for the chemical. All of the query terms were found." and the record entry.
- Additional Chemical Records:** Points to the next three results: "2. P-ARAMID 24938-64-5", "3. 4-NITRO-O-PHENYLENEDIAMINE 99-56-9", and "4. BENZO[A]PYRENE 50-32-8". A red box highlights the text: "The following 3 records contain one or more of the requested chemical name(s) and all of the query terms anywhere in the record." and the three record entries.

Click any of these non-primary chemicals on the **Search Results** screen to display the sections of the record best matching the query terms (**Closest Match to Search Terms**), those where the chemical search term(s) appears with greatest frequency. The search term(s) are bolded and highlighted in yellow.

The **Record** screen is organized into three sections:

1. Navigation buttons at the top of the record allow you to **View record in another database** (NLM databases), **Download Record**, **Print** the record, **Select Record** (adding it to your list), and view your list of selected records (**My List**).
2. A **Table of Contents** in the left frame allows users to choose categories and fields for display.
3. Chemical Data is shown in the right frame.

## Primary Record

Search Details | History Previous Record | Next Record »

**CCRIS: CHLOROFORM** CASRN: 67-66-3 This record appears in multiple databases.

1 View record in another database: CCRIS Download this Record | Print | Select Record | My List

2 TABLE OF CONTENTS Expand all | Collapse all

- Closest Match to Search Terms
- Full Record
- Substance Identification
- Studies Data
- Administrative Information

3 **CHLOROFORM**  
CASRN: 67-66-3

ClC(Cl)Cl

**Search terms are bolded and highlighted in yellow**

**Substance Identification:**

**Substance Name:**  
**CHLOROFORM**

**FULL RECORD DISPLAY**  
Displays all fields in the record.  
For other data, click on the Table of Contents

## Additional Chemical Record

**CCRIS: P-ARAMID** CASRN: 24938-64-5

View record in another database: CCRIS Download this Record | Print | Select Record | My List

TABLE OF CONTENTS Expand all | Collapse all

- Closest Match to Search Terms
- Full Record
- Substance Identification
- Studies Data
- Administrative Information

**P-ARAMID**  
CASRN: 24938-64-5

\*c1ccc(cc1)N(=O)c2ccc(cc2)\*

**CLOSEST MATCH TO SEARCH TERMS**  
Displays excerpts in the record that contain your search words.  
For other data, click on the Table of Contents

**Mutagenicity Studies:**

Test System:	AMES SALMONELLA TYPHIMURIUM
Strain Indicator:	TA100
Metabolic Activation:	NONE
Method:	PREINCUBATION
Dose:	<b>CHLOROFORM EXTRACT OF 1 G</b>
Results:	NEGATIVE

## Additional Resources

For further information, review these additional resources:

- ▶ CCRIS Fact Sheet  
[nlm.nih.gov/pubs/factsheets/ccrisfs.html](http://nlm.nih.gov/pubs/factsheets/ccrisfs.html)
- ▶ TOXNET Help-CCRIS  
[toxnet.nlm.nih.gov/help/CCRIShelp.htm](http://toxnet.nlm.nih.gov/help/CCRIShelp.htm)

## CCRIS Search Exercises

 Go to [toxnet.nlm.nih.gov](http://toxnet.nlm.nih.gov).

 Click **CCRIS**.

**Exercise 1: Does the record for naphthalene contain any positive carcinogenicity studies? Does it contain any positive mutagenicity studies?**

Suggested Solution:

Type **naphthalene** in the Search box

Click **Search**

Click **NAPHTHALENE**

Click the + next to **Studies Data** in the Table of Contents

Click **Carcinogenicity Studies**

Review the information retrieved in the right frame

Click **Mutagenicity Studies** in the Table of Contents

Review the information retrieved in the right frame

Click **CCRIS Home** at the top left of the page to prepare for a new search

**Exercise 2: Locate the mirex record and review the tumor promotion studies.**

Suggested Solution:

Type **mirex** in the Search box

Click **Search**

Click **MIREX**

Click the + next to **Studies Data** in the Table of Contents

Click **Tumor Promotion Studies** under Studies Data

Review the information in the right frame

Click **CCRIS Home** at the top left of the page to prepare for a new search

**Exercise 3: Review the citral record for carcinogenicity data and any associated human health effects.**

Suggested Solution:

- Type **citral** in the Search box
- Click **Search**
- Click **CITRAL**
- Click the + next to **Studies Data**
- Click **Carcinogenicity Studies**
- Review the information in the right frame
- Select **HSDB** from the **View record in another database** drop-down
- Review the information in the right frame
- Click **Return to CCRIS** at the top of the page
- Click **CCRIS Home** the top left of the page to prepare for a new search

**Exercise 4: How many substances are identified in CCRIS as positive for lung cancer?**

Suggested Solution:

- Type **positive lung cancer** in the Search box
- Click **Search**
- Click chemical record(s) of choice
- Review the information in the right frame

## Carcinogenic Potency Database (CPDB) – Archived and no longer updated

The **Carcinogenic Potency Database (CPDB)** covers 1980-2011 and is no longer updated. CPDB reports analyses of animal cancer tests used in support of cancer risk assessments for humans. It was developed by the Carcinogenic Potency Project at the University of California, Berkeley, and the Lawrence Berkeley National Laboratory. It includes 6,540 chronic, long-term animal cancer tests from the published literature as well as from the National Cancer Institute and the National Toxicology Program (NTP).

The screenshot shows the CPDB website interface. At the top, there is a navigation bar with the NIH logo and 'U.S. National Library of Medicine' on the left, and 'TOXNET TOXICOLOGY DATA NETWORK' on the right. Below this, there are links for 'Mobile', 'Help', 'FAQs', 'TOXNET Fact Sheet', and 'Training Manual & Schedule'. The main content area has a breadcrumb trail 'TOXNET Home > CPDB' and a 'Share' button. The title 'CPDB A TOXNET DATABASE' is displayed above the search area. The search area includes a search bar with the text 'e.g. benzene, endocrine disruptor', a 'Search' button, and options for 'Search Term' (singular/plural) and 'Records with' (all of the words). There is also a checkbox for 'Include Synonyms and CAS Numbers in Search'. Below the search area, there are sections for 'About CPDB', 'Did you know', 'Support', and 'Environmental Health & Toxicology'.

**[toxnet.nlm.nih.gov/newtoxnet/cpdb.htm](http://toxnet.nlm.nih.gov/newtoxnet/cpdb.htm)**

### Searching CPDB

Search by chemical name or fragment, or Chemical Abstracts Service Registry Number. Results include a summary for each sex-species tested, including carcinogenicity, target organs, and carcinogenic potency values. Detailed results from each experiment on that particular chemical are given in a plot format suitable for screen viewing.

## Additional Resources

For further information, review these additional resources:

- ▶ Carcinogenic Potency Database Fact Sheet  
[nlm.nih.gov/pubs/factsheets/cpdbfs.html](https://nlm.nih.gov/pubs/factsheets/cpdbfs.html)

## CPDB Search Exercises

 Go to [toxnet.nlm.nih.gov](http://toxnet.nlm.nih.gov).

 Click **CPDB**.

### Exercise 1: Use CPDB to research the rat and mice cancer data for limonene.

Suggested Solution:

Type **limonene** in the Search field

Click **Search**

Click the **d-Limonene** link

 The record opens in the CPDB archival site

Locate the rat and mouse cancer data summary

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## Section 6: Genetics and Genomics

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## Genetic Toxicology Database (GENE-TOX) – Archived and no longer updated

**GENE-TOX** (Genetic Toxicology Database) covers the years 1991-1998 and is no longer updated. GENE-TOX is created by the US Environmental Protection Agency (EPA) and contains genetic toxicology (mutagenicity) test data, resulting from expert peer review of the open scientific literature, on more than 3,000 chemicals.

TOXNET Home > GENETOX Share

**GENETOX**  
A TOXNET DATABASE  
Genetic Toxicology Data Bank (GENE-TOX)

SEARCH GENETOX | BROWSE GENETOX | ADVANCED SEARCH

e.g. benzene, endocrine disruptor Search

Search Term: singular/plural | Records with: all of the words |  Include Synonyms and CAS Numbers in Search

**About GENETOX**  
What is GENE-TOX?  
GENE-TOX provides genetic toxicology (mutagenicity) test data from expert peer review of open scientific literature for more than 3,000 chemicals from the United States Environmental Protection Agency (EPA). GENE-TOX was established to select assay systems for evaluation, review data in the scientific literature, and recommend proper testing protocols and evaluation procedures for these systems.  
Years covered and Updates: GENE-TOX covers the years 1991 - 1998. It is no longer updated.

**Did you know**  
How do I lease/license the TOXNET databases?  
The following TOXNET databases are available for lease: ChemIDplus, DIRLINE, CCRIS, GENE-TOX, HSDB, and TOXLINE.  
For further information visit [Leasing Data from the National Library of Medicine](#).  
[More FAQs](#)

**Support**  
Resources  
[Help](#)  
[Fact Sheet](#)  
[Sample Record](#)  
[TOXNET FAQ](#)  
Contact Us  
Email: [tehip@tehl.nlm.nih.gov](mailto:tehip@tehl.nlm.nih.gov)  
Telephone: (301) 496-1131  
Fax: (301) 480-3537

**Environmental Health & Toxicology**  
Resources on environmental health and toxicology  
[Visit Site](#)

**[toxnet.nlm.nih.gov/newtoxnet/genetox.htm](http://toxnet.nlm.nih.gov/newtoxnet/genetox.htm)**

### Searching GENE-TOX

Search GENE-TOX by chemical or other name, chemical name fragment, Chemical Abstracts Service (CAS) Registry Number<sup>®</sup>, and/or subject terms. By default, the system adds synonyms and CAS numbers to chemical searches.

Use truncation (\*), Boolean operators (AND, OR, NOT), nested parentheses, limits, and index browsing to refine the search results.

Click the **Advanced Search** tab to search:

- ▶ Exact words, singular and plural forms, or word variants
- ▶ Records with the phrase, all words, or any words
- ▶ In specific fields or categories of fields, click the plus sign (+) to the left of a category to show all fields in that category. Use the **Expand all** link above the list to display all categories.

With the **Browse GENETOX** feature, the system returns a list of index terms related to the search term entered and the number of records containing that term. Select the record(s) to be viewed by clicking the appropriate term in the drop-down list and clicking **Search**.

## Search Results

The initial retrieval is displayed as a list of substance names in blue and their CAS Registry Numbers. Substances are listed in relevancy ranked order. Relevancy ranking is based on the number of individual search terms occurring in a document, the number of times each search term occurs in a document, the rarity of the search terms within the database, and the nearness of search terms to each other. Records containing combinations of search terms tend to be ranked higher than records with isolated occurrences of search terms. When searching for a chemical, the retrieval may include other chemical records in addition to the initial matching chemical record (the **Primary Record**).

The screenshot displays the GENETOX Search Results interface. At the top, there are tabs for 'GENETOX SEARCH RESULTS', 'BROWSE GENETOX', and 'ADVANCED SEARCH'. A search bar contains 'benzene' and a 'Search' button. Below the search bar, there are options for 'Search Term' (singular/plural), 'Records with' (all of the words), and a checkbox for 'Include Synonyms and CAS Numbers in Search'. The results section shows '352 items found for "benzene".' and includes links for 'Download Records', 'Search Details', 'History', and 'My List'. The results are sorted by 'Relevance' and show 10 items per page. The first result is highlighted in red and labeled 'Primary Record'. It is '1. BENZENE' with CAS number '71-43-2'. Below it, three more results are highlighted in red and labeled 'Additional Chemical Records': '2. RESERPINE' (50-55-5), '3. NIALAMID' (51-12-7), and '4. 2,4-DINITROPHENOL' (51-28-5). Each result has a 'Select Record' button.

These additional records appear if they contain the chemical name or search term. Click any of these non-primary chemicals on the **Search Results** screen to display the sections of the record best matching the query term(s) (**Closest Match to Search Terms**), those where the chemical search term(s) appear with greatest frequency. The search term(s) are bolded and highlighted in yellow. The **Record** screen is organized into three sections:

1. Navigation options at the top of the record allow you to **View record in another database** (NLM databases), **Download Record**, **Print** the record, **Select Record** (adding it to your list), and view your list of selected records (**My List**).
2. A **Table of Contents** in the left frame allows users to choose categories and fields for display.
3. Chemical Data is shown in the right frame.

## Primary Record

Search Details | History « Previous Record | Next Record »

**GENE-TOX: BENZENE** CASRN: 71-43-2 This record appears in multiple databases.

1 View record in another database: GENE-TOX Download this Record Print Select Record My List

2 TABLE OF CONTENTS Expand all  
Collapse all

Closest Match to Search Terms  
 Full Record

Substance Identification  
 Mutagenicity Studies  
 Administrative Information

Show Selected Items Clear

**BENZENE** CASRN: 71-43-2

3 c1ccccc1

**FULL RECORD DISPLAY**  
Displays all fields in the record.  
For other data, click on the Table of Contents

Substance Identification:

Substance Name: **BENZENE**

Search terms are bolded and highlighted in yellow

## Additional Chemical Record

**GENE-TOX: RESERPINE** CASRN: 50-55-5 This record appears in multiple databases.

View record in another database: GENE-TOX Download this Record Print Select Record My List

TABLE OF CONTENTS Expand all  
Collapse all

Closest Match to Search Terms  
 Full Record

Substance Identification  
 Substance Name  
 CAS Registry Number  
 Chemical Classification Category  
 Taxonomic Name & Assay

Mutagenicity Studies  
 GENE-TOX Evaluation A (pre-1980)

Administrative Information  
 GENETOX Record Number  
 Last Revision Date  
 Update History

Show Selected Items Clear

**RESERPINE** CASRN: 50-55-5

CC1=NC2=C(C=C1)C(=O)N(C2)C3=CC=C(C=C3)C4=CC=C(C=C4)C5=CC=C(C=C5)C6=CC=C(C=C6)C7=CC=C(C=C7)C8=CC=C(C=C8)C9=CC=C(C=C9)C10=CC=C(C=C10)C11=CC=C(C=C11)C12=CC=C(C=C12)C13=CC=C(C=C13)C14=CC=C(C=C14)C15=CC=C(C=C15)C16=CC=C(C=C16)C17=CC=C(C=C17)C18=CC=C(C=C18)C19=CC=C(C=C19)C20=CC=C(C=C20)C21=CC=C(C=C21)C22=CC=C(C=C22)C23=CC=C(C=C23)C24=CC=C(C=C24)C25=CC=C(C=C25)C26=CC=C(C=C26)C27=CC=C(C=C27)C28=CC=C(C=C28)C29=CC=C(C=C29)C30=CC=C(C=C30)C31=CC=C(C=C31)C32=CC=C(C=C32)C33=CC=C(C=C33)C34=CC=C(C=C34)C35=CC=C(C=C35)C36=CC=C(C=C36)C37=CC=C(C=C37)C38=CC=C(C=C38)C39=CC=C(C=C39)C40=CC=C(C=C40)C41=CC=C(C=C41)C42=CC=C(C=C42)C43=CC=C(C=C43)C44=CC=C(C=C44)C45=CC=C(C=C45)C46=CC=C(C=C46)C47=CC=C(C=C47)C48=CC=C(C=C48)C49=CC=C(C=C49)C50=CC=C(C=C50)C51=CC=C(C=C51)C52=CC=C(C=C52)C53=CC=C(C=C53)C54=CC=C(C=C54)C55=CC=C(C=C55)C56=CC=C(C=C56)C57=CC=C(C=C57)C58=CC=C(C=C58)C59=CC=C(C=C59)C60=CC=C(C=C60)C61=CC=C(C=C61)C62=CC=C(C=C62)C63=CC=C(C=C63)C64=CC=C(C=C64)C65=CC=C(C=C65)C66=CC=C(C=C66)C67=CC=C(C=C67)C68=CC=C(C=C68)C69=CC=C(C=C69)C70=CC=C(C=C70)C71=CC=C(C=C71)C72=CC=C(C=C72)C73=CC=C(C=C73)C74=CC=C(C=C74)C75=CC=C(C=C75)C76=CC=C(C=C76)C77=CC=C(C=C77)C78=CC=C(C=C78)C79=CC=C(C=C79)C80=CC=C(C=C80)C81=CC=C(C=C81)C82=CC=C(C=C82)C83=CC=C(C=C83)C84=CC=C(C=C84)C85=CC=C(C=C85)C86=CC=C(C=C86)C87=CC=C(C=C87)C88=CC=C(C=C88)C89=CC=C(C=C89)C90=CC=C(C=C90)C91=CC=C(C=C91)C92=CC=C(C=C92)C93=CC=C(C=C93)C94=CC=C(C=C94)C95=CC=C(C=C95)C96=CC=C(C=C96)C97=CC=C(C=C97)C98=CC=C(C=C98)C99=CC=C(C=C99)C100=CC=C(C=C100)

**CLOSEST MATCH TO SEARCH TERMS**  
Displays excerpts in the record that contain your search words.  
For other data, click on the Table of Contents

Chemical Classification Category:

**Benzene** n

## Additional Resources

For further information, review these additional resources:

- ▶ GENE-TOX Fact Sheet  
[nlm.nih.gov/pubs/factsheets/genetxfs.html](http://nlm.nih.gov/pubs/factsheets/genetxfs.html)
- ▶ TOXNET Help- GENE-TOX  
[toxnet.nlm.nih.gov/help/GENETOXhelp.htm](http://toxnet.nlm.nih.gov/help/GENETOXhelp.htm)

## GENE-TOX Search Exercises

 Go to [toxnet.nlm.nih.gov](http://toxnet.nlm.nih.gov).

 Click **GENE-TOX**.

**Exercise 1: Using the CAS Registry Number 108-95-2, identify the chemical it represents. Review the mutagenicity studies panel report.**

Suggested Solution:

Type **108-95-2** in the Search box

Click **Search**

Click **PHENOL**

Click **Mutagenicity Studies** in the Table of Contents

Review the information retrieved in the right frame

Click the link for the Panel Report of choice to view the abstract

Review the abstract

Click the browser's **Back** button to return to the GENE-TOX record

Click **GENE-TOX Home** at the top of the page to prepare for the next search

**Exercise 2: Has cyclophosphamide been studied for effects on human male fertility and sterility?**

Suggested Solution:

Type **cyclophosphamide human male fertility** in the Search box

Click **Search**

Click **CYCLOPHOSPHAMIDE**

Click the **Closest Match to Search Terms** link in the Table of Contents

Click **GENE-TOX Home** at the top of the page to prepare for the next search

**Exercise 3: Search GENE-TOX for mutagenicity study results for caffeine. How do study results compare with results in CCRIS?**

Suggested Solution:

Type **caffeine** in the Search box

Click **Search**

Click **Mutagenicity Studies** in the Table of Contents

Review the information retrieved in the right frame

Select **CCRIS** from the **View record in another database** dropdown

Click the + next to **Studies Data** in the Table of Contents

Click **Mutagenicity Studies**

Review the information in the right frame

Click **Return to GENE-TOX** at the top of the page to return to the GENE-TOX record

## Comparative Toxicogenomics Database (CTD)

**CTD** (Comparative Toxicogenomics Database) contains manually curated data describing cross-species chemical-gene/protein interactions and chemical- and gene-disease relationships. The results provide insight into the molecular mechanisms underlying variable susceptibility and environmentally influenced diseases. These data will also provide insights into complex chemical-gene and protein interaction networks. CTD was developed at North Carolina State University. The database is updated several times a year.

U.S. National Library of Medicine **TOXNET** TOXICOLOGY DATA NETWORK

Mobile | Help | FAQs | TOXNET Fact Sheet | Training Manual & Schedule

TOXNET Home > CTD Share

**CTD**  
A TOXNET DATABASE  
Comparative Toxicogenomics Database (CTD™)

SEARCH CTD | BROWSE CTD | ADVANCED SEARCH

e.g. benzene, endocrine disruptor Search

Search Term:  Records with:   Include Synonyms and CAS Numbers in Search

**About CTD**  
What is CTD?  
CTD contains manually curated data describing cross-species chemical-gene/protein interactions and chemical- and gene-disease relationships. The results provide insight into the molecular mechanisms underlying variable susceptibility and environmentally influenced diseases. These data will also provide insights into complex chemical-gene and protein interaction networks. CTD was developed at [North Carolina State University \(NCSU\)](#).  
Updates: The database is updated several times a year.

**Did you know**  
How do I lease/license the TOXNET databases?  
The following TOXNET databases are available for lease: ChemIDplus, DIRLINE, CCRIS, GENE-TOX, HSDB, and TOXLINE.  
For further information visit [Leasing Data from the National Library of Medicine](#).  
[More FAQs](#)

**Support**  
Resources  
[Help](#)  
[Fact Sheet](#)  
[Sample Record](#)  
[TOXNET FAQ](#)  
Contact Us  
Email: [tehip@tehl.nlm.nih.gov](mailto:tehip@tehl.nlm.nih.gov)  
Telephone: (301) 496-1131  
Fax: (301) 480-3537

**Environmental Health & Toxicology**  
Resources on environmental health and toxicology  
[Visit Site](#)

[toxnet.nlm.nih.gov/newtoxnet/ctd.htm](http://toxnet.nlm.nih.gov/newtoxnet/ctd.htm)

## Searching CTD

In TOXNET, users can search CTD by chemical or other name, diseases, Chemical Abstracts Service Registry Number, genes, GO terms, organisms, pathways, and references.

Use truncation (asterisks: \*), Boolean operators (AND, OR, NOT), and index browsing to refine the search results. Users can then be taken via the TOXNET's CTD results to the complete CTD site for further details.

Users can perform several types of searches, for example:

- ▶ Browse relationships among chemicals, and obtain detailed information about them, including structure, toxicology data and related genes, diseases, pathways and references.
- ▶ Browse relationships among diseases, and obtain detailed information about them, including related chemicals, genes, pathways, and references.
- ▶ Browse for genes from diverse vertebrates and invertebrates by symbol, synonym, accession ID, organism taxon, chemical, interaction type, disease or Gene Ontology annotation.
- ▶ Search for cross-species chemical–gene and protein interactions curated from the published literature. Interactions may be retrieved by chemical, interaction type, gene, organism or Gene Ontology annotation. Search for references by gene, organism taxon, chemical, chemical–gene interaction type, disease, citation information or accession ID.

Users can also easily conduct their CTD search strategy against other databases (e.g., Hazardous Substances Data Bank<sup>®</sup>, TOXLINE<sup>®</sup>, and ChemIDplus<sup>®</sup>).

## Additional Resources

For further information, review these additional resources:

- ▶ CTD Resource Guide  
[ctdbase.org/documents/ctd\\_resource\\_guide.pdf](http://ctdbase.org/documents/ctd_resource_guide.pdf)
- ▶ Glossary  
[ctdbase.org/help/glossary.jsp](http://ctdbase.org/help/glossary.jsp)
- ▶ Tutorials  
[ctdbase.org/help/tutorials.jsp](http://ctdbase.org/help/tutorials.jsp)
- ▶ CTD – Users E-mail List  
[ctdbase.org/help/emailListHelp.jsp](http://ctdbase.org/help/emailListHelp.jsp)
- ▶ Frequently Asked Questions  
[ctdbase.org/help/faq/](http://ctdbase.org/help/faq/)
- ▶ CTD Fact Sheet  
[nlm.nih.gov/pubs/factsheets/ctdfs.html](http://nlm.nih.gov/pubs/factsheets/ctdfs.html)

## CTD Search Exercises

 Go to [toxnet.nlm.nih.gov](http://toxnet.nlm.nih.gov).

 Click **CTD**.

**Exercise 1: What are the related genes and related diseases for acetone? Use CTD to find this information. Then, open the record in the main CTD database.**

Suggested Solution:

Type **acetone** in the Search field

Click **Search**

Click **Acetone** to view the record

Click the + next to **Genetic Information** in the Table of Contents

Select **Related Genes** in the Table of Contents

Review the information about related genes

Click the + next to **Disease Information** in the Table of Contents

Select **Related Diseases** in the Table of Contents

Review the information about related diseases

Click the **CTD** logo () in the upper right corner of the record display.

 The main CTD record opens in a new tab.

Review the CTD record.

Close the CTD tab to return to TOXNET.

Click **CTD Home** in the upper left area of the page to prepare for the next scenario.

### Scenario 1 – Disease Information

A researcher in occupational health is investigating the connections between exposure to the industrial chemical, trichloroethylene (TCE), and the later development of liver cancer. She is most interested in the connections between chemical exposure, genes, and disease.

**Search CTD to determine if TCE is associated with liver tumors in humans: Locate the TCE record in CTD. Open the CTD record. Find examples of liver tumors that have been inferred with TCE. What is the level of inference that has been reported for TCE and liver tumors?**

## Suggested Solution:

Type **TCE** in the [Search](#) box

Click **Search**

Click **Trichloroethylene** in the search results list

Click on the **Disease Information** section in the [Table of Contents](#)

Scroll to **Disease: Carcinoma, Hepatocellular**



The inference score reflects the degree of similarity between CTD chemical-gene-disease networks and a similar scale-free random network. The higher the score, the more likely the inference network has atypical connectivity.

View the **Inference Score** for the gene named [ABCB1: 38.83](#)

# Section 7: Risk Assessment

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## Integrated Risk Information System (IRIS)

**IRIS** (Integrated Risk Information System) contains data for more than 500 chemicals, compiled by the US Environmental Protection Agency (EPA), in support of human health risk assessment. Overall, IRIS focuses on the human health effects that may result from exposure to various substances found in the environment with data on hazard identification and dose-response assessments.

The screenshot shows the TOXNET website header with the NIH logo and navigation links. The main content area features the IRIS logo and a search interface with tabs for 'SEARCH IRIS', 'BROWSE IRIS', and 'ADVANCED SEARCH'. The search bar contains the text 'e.g. benzene, endocrine disruptor'. Below the search bar are options for 'Search Term' (singular/plura), 'Records with' (all of the word), and a checkbox for 'Include Synonyms and CAS Numbers in Search'. To the right is a 'Support' sidebar with links for 'Resources', 'Help', 'Fact Sheet', 'Sample Record', 'EPA Disclaimer', and 'TOXNET FAQ', along with 'Contact Us' information. Below the search bar are two informational boxes: 'About IRIS' and 'Did you know'. The 'About IRIS' box explains the database's purpose and update frequency. The 'Did you know' box lists available TOXNET databases and provides a link to 'Leasing Data from the National Library of Medicine'.

[toxnet.nlm.nih.gov/newtoxnet/iris.htm](http://toxnet.nlm.nih.gov/newtoxnet/iris.htm)

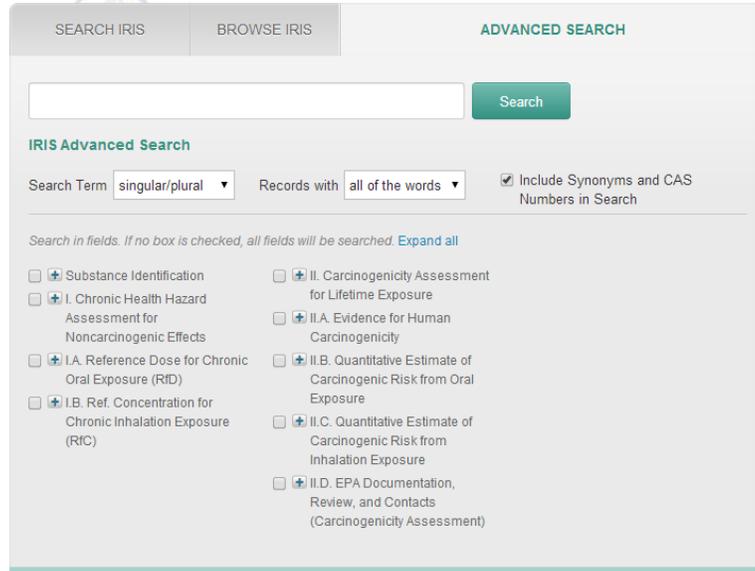
## Searching IRIS

Search IRIS by chemical or other name, chemical name fragment, Chemical Abstracts Service (CAS) Registry Number, and/or subject terms. Search results, displayed in relevancy ranked order, can easily be viewed, printed, or downloaded.

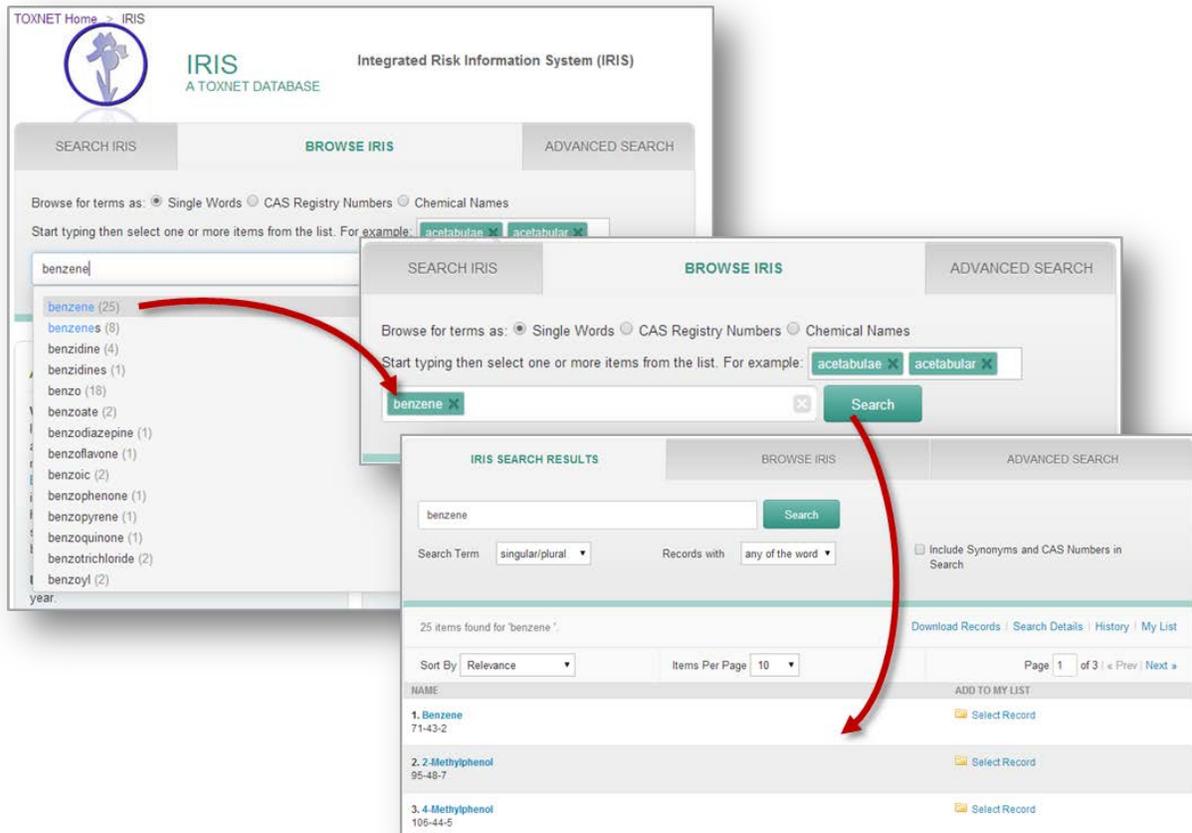
Use truncation (\*), Boolean operators (AND, OR, NOT), phrase searching, nested parentheses, limits, and index browsing to refine the search results.

Click the **Advanced Search** tab to search:

- ▶ Exact words, singular and plural forms, or word variants
- ▶ Records with the phrase, all words, or any words
- ▶ In specific fields or categories of fields, click the plus sign (+) to the left of a category to show all fields in that category. Use the **Expand all** link to display all available categories.



With the **Browse IRIS** tab, the system returns a list of index terms related to the search term entered. Select one or more index terms and click the **Search** button for the search results.



## Search Results

Search results are relevancy ranked. Relevancy ranking is based on the number of individual search terms occurring in a document, the number of times each search term occurs in a document, the rarity of the search terms within the database, and the nearness of search terms to each other. Records containing combinations of search terms tend to be ranked higher than records with isolated occurrences of search terms. When searching for a chemical, the retrieval may include other chemical records in addition to the initial matching chemical record (the **Primary Record**).

The screenshot displays the IRIS Search Results interface. At the top, there are tabs for 'IRIS SEARCH RESULTS', 'BROWSE IRIS', and 'ADVANCED SEARCH'. A search bar contains 'benzene' with a 'Search' button. Below the search bar, there are filters for 'Search Term' (singular/plural), 'Records with' (all of the words), and a checkbox for 'Include Synonyms and CAS Numbers in Search'. The results section shows '25 items found for "benzene".' and navigation options like 'Download Records', 'Search Details', 'History', and 'My List'. At the bottom, there are controls for 'Sort By' (Relevance), 'Items Per Page' (10), and 'Page 1 of 3'. A table of results is shown with columns for 'NAME' and 'ADD TO MY LIST'. A callout box labeled 'Primary Record' points to the first result: '1. Benzene' with a 'Select Record' button. A red box highlights the primary record and the first three additional records: '2. 2-Methylphenol', '3. 4-Methylphenol', and '4. Benzotrithloride', each with a 'Select Record' button.

These additional records appear if they contain the chemical name or search term. Click any of these non-primary chemicals on the **Search Results** screen to display the **Closest Match to Search Terms**, those where the chemical search term(s) appear with greatest frequency. The search term(s) are bolded and highlighted in yellow. The **Record** screen is organized into three sections:

1. Navigation options at the top of the record allow you to **View record in another database** (NLM databases), **Download Record**, **Print** the record, **Select Record** (adding it to your list), and view your list of selected records (**My List**).
2. A **Table of Contents** in the left frame allows users to choose categories and fields for display.
3. Chemical Data is shown in the right frame.

## Primary Record

IRIS: BENZENE CASRN: 71-43-2 This record appears in multiple databases.

View record in another database: IRIS [Download this Record](#) [Print](#) [Select Record](#) [My List](#)

**1**

TABLE OF CONTENTS

Show Selected Items Clear Expand all Collapse all

**2**

Closest Match to Search Terms

Full Record

Status

Substance Identification

I. Chronic Health Hazard Assessment for Noncarcinogenic Effects

II. Carcinogenicity Assessment for Lifetime Exposure

VI. Bibliography

VII. Revision History

Show Selected Items Clear

**3**

**Benzene**

CASRN: 71-43-2

C1=CC=CC=C1

For other data, click on the Table of Contents

Status:

STATUS OF DATA FOR **Benzene**

Search terms are bolded and highlighted in yellow

## Additional Chemical Record

IRIS: 2-METHYLPHENOL CASRN: 95-48-7 This record appears in multiple databases.

View record in another database: IRIS [Download this Record](#) [Print](#) [Select Record](#) [My List](#)

TABLE OF CONTENTS

Show Selected Items Clear Expand all Collapse all

Closest Match to Search Terms

Full Record

Status

Substance Identification

I. Chronic Health Hazard Assessment for Noncarcinogenic Effects

II. Carcinogenicity Assessment for Lifetime Exposure

VI. Bibliography

VII. Revision History

Show Selected Items Clear

**2-Methylphenol**

CASRN: 95-48-7

CC1=CC=C(O)C=C1

CLOSEST MATCH TO SEARCH TERMS

Displays excerpts in the record that contain your search words.

For other data, click on the Table of Contents

**II.A.3. Animal Carcinogenicity Data:**

Limited. Four skin application studies which had positive results are reported; however, the final two studies are of limited value due to the application of a mixture of chemicals. In a study by Boutwell and Bosch (1959), female Sutter mice (27-29/group; 2-3 months of age) received a single dermal application of 25 uL of 0.3% dimethylbenzanthracene (DMBA) in acetone as the initiator, followed 1 week later by 25 uL of 20% (w/v) o-, m- or p-cresol in benzene twice weekly for 12 weeks. Skin papillomas were evaluated at 12 weeks. Many of the cresol-treated mice had presumable of cresol toxicity. There was no mortality or evidence of skin papillomas in the

Search terms are bolded and highlighted in yellow

## Additional Resources

For further information, review these additional resources:

- ▶ IRIS Fact Sheet  
[nlm.nih.gov/pubs/factsheets/irisfs.html](https://nlm.nih.gov/pubs/factsheets/irisfs.html)
- ▶ EPA IRIS Web Site  
[epa.gov/NCEA/iris](https://epa.gov/NCEA/iris)
- ▶ TOXNET® Help Text - IRIS  
[toxnet.nlm.nih.gov/help/IRIShelp.htm](https://toxnet.nlm.nih.gov/help/IRIShelp.htm)

## IRIS Search Exercises

 Go to [toxnet.nlm.nih.gov](http://toxnet.nlm.nih.gov).

 Click **IRIS**.

### Exercise 1: What is the NOAEL (No Observed Adverse Effect Level) for significant proteinuria from cadmium?

Suggested Solution:

- Type **cadmium proteinuria** in the Search box
- Click **Search**
- Click **Cadmium**
- Click **Closest Match to Search Terms** in the Table of Contents
- Review the information in the right frame
- Click **IRIS Home** at the top left to prepare for the next search

### Exercise 2: What is the Inhalation Reference Concentration (RfC) of ammonia? (Note: The RfC is a non-carcinogenic risk assessment parameter). Also, view the Download options available.

Suggested Solution:

- Type **ammonia** in the Search box
- Click **Search**
- Click **Ammonia**
- Scroll down and review the **I.B. Reference Concentration for Chronic Inhalation Exposure (RfC)** information
- Click **I. Chronic Health Hazard Assessment for Noncarcinogenic Effects** in the Table of Contents
- Click **Download this Record** at the top of the page
- Review the Custom Formats
- Close Custom Formats window
- Click **IRIS Home** in the upper left to prepare for the next search

### Exercise 3: How does the US Environmental Protection Agency (EPA) characterize the carcinogenicity of methylmercury?

Suggested Solution:

- Type **methylmercury** in the [Search](#) box
- Click **Search**
- Click **Methylmercury (MeHg)**
- Click **II. Carcinogenicity Assessment for Lifetime Exposure** in the [Table of Contents](#)
- Scroll down to the **II.A. Evidence for Human Carcinogenicity** section
- Review the information retrieved
- Click **IRIS Home** in the upper left to prepare for the next search

### Exercise 4: What is the Inhalation BMC (Benchmark Concentration) for n-hexane?

Suggested Solution:

- Type **n-hexane** in the [Search](#) box
- Click **Search**
- Click **n-Hexane**
- Click the + next to **I. Chronic Health Hazard Assessment for Noncarcinogenic Effects** in the [Table of Contents](#)
- Click **I.B.1. Inhalation RfC Summary**
- Review the information retrieved
- Click **IRIS Home** in the upper left to prepare for the next search

### Exercise 5: Review the carcinogenicity assessment documentation listed for boron.

Suggested Solution:

- Type **boron** in the Search box
- Click **Search**
- Click **II. Carcinogenicity Assessment for Lifetime Exposure** in the [Table of Contents](#)
- Review the information retrieved

## International Toxicity Estimates for Risk (ITER)

**ITER** (International Toxicity Estimates for Risk) contains data in support of human health risk assessments. Compiled by Toxicology Excellence for Risk Assessment, ITER is a small database with data on more than 600 chemical records. It is structured to provide a comparison of international risk assessment information in a side-by-side format and explains differences in risk values derived by different organizations.

The screenshot shows the ITER database interface. At the top, there is a navigation bar with the NIH logo and 'U.S. National Library of Medicine' on the left, and 'TOXNET TOXICOLOGY DATA NETWORK' in the center. On the right of the navigation bar are links for 'Mobile', 'Help', 'FAQs', 'TOXNET Fact Sheet', and 'Training Manual & Schedule'. Below the navigation bar, the breadcrumb 'TOXNET Home > ITER' is visible, along with a 'Share' button. The main content area features a search bar with the text 'e.g. benzene, endocrine disruptor' and a 'Search' button. Below the search bar are options for 'Search Term' (singular/plural), 'Records with' (all of the words), and a checkbox for 'Include Synonyms and CAS Numbers in Search'. The page also includes sections for 'About ITER', 'Did you know', and 'Support'.

**SEARCH ITER** | BROWSE ITER | ADVANCED SEARCH

e.g. benzene, endocrine disruptor

Search Term:  Records with:   Include Synonyms and CAS Numbers in Search

**About ITER**

**What is ITER?**  
ITER contains data in support of human health risk assessments. It is compiled by Toxicology Excellence for Risk Assessment (TERA) and contains data from CDC/ATSDR, Health Canada, RIVM, U.S. EPA, IARC, NSF International and independent parties offering peer-reviewed risk values. ITER provides comparison charts of international risk assessment information and explains differences in risk values derived by different organizations.

**Updates:** The database is updated several times a year.

**Did you know**

**How do I lease/license the TOXNET databases?**

The following TOXNET databases are available for lease: ChemDplus, DIRLINE, CCRIS, GENE-TOX, HSDB, and TOXLINE.

For further information visit [Leasing Data from the National Library of Medicine](#).

[More FAQs](#)

**Support**

**Resources**

- [ITER Glossary](#)
- [What's New](#)
- [Risk Methods](#)
- [More about ITER](#)
- [Risk Assessment Links](#)
- [Help](#)
- [Fact Sheet](#)
- [Sample Record](#)
- [TOXNET FAQ](#)

**Contact Us**

Email: [tehip@tehl.nlm.nih.gov](mailto:tehip@tehl.nlm.nih.gov)  
Telephone: (301) 496-1131  
Fax: (301) 480-3537

**Environmental Health & Toxicology**

Resources on environmental health and toxicology

[Visit Site](#)

[toxnet.nlm.nih.gov/newtoxnet/iter.htm](http://toxnet.nlm.nih.gov/newtoxnet/iter.htm)

ITER provides risk data and cancer classifications. Information is derived from:

- ▶ Agency for Toxic Substances & Disease Registry (ATSDR)
- ▶ Health Canada
- ▶ US Environmental Protection Agency (EPA)
- ▶ International Agency for Research on Cancer (IARC)
- ▶ NSF International (National Sanitation Foundation)
- ▶ National Institute of Public Health & the Environmental (RIVM), The Netherlands

## Searching ITER

Search ITER by chemical or other name, chemical name fragment, Chemical Abstracts Service (CAS) Registry Number, and/or subject terms. By default, the system adds synonyms and CAS numbers to chemical searches.

Use truncation (\*), Boolean operators (AND, OR, NOT), nested parentheses, limits, and index browsing to refine the search results.

Click the **Advanced Search** tab to search:

- ▶ Exact words, singular and plural forms, or word variants
- ▶ Records with the phrase, all words, or any words
- ▶ In specific fields or categories of fields, click the plus sign (+) to the left of a category to show all fields in that category. Use the **Expand all** link to display all categories.

With the **Browse ITER** feature, the system returns a list of index terms related to the search term entered. Select one or more index terms and click the **Search** button for the search results.

## Search Results

The initial retrieval is displayed as a list of substance names highlighted in blue and their CAS Registry Numbers. Substances are listed in relevancy ranked order. Relevancy ranking is based on the number of individual search terms occurring in a document, the number of times each search term occurs in a document, the rarity of the search terms within the database, and the nearness of search terms to each other. Records containing combinations of search terms tend to be ranked higher than records with isolated occurrences of search terms. When searching for a chemical, the retrieval may include other chemical records in addition to the initial matching chemical record (the **Primary Record**).

The screenshot displays the ITER Search Results interface. At the top, there are tabs for 'ITER SEARCH RESULTS', 'BROWSE ITER', and 'ADVANCED SEARCH'. A search bar contains the term 'benzene'. Below the search bar, there are options for 'Search Term' (singular/plural), 'Records with' (all of the words), and a checkbox for 'Include Synonyms and CAS Numbers in Search'. The results section shows '11 items found for "benzene"'. Below this, there are options for 'Sort By' (Relevance), 'Items Per Page' (10), and 'Page 1 of 2'. The results are listed in a table with columns for 'NAME' and 'ADD TO MY LIST'. The first record is highlighted in blue and is identified as the 'Primary Record'. It contains the text: 'The following is the primary record for the chemical. All of the query terms were found.' Below this, there is a list of 10 additional records, each with a 'Select Record' button. These are identified as 'Additional Chemical Records'.

NAME	ADD TO MY LIST
The following is the primary record for the chemical. All of the query terms were found.	
1. BENZENE 71-43-2	Select Record
The following 10 records contain one or more of the requested chemical name(s) and all of the query terms anywhere in the record.	
2. DICHLOROBENZENE, 1,2- 95-50-1	Select Record
3. ALPHA-HEXACHLOROCYCLOHEXANE 319-84-6	Select Record
4. BUTADIENE, 1,3- 105-99-0	Select Record

These additional records appear if they contain the chemical name or search term. Click any of these non-primary chemicals on the **Search Results** screen to display the sections of the record best matching the query terms (**Closest Match to Search Terms**), those where the chemical search term(s) appear with greatest frequency. The search term(s) are bolded and highlighted in yellow.

The **Record** screen is organized into three sections:

1. Navigation options at the top of the record allow you to **View record in another database** (NLM databases), **Download Record**, **Print** the record, **Select Record** (adding it to your list), and view your list of selected records (**My List**).
2. A **Table of Contents** in the left frame allows users to choose categories and fields for display.
3. Chemical Data is shown in the right frame.

## Primary Record

ITER: **BENZENE** CASRN: 71-43-2 This record appears in multiple databases.

View record in another database: ITER    My List

**1** TABLE OF CONTENTS  
  Expand all Collapse all  
 Closest Match to Search Terms  
 Full Record  
 Substance Identification/Summary Table  
 Data - Noncancer Oral  
 Data - Cancer Oral  
 Data - Noncancer Inhalation  
 Data - Cancer Inhalation

**2**

**3** **BENZENE** CASRN: 71-43-2

**Substance Name:**  
**BENZENE**

Search terms are bolded and highlighted in yellow

## Additional Chemical Record

ITER: **DICHLOROBENZENE, 1,2-** CASRN: 95-50-1 This record appears in multiple databases.

View record in another database: ITER    My List

TABLE OF CONTENTS  
  Expand all Collapse all  
 Closest Match to Search Terms  
 Full Record  
 Substance Identification/Summary Table  
 Data - Noncancer Oral  
 Data - Cancer Oral  
 Data - Noncancer Inhalation  
 Data - Cancer Inhalation

**DICHLOROBENZENE, 1,2-** CASRN: 95-50-1

**CLOSEST MATCH TO SEARCH TERMS**  
 Displays excerpts in the record that contain your search words.  
 For other data, click on the Table of Contents

To view organizational risk data with risk tables and synopses, click on **FULL RECORD** in "Contents" table at left.

**Cancer Inhalation Specifics:**

## Additional Resources

For further information, review these additional resources:

- ▶ ITER Fact Sheet  
[nlm.nih.gov/pubs/factsheets/toxnetfs.html](http://nlm.nih.gov/pubs/factsheets/toxnetfs.html)
- ▶ TOXNET Help Text – ITER  
[toxnet.nlm.nih.gov/help/ITERhelp.htm](http://toxnet.nlm.nih.gov/help/ITERhelp.htm)
- ▶ What's New  
[tera.org/iter](http://tera.org/iter)

## ITER Search Exercises

 Go to [toxnet.nlm.nih.gov](http://toxnet.nlm.nih.gov).

 Click **ITER**.

### Exercise 1: Do ATSDR and US EPA currently have any noncancer oral risk data for the chemical acetone?

Suggested Solution:

Type **acetone** in the [Search](#) box  
Click **Search**  
Click **ACETONE**  
Click the + next to **Data - Noncancer Oral** in the [Table of Contents](#)  
Click **Noncancer Oral Risk Values Table** in the [Table of Contents](#)  
Review the information in the right frame  
Click the + next to **Data - Cancer Oral** in the [Table of Contents](#)  
Click **Cancer Oral Risk Values Table** in the [Table of Contents](#)  
Review the information in the right frame  
Click **ITER Home** in the upper left to prepare for the next search

### Exercise 2: How many international agencies have classified dichloroacetic acid as carcinogenic to humans?

Suggested Solution:

Type **dichloroacetic acid** in the [Search](#) box  
Click **Search**  
Click **DICHLOROACETIC ACID**  
Review the information displayed (the full record is shown by default)  
Click **ITER Home** in the upper left to prepare for the next search

**Exercise 3: How do the Dutch RIVM, Health Canada, and ATSDR compare in their noncancer inhalation risk values for nickel oxide?**

Suggested Solution:

- Type **nickel oxide** in the [Search](#) box
- Click **Search**
- Click **NICKEL OXIDE**
- Click the + next to **Data - Noncancer Inhalation** in the [Table of Contents](#)
- Click **Noncancer Inhalation Risk Values Table** in the [Table of Contents](#)
- Review the **Noncancer Inhalation Risk Values Table**

# Section 8: Environmental Health

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## Toxics Release Inventory (TRI)

**TRI** (Toxics Release Inventory) is a publicly available resource of the US Environmental Protection Agency (EPA). It contains detailed information on more than 650 chemicals and chemical categories, which more than 23,000 US industrial and Federal facilities manage through disposal or other releases, recycling, energy recovery, or treatment. This inventory was established under the Emergency Planning and Community Right to Know Act of 1986 (EPCRA) and was expanded by the Pollution Prevention Act of 1990. TRI's data, beginning with the 1987 reporting year, cover air, water, land, and underground injection releases as well as transfers to waste sites.

The screenshot shows the TOXNET TRI database search interface. At the top, there is a navigation bar with the NIH logo and the text "U.S. National Library of Medicine TOXNET TOXICOLOGY DATA NETWORK". Below this, there are links for "Mobile", "Help", "FAQs", "TOXNET Fact Sheet", and "Training Manual & Schedule". The main content area is titled "TRI A TOXNET DATABASE" and "Toxics Release Inventory (TRI)". It features a search bar with the text "SEARCH TRI Enter chemical name or CAS Registry Number" and a "Search" button. Below the search bar, there is a checkbox for "Include Synonyms and CAS Numbers in Search". On the left, there is a list of "TRI Files" with a "Select all years" link. The list includes years from 1999 to 2012, with TRI2012 selected. On the right, there are several filter sections: "TRI Facility Names" (e.g., Facility 1, Facility 2), "TRI Reporting Form Type" (Both Form R and Form A), "TRI Facility Location" (e.g., NJ, DE, Trenton/NJ, Montgomery County/MD, or 21113, separate multiple entries with commas), "Release Greater Than" (0 lbs for None selected), and "Classification Code" (Standard Industrial (1987-2005 only) or North American Industry (1988 to present) (e.g., 112340, 221310, separate multiple entries with commas)). On the far right, there is a "Support" sidebar with links for "Resources" (Help, Fact Sheet, Sample Record, TOXNET FAQ) and "Contact Us" (Email: tehip@tehl.nlm.nih.gov, Telephone: (301) 496-1131, Fax: (301) 480-3537). Below the sidebar, there is a banner for "Environmental Health & Toxicology" with a "Visit Site" button.

[toxnet.nlm.nih.gov/newtoxnet/tri.htm](http://toxnet.nlm.nih.gov/newtoxnet/tri.htm)

## Searching TRI

Search TRI by chemical or other name, chemical name fragment, Chemical Abstracts Service (CAS) Registry Number, and/or subject terms. By default, the system adds synonyms and CAS numbers to chemical searches. Use limits to refine the search results. TRI currently contains data from 1987 through 2012. By default the system will search the most current year. Limit the search with the following criteria:

- ▶ Facility Name
  - ▶ TRI Reporting Form Type
    - Ability to search for either Form R (long) or Form A (short) or both
  - ▶ Facility Location
    - Select State, City/State, County/State, or ZIP Code
  - ▶ Weight in pounds (Greater Than)
    - ▶ Type of release (onsite-air, onsite-water, onsite-land, onsite-underground injection, total disposal, or total production-related waste)
  - ▶ Standard Industrial Classification Code or North American Industry Classification System Code
    - Separate multiple entries with commas

The screenshot shows the 'SEARCH TRI' interface with the following fields and options:

- SEARCH TRI**: Enter chemical name or CAS Registry Number. Includes a 'Search' button and a checkbox for 'Include Synonyms and CAS Numbers in Search'.
- TRI Files**: A list of years from 1999 to 2012, with 'TRI2012' selected.
- TRI Facility Names**: A text input field for facility names.
- TRI Reporting Form Type**: A dropdown menu set to 'Both Form R and Form A'.
- TRI Facility Location**: A dropdown menu for state selection and a text input for city/county/ZIP.
- Release Greater Than**: A dropdown menu for weight in pounds, currently set to '0 lbs', and a dropdown for release type, currently set to 'None selected'.
- Classification Code**: A text input field for Standard Industrial or North American Industry Classification codes.

## Search Results

The initial retrieval is displayed as a list of abbreviated records with the facility name (which links to the record), chemical name, and city and state where the facility is located. Relevancy ranking is based on the number of individual search terms occurring in a document, the number of times each search term occurs in a document, the rarity of the search terms within the database, and the nearness of search terms to each other. Records containing combinations of search terms tend to be ranked higher than records with isolated occurrences of search terms.

The screenshot shows the 'TRI2012 SEARCH RESULTS' page for a search of 'benzene'. The search bar contains 'benzene' and a 'Search' button. Below the search bar, it indicates '977 items found' and provides links for 'Calculate Totals', 'Map it with TOXMAP', 'Download Records', 'Search Details', 'History', and 'My List'. The results table has columns for 'NAME' and 'ADD TO MY LIST'. The first result is '1. BP PRODUCTS NA INC WOOD RIVER TERMINAL' with 'BENZENE' and 'WOOD RIVER, IL' listed below it. Three callout boxes point to specific parts of the interface: 'Facility Name (link)' points to the facility name, 'Search term' points to 'BENZENE', and 'Facility Location' points to 'WOOD RIVER, IL'.

## Record Screen

The Record screen is organized into three sections:

1. Navigation options at the top of the record allow you to **View record in another database** (NLM databases), **Download Record**, **Print** the record, **Select Record** (adding it to your list), and view your list of selected records (**My List**).
2. A **Table of Contents** in the left frame allows users to choose categories and fields for display.
3. Data is shown in the right frame. Click the **Map it with TOXMAP** button on the right to visually explore on-site releases in TOXMAP® classic.

Search Details | History ◀ Previous Record | Next Record ▶

**TRI2012: BENZENE** CASRN: 71-43-2 This record appears in multiple databases.

1 View record in another database: TRI2012    My List

2 **TABLE OF CONTENTS**  
  Expand all Collapse all  
 Full Record  
 Facility Identification  
 Substance Identification  
 On-site Releases of Chemical  
 Off-Site Waste Transfer  
 Source Reduction and Recycling  
 Waste Treatment  
 Administrative Information

3 **TRI2012**  
**BENZENE**  
**BP PRODUCTS NA INC WOOD RIVER**  
**TERMINAL**  
**WOOD RIVER, IL**

View the record in TOXMAP (refer to the TOXMAP section in this workbook)

**FULL RECORD DISPLAY**  
 Displays all fields in the record.  
 For other data, click on the Table of Contents

## Additional Resources

For further information, review these additional resources:

- ▶ TRI Fact Sheet  
[nlm.nih.gov/pubs/factsheets/trifs.html](http://nlm.nih.gov/pubs/factsheets/trifs.html)
- ▶ TRI/EPA  
[epa.gov/tri](http://epa.gov/tri)
- ▶ North American Industry Classification System (NAICS) Code  
[www2.epa.gov/toxics-release-inventory-tri-program/my-facilitys-six-digit-naics-code-tri-covered-industry](http://www2.epa.gov/toxics-release-inventory-tri-program/my-facilitys-six-digit-naics-code-tri-covered-industry)

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## TOXMAP®

**TOXMAP** is a Geographic Information System (GIS) that uses maps of the United States to help users visually explore data from the US Environmental Protection Agency's (EPA) Toxics Release Inventory (TRI) and Superfund programs. TOXMAP helps users create nationwide, regional, or local area maps showing where TRI chemicals are released on site into the air, water, and ground. Maps can also show locations of Superfund sites on the National Priorities List (NPL). The NPL guides the Federal Government in determining which sites should be investigated. It is updated on a regular basis.

Two versions of TOXMAP are available: the classic version of TOXMAP released in 2004, and a new version of TOXMAP based on Adobe® Flash/Flex technology. In addition to many of the features of TOXMAP classic, the new version provides an improved map appearance and interactive capabilities as well as a more current GIS appearance. This includes seamless panning, immediate update of search results when zooming to a location, two collapsible side panels to maximize map size, and automatic size adjustment after a window resize. The new TOXMAP also has improved US Census layers and availability by Census Tract (2000 and 2010), Canadian National Pollutant Release Inventory (NPRI) data, US commercial nuclear power plants, and improved and updated congressional district boundaries. Both versions of TOXMAP can be accessed from [toxmap.nlm.nih.gov](http://toxmap.nlm.nih.gov). Entering the site will prompt users to select the classic or beta version.

The screenshot shows the TOXMAP website interface. At the top, it features the U.S. Department of Health & Human Services logo and the NIH U.S. National Library of Medicine logo. The main header includes the TOXMAP Environmental Health Maps logo and navigation links for Home, About, News, FAQ, and Glossary. Below the header, there is a section titled "Two Ways to Explore Toxic Chemicals in Your Community" with two columns. The left column is for TOXMAP classic, showing a map of the United States with numerous red and blue markers. The right column is for TOXMAP beta, showing a similar map but with a more modern, interactive appearance. To the right of the maps, there is a "News" section with a list of updates, including "TOXMAP beta now includes TRI 2012 data". Below the news is a "More Information" section with a list of frequently asked questions and links. At the bottom of the page, there is a note about pop-up blockers and a link to the TOXMAP website.

U.S. Department of Health & Human Services | www.hhs.gov

NIH U.S. National Library of Medicine | TOXMAP Environmental Health Maps

Home | About | News | FAQ | Glossary | NLM Environmental Health Portal

Two Ways to Explore Toxic Chemicals in Your Community

Connect with Us | Share

**TOXMAP classic**

**TOXMAP beta**

**News**

- TOXMAP beta now includes TRI 2012 data
- New TOXMAP web site
- See all TOXMAP news

**More Information**

- What is TOXMAP?
- Which TOXMAP should I use?
- What is the Toxics Release Inventory (TRI)?
- What is the "Superfund" Program?
- Does TOXMAP show all sources of toxic chemicals?
- What data sources does TOXMAP use?
- Learn to use TOXMAP

Note: Both versions of TOXMAP open in new windows - please disable pop-up blockers.

TOXMAP belongs to a group of TOXNET databases related to toxicology, hazardous chemicals, environmental health, and toxic releases.

[toxmap.nlm.nih.gov](http://toxmap.nlm.nih.gov)

## TOXMAP Classic

**TOXMAP® Environmental Health e-Maps**

Use Quick Search or click on a map to explore on-site toxic chemical releases and hazardous waste sites from the EPA's [Toxics Release Inventory \(TRI\)](#) and the [Superfund National Priorities List \(NPL\)](#).

TRI facilities (blue) and Superfund NPL sites (red).

Portal to environmental health and toxicology resources

This site complies with the [HONcode standard for trustworthy health information](#) (verify here).

### Map Features

TOXMAP classic offers several ways to create maps: using the tabs and sub-tabs along the top of the page, the **Quick Search** box on the homepage, and the **Map Controls** below each created map.

**MAP CONTROLS**

**TRI** [Save results]  None  Facilities : 2011  Releases : 2011  Trends

**Superfund** [Save results]  None  All NPL  NPL Final  NPL Deleted  NPL Proposed

**Demographic** [?]  None  Population Density - 2000

[Apply other demographics](#)

TOXMAP classic can create several types of maps:

- ▶ TRI Facilities
- ▶ TRI Chemical Releases
- ▶ TRI Chemical Trends
- ▶ Superfund Maps
- ▶ Combination (Combo) Maps
- ▶ Search (Advanced)

TOXMAP classic also overlays map data such as:

- ▶ US Census Data—1990 and 2000 demographics (population, ethnicity, age, gender ratio)
- ▶ Income Data—per capita personal income
- ▶ Health Data—mortality data for cancer and various causes
- ▶ Reference Data—cities, roads, hospitals, Federal land, and urban areas

**DISCLAIMER:** The co-occurrence of a substance and a particular health problem does not by itself imply an effect on human health by that substance.

## Searching and Creating Maps in TOXMAP Classic

TOXMAP classic's **Quick Search** feature on the homepage allows users to search TRI and Superfund data by chemical and to zoom the resulting map to a specific city, state, or ZIP Code. More advanced search options are available by clicking the [More search options...](#) link or by selecting the **Search** tab at the top of the page.

The **Search** page allows users to search a chemical CAS RN, TRI facility name/ID, release year ranges, release medium, release amount, Superfund NPL site name/ID/status, and Hazard Ranking System (HRS) score. Also, specific geographic regions can be selected. Release color coding is calibrated only for releases in that region rather than for the entire nation.

**Quick Search**

Select Dataset(s):

TRI  Superfund NPL

Chemical Name

City

State ZIP [Lookup]

-- v

[Zoom to a place...](#)  
[Choose a region...](#)  
[More search options...](#)

[Search TOXNET® TRI](#)

U.S. National Library of Medicine

**TOXMAP® classic**  
 Environmental Health Maps

Home
TRI Facilities
TRI Releases
TRI Trends
Superfund
Combo
Search
Help
Contact Us

▶ Edit Search
Display Map
Set Region
Other Data
Download

**Search**

Click the "Set Region" tab to show results only in a specified geographic region. [?](#)

---

**CHOOSE A CHEMICAL** [?](#)

Chemical: 
 CAS RN [?](#):

TRI or Superfund Chemical [?](#)

**CHOOSE A DATASET**

**Toxics Release Inventory (TRI)** [?](#)

Search all TRI facilities  
 Search only facilities with the selected chemical  
 Do not search TRI facilities

**Superfund National Priorities List (NPL)** [?](#)

Search all Superfund sites  
 Search only NPL sites with the selected chemical  
 Do not search Superfund sites

TRI Facility Name

TRI Facility ID [?](#)

Release Medium [?](#)

Any Medium  
 Water  
 Air  
 Land  
 Underground Injection

Release Years [?](#)  to

Release Exceeds [?](#)  lbs.

NPL Site Name

EPA ID [?](#)

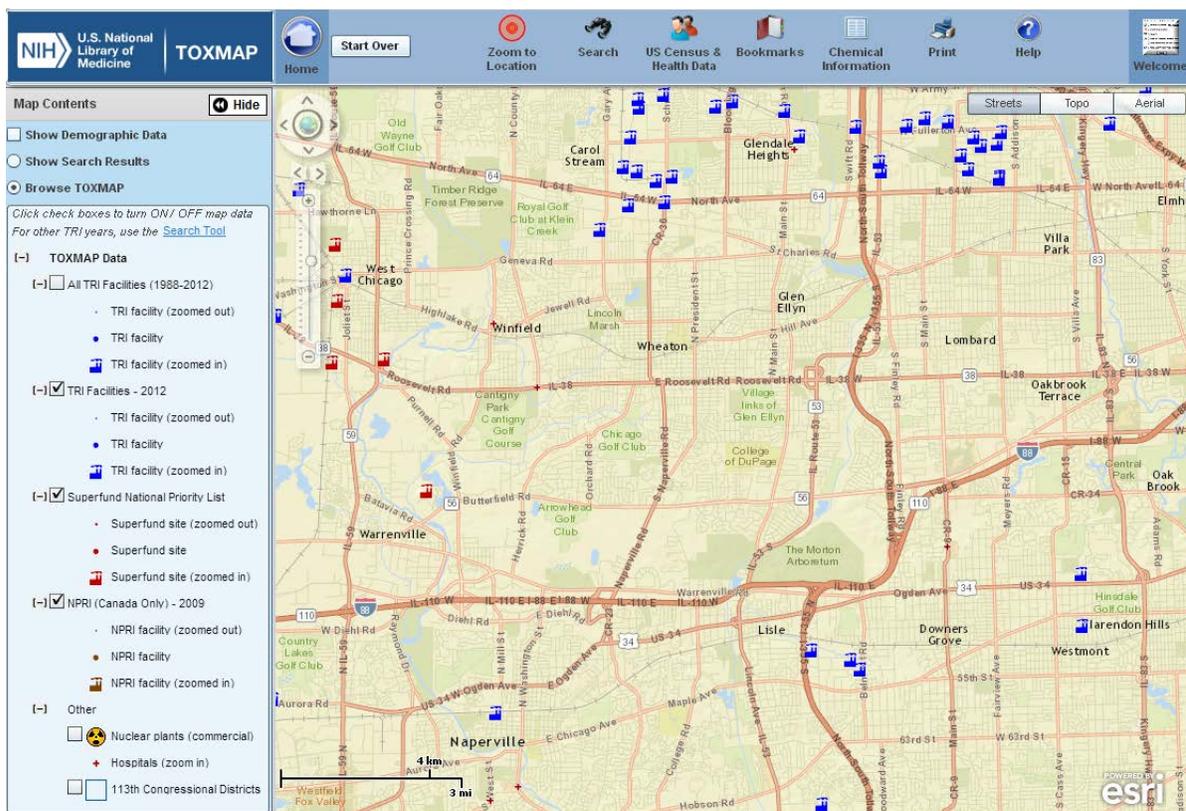
NPL Status [?](#)

All  
 Final  
 Proposed  
 Deleted

Hazard Ranking System Score [?](#)  to

Auto-zoom map to include all search results

## TOXMAP Beta



### Map Features

When first launched, TOXMAP beta displays a Welcome window allowing you to select what you want to do with TOXMAP. The default selection is to Browse TOXMAP.

**Welcome to TOXMAP**

TOXMAP® helps you **explore on-site toxic releases and hazardous waste sites** from:

- [US EPA's](#) **Toxics Release Inventory (TRI)**;
- EPA's **Superfund** [National Priorities List \(NPL\)](#); and
- [Environment Canada's](#) **National Pollutant Release Inventory (NPRI)**.

TOXMAP does **NOT show all sources of toxic chemicals** in the environment. Mouse over **highlighted terms** for more information.

begins a new session and **clears all searches**.

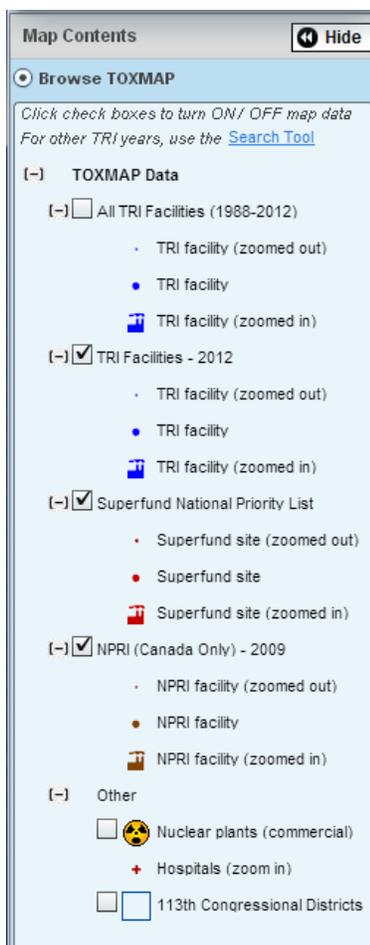
The **Welcome icon** in the upper right corner returns you to this window but **keeps your current map**.

**What do you want to do with TOXMAP?**

- Browse TOXMAP: **TRI, Superfund, NPRI**
- Zoom to a location (US and Canada only)
- Search US TRI and Superfund NPL
- View US Census, income, and health data
- View information on toxic chemicals
- New user? View Help (including FAQ, tutorials, ...)

After selecting the desired option and clicking the **Go** button, the interactive map is displayed. From here, you can interact with the map by panning and zooming as needed.

TOXMAP offers several ways to modify the map: using the icons along the top of the page, using the view options in the upper right corner of the map, and using the **Map Contents** panel to the left of the map.



TOXMAP provides several map layers that can be toggled:

- ▶ TRI facilities 2012
- ▶ All TRI facilities
- ▶ Superfund
- ▶ NPRI (Canada only)
- ▶ Nuclear plants
- ▶ Congressional districts

TOXMAP also overlays demographic map data, including US Census & Health Data, such as:

- ▶ 1990, 2000, and 2010 demographics (options depend on the year selected)
  - **Population**—density, gender ratio, and diversity index
  - **Age**—median age, under 18, and over 65 years of age
  - **Race**
  - **Cancer and Disease Mortality** (coming soon)
- ▶ **Income**—per capita personal income by year (1988-2008)

**DISCLAIMER:** The co-occurrence of a substance and a particular health problem does not by itself imply an effect on human health by that substance.

### Searching and Interacting with TOXMAP

TOXMAP's Search feature—accessible from the **Welcome** window and the toolbar—allows you to search TRI and Superfund data. You can optionally search by chemical and/or TRI release year, and you can zoom to a particular city, state, or ZIP Code. When you specify a state or ZIP Code, then only results from the specified state (or state containing the ZIP code) are displayed and TRI release color-coding is calibrated only for releases in that state rather than for the entire nation.

In the resulting Search Results side panel, move the mouse over facilities to highlight them on the map. Click the name in the list or the point on the map to pop up details about the facility. On the details window, click **more...** to see chemical release and other details. To return to all TOXMAP data, click **Browse TOXMAP** in the Map Contents side panel or via the Welcome window which can itself be accessed with the icon in the upper-right corner.

TOXMAP features include:

- ▶ **Zoom to Location**—Click this option to open the [Zoom to Location](#) window. Here, zoom to a specific location on the map by entering an address or place, or by providing a longitude and latitude.
- ▶ **Search**—Click the **Search** button at the top of the page to open the [Search](#) window. Here, several search options are provided, including searching TRI, Superfund, or both datasets for a specific chemical, year, city, state, or ZIP Code. Up to the top 1000 releasing TRI facilities will be shown.
- ▶ **US Census & Health Data**—Opens the demographics window, allowing users to select census and health overlay options.
- ▶ **Bookmarks**—Opens the list of bookmarks that zoom the map to specific locations. The list provides bookmarks to the entire United States and to various country regions. It also allows users to create their own bookmarks.
- ▶ **Chemical Information**—Opens a window allowing users to select specific chemicals from TRI, Superfund, or both datasets. Double-clicking a chemical displays it in the [View Details](#) tab, which links to various NLM and CDC resources. The [Health Risk Information](#) tab provides links to other related information.
- ▶ **Start Over**—Clears your map and refreshes the page.

## Additional Resources

For further information, review these additional resources:

- ▶ TOXMAP Fact Sheet  
[nlm.nih.gov/pubs/factsheets/toxmap.html](http://nlm.nih.gov/pubs/factsheets/toxmap.html)
- ▶ TOXMAP Brochure  
[toxmap.nlm.nih.gov/toxmap/home/TOXMAP\\_Brochure.pdf](http://toxmap.nlm.nih.gov/toxmap/home/TOXMAP_Brochure.pdf)
- ▶ TOXMAP FAQ  
[toxmap.nlm.nih.gov/toxmap/faq.html](http://toxmap.nlm.nih.gov/toxmap/faq.html)
- ▶ TOXMAP classic FAQ  
[toxmap-classic.nlm.nih.gov/toxmap/help/faq.jsp](http://toxmap-classic.nlm.nih.gov/toxmap/help/faq.jsp)
- ▶ TOXMAP classic Tour  
[toxmap.nlm.nih.gov/toxmap/tour/index.html](http://toxmap.nlm.nih.gov/toxmap/tour/index.html)
- ▶ TOXMAP Tour  
[youtu.be/QUMRCH7YuU8](https://youtu.be/QUMRCH7YuU8)

## Stay Connected



Subscribe to TOXMAP news feed

[toxmap.nlm.nih.gov/toxmap/news/atom.xml](http://toxmap.nlm.nih.gov/toxmap/news/atom.xml)

## TRI /TOXMAP Decision Tree

**TRI (Toxics Release Inventory)** is the US Environmental Protection Agency's (EPA) publicly available database that contains information on toxic chemical releases and waste management activities, and more recently, source reduction and recycling information, reported annually by US industrial and Federal facilities beginning with the 1987 reporting year. TRI is accessible via the National Library of Medicine<sup>®</sup> (NLM) **TOXNET<sup>®</sup>** (TOXicology Data NETwork) databases, which cover toxicology, hazardous chemicals, environmental health and related areas.

**TOXMAP** is a geographic information system from the NLM Division of Specialized Information Services that uses maps of the United States to help users visually explore data from the EPA's TRI and Superfund Program. With TOXMAP, users can create nationwide, regional, or local area maps showing where TRI chemicals are released on-site into the air, water, and ground. Information on the releasing facilities is provided. Maps can also show locations of Superfund sites, with listings of all chemical contaminants present at these sites.

Use this decision tree to choose the correct database:

Use TRI if...	Use TOXMAP if...
<ul style="list-style-type: none"> <li>▶ You want full-reference, book-style information on TRI facilities or releases</li> <li>▶ You are using other TOXNET resources</li> <li>▶ You want to benefit from chemical synonyms</li> <li>▶ You would like to use a browse interface</li> <li>▶ You want to calculate the total release of chemicals</li> <li>▶ You want multiple sorting options for search results</li> </ul>	<ul style="list-style-type: none"> <li>▶ You are interested in a health-related presentation of data</li> <li>▶ You want to see TRI locations on a map</li> <li>▶ You are interested only in on-site chemical releases</li> <li>▶ You want to search by combinations of states and/or counties</li> <li>▶ You are also interested in Superfund sites and/or demographic data</li> <li>▶ You only want location data from the Federal Registry System (not self-reported locations)</li> </ul>

Use this decision tree to choose the correct TOXMAP version:

Use TOXMAP beta if...	Use TOXMAP classic if...
<ul style="list-style-type: none"> <li>▶ You want a more responsive map with a rich user experience</li> <li>▶ You have the free Adobe Flash Player</li> <li>▶ You want a map experience that reflects regular updates and enhancements</li> <li>▶ You want a map that offers Census layers (including for Census 2010) available by county and by Census Tract</li> </ul>	<ul style="list-style-type: none"> <li>▶ You cannot or choose not to install the free Adobe Flash Player</li> <li>▶ You do not wish to use a pre-release Web site</li> <li>▶ You require features that are currently only available in TOXMAP classic, including Advanced Search, the ability to save your search results, and regional TRI summaries</li> <li>▶ You have an old computer, a slow Internet connection, or a screen resolution of less than 1100 pixels wide or 800 pixels high</li> <li>▶ You are visually impaired</li> </ul>

## TRI/TOXMAP Classic Search Exercises

### Search Exercises

The following exercises have been designed to be completed in sequence, beginning in TRI and moving to TOXMAP classic.

 Go to [toxnet.nlm.nih.gov](http://toxnet.nlm.nih.gov).

 Click **TRI**.

**Exercise 1: Search TRI to gather environmental information about methanol in Mississippi, including: how much methanol was released in Mississippi, where the release(s) occurred, and what type of release(s) occurred.**

Suggested Solution:

- Type **methanol** in the Chemical Name or CAS Registry Number Search box
- Select **State** from the drop-down menu next to **TRI Facility Location**
- Type **MS** in the **TRI Facility Location** field
- Click **Search**
- Click **Calculate Totals** at the top of the search results
- Review the calculation results
-  Information is for the most recently reported year available from EPA.
- Close the pop-up window
- Click **TRI Home** in the upper left to prepare for the next search

**Exercise 2: Did any facilities in Mississippi release more than 100 pounds of methanol to the air in 2006? Map the releases in TOXMAP and view the environmental release information for the first facility.**

Suggested Solution:

- Type **methanol** in the TRI Chemical Name Search box
- Select **State** from the **TRI Facility Location** drop-down menu
- Type **MS** in the TRI Facility Location field
- Select **100 lbs** from the Release Greater Than drop-down menu
- Select **Total On-site Air Release** from the drop-down menu under Release Greater Than
- Click **Search**
- Click the first facility link in the list of **Facility/Substance** names

- Click **On-site Releases of Chemical** in the [Table of Contents](#)
- Review the information in the right frame
- Click **Map it with TOXMAP** ()
- Select **MS** from the [ZOOM TO](#) drop-down menu just to the left of the map
- Click **TRI on-site release details** to the right of the map under [Map Details](#)
- Click the facility name link under **Facilities reporting to TRI** to the right of the map
- Review the **On-site Release Estimates** and [All chemicals reported by this facility](#)

### Exercise 3: Link to HSDB to explore the human health effects of methanol.

Suggested Solution (continued from previous exercise):

- Scroll to the top of the page and find the **Information about this chemical** section to the left of the map
- Click **Human Health Effects** under [Information about this Chemical](#)
- Review the information in the HSDB Search Results window
- Close the HSDB window and return to the TOXMAP results page
- Click **Start over** at the top right of the page to prepare for the next search

### Exercise 4: What TRI facility in EPA Region 5 released the most chemicals on site in 2004? What were the top five chemicals released by that facility in 2004?

Suggested Solution:

- Click **Choose a region** in the [Quick Search](#) box
- Select **EPA Region 5** from the [Pre-defined Region](#) list
- Click **Submit**
- Select **Define Map** sub-tab at the top of the page
- Select **2004** from the [Facilities](#) drop-down menu
- Click **Submit**
- Click **TRI facilities details** in the [MAP DETAILS](#) box
- Click the first facility name in the **Facilities reporting to TRI** list
- View the facility name and the chemicals listed in the **Chemical (summary table)**

Click **Start over** at the top left of the page to prepare for the next search

### Exercise 5: How many NPL Final Superfund sites are located in New England?

Suggested Solution:

- Click **Choose a region** in the Quick Search box
- Select **New England** from the Pre-defined Region list
- Click **Submit**
- Click the **Superfund** tab at the top of the page
- Click the **NPL Final** sub-tab
- View the search results above the map to see how many NPL Final sites are in this region

### Scenario 1 – Mapping TRI and Health Data in TOXMAP Classic

Teresa, an epidemiologist, is familiar with the TRI database. She has learned about TOXMAP and decides to take a look at cancer data for females and chemical releases from 2001 to 2005 for styrene in her home state of New Jersey, excluding Superfund NPL. Monitoring data indicate that populations may be exposed to styrene through inhalation of air polluted by industrial sources, so she wants to limit her search to air releases. Teresa knows current studies do not provide adequate evidence to classify styrene as a human carcinogen.

 Go to [toxnet.nlm.nih.gov](http://toxnet.nlm.nih.gov).

 Click **TOXMAP**.

 Click **TOXMAP classic**.

Suggested Solution (TOXMAP classic):

- Click **Search** tab at the top of the page ()
- Click the **Chemical** button under Choose a Chemical
- Type **styrene** in the Chemical Name Search box
- Click the **Water**, **Land**, and **Underground Injection** checkboxes to deselect them (if they are currently selected)
- Select **2001** and **2005** in the **Release Years** drop-down menus
- Click **Search**
-  Note that this shows releases for all of the United States and territories.

- Select the **Set Region** sub-tab
- Click the **Create a new region** link
- Select **New Jersey** from the US States and Territories drop-down menu
- Click **Add selected>>** to add New Jersey, all counties to the **Region County List states/counties**
-  Note that assigning a region name is optional. However, naming the search makes it easy to identify when saved as a previous search.
- Click **Submit**
- Click **Continue to map**
- Click **Health Data** under Map Other Data to the left of the page
- Select **Mortality, Cancers 2004-2008**
- Select **All Malignant Cancers - All Races - Female** from the Mortality, Cancer 2004-2008 list
- Click **Submit**
- Click **Show legend values** in the legend below the map
- View the map legend to interpret the information
- Click **Start Over** to prepare for the next search

## Scenario 2 – Mapping TRI and Health Data in TOXMAP Classic

You are a public health professional researching lung cancer. You are interested in all releases of benzene, a known carcinogen, in Texas between 1995 and 2001.

Suggested Solution:

- Click **Search** tab at the top of the page ()
- Type **benzene** in the Chemical Name Search box or select it from the **chemical drop-down menu**
- Select **1995** and **2001** in the **Release Years** drop-down menus
- Click **Search**
-  This zooms the map to include all search results
- Select **TX** from the ZOOM TO drop-down menu to the left of the map
- Click **Health Data** under Map Other Data to the left of the page
- Select **Mortality, Cancers 2004-2008**
- Select **Lung and Bronchus - All Races - Female** from the Mortality, Cancer 2004-2008 list
- Click **Submit**
- Click **Show legend values** in the legend below the map
- View the map legend to interpret the information
- Click **Start over** at the top right of the page to prepare for the next search

This page was intentionally left blank.

## TOXMAP Beta Exercises

The following exercises have been designed to be completed in TOXMAP beta.

 Go to [toxmap.nlm.nih.gov](http://toxmap.nlm.nih.gov).

 Select **TOXMAP beta**.

 Click **Go**.

**Exercise 1: Using population data from the 2010 US Census, create a map displaying the Hispanic population in Mississippi.**

Suggested Solution:

Select **Zoom to a Location (US and Canada only)**

Click **Go**

Select **Mississippi** from the State or Province drop-down menu

Click **Zoom to**

Click **US Census and Health Data** at the top of the map

Click the **Race** tab

Click the **US Census 2010** tab

Select **Hispanic**

Click the close button () on the US Census & Health Data window

Click the close button () on the Zoom to Location window

Review the map

Click the **Start Over** button in the top left area of the map

**Exercise 2: Rickenbacker Air National Guard base in Lockbourne, Ohio, is a proposed NPL Superfund site. What are some of its contaminants?**

Suggested Solution:

- Select **Browse TOXMAP**
- Click **Go**
- Select only the **Superfund National Priority List** under TOXMAP Data to the left of the map
-  Deselect all the other TOXMAP data sets by unchecking the boxes
- Click **Zoom to Location** near the top center of the map
- Type **Rickenbacker Air National Guard** in the Address or Place search box
- Type **Lockbourne** in City search box
- Select **Ohio** from the State or Province drop-down menu
- Click **Zoom to**
- Click the close button () on the **Zoom to Location** window
- Click the superfund site symbol ()
- Click **more...** on the Superfund Site Details window
- Review the list of contaminants
- Click **Close Window** at the bottom of the display area
- Click the **Start Over** button in the top left area of the map

### Exercise 3: How many facilities in West Virginia released mercury compounds for all years in TOXMAP?

Suggested Solution:

- Select **Search US TRI and Superfund NPL**
- Click **Go**
- Select **TRI** next to Dataset(s)
- Enter **mercury compounds** in the Chemical Name field
- Select the **All years** checkbox
- Select **West Virginia** from the State drop-down menu
- Click **Search**
- Review the results to the right of the page to answer the question
- Click the **Start Over** button in the top left area of the map

### Exercise 4: View a topographic map of Vancouver, Canada's National Pollutant Release Inventory (NPRI) facilities.

Suggested Solution:

- Select **Browse TOXMAP**
- Click **Go**
- Select only **NPRI (Canada Only)** under TOXMAP Data to the left of the map
-  Deselect all the other TOXMAP data sets by unchecking the boxes
- Click **Zoom to Location** near the top center of the map
- Type **Vancouver** in City search box
- Select **Canada** from the Country drop-down menu
- Click **Zoom to**
- Click **Topo** in the upper right area of the page
- Click the close button () on the **Zoom to Location** window
- Click any NPRI site symbol ()
- Click **more...** on the NPRI Facility Details window
- Review the Facility and Substance Information
- Close the **Facility and Substance Information** tab or window to return to TOXMAP beta
- Click **Start Over** in the upper left to prepare for the next exercise

## Scenario 1 – Benzene Releases in Arizona

You are an environmental justice advocate researching minority exposure to benzene, a known carcinogen. You are interested in the minority population in areas of benzene releases in Arizona in 2010.

### Use TOXMAP beta to examine information about benzene releases in Arizona in 2010.

Suggested Solution:

- Select **Search US TRI and Superfund NPL** from the What do you want to do with TOXMAP? radio buttons
- Click **Go**
- Type **benzene** in the Chemical Name search box
- Select **2010** in the Year drop-down menu
- Select **Arizona** from the State drop-down menu
- Click **Search**
-  This zooms the map to Arizona and includes only results in that state
- Click **US Census & Health Data** at the top of the screen
- Click the **Race** tab on the US Census & Health window
- Click the **US Census 2010** secondary tab
- Click **Minority Population**
- Click the close button () in the upper right corner of the US Census & Health Data window
- View the map, the search results, and the demographic legend in the Map Contents side panel to interpret the information

## Household Products Database (HPD)

**Household Products Database** contains links for more than 14,000 consumer household products to information on health effects from Material Safety Data Sheets (MSDS) provided by the manufacturers.

The screenshot shows the homepage of the Household Products Database. At the top, it is part of the U.S. Department of Health & Human Services website. The main header includes the title 'Household Products Database' and the tagline 'Health & Safety Information on Household Products'. Navigation tabs are provided for Home, Products, Manufacturers, Ingredients, and Health Effects. On the left, there is a 'Quick Search' section with a search box and a 'Go' button, followed by an 'Advanced Search' link. Below that, a 'Browse by Category' section lists various product types like Auto Products, Inside the Home, Pesticides, Landscape/Yard, Personal Care, Home Maintenance, Arts & Crafts, Pet Care, and Home Office. A 'Browse A-Z' section is also present. A 'Support' section at the bottom left includes links for 'About the Database', 'FAQ', 'Product Recalls', 'Help', 'Glossary', 'Contact Us', and 'More Resources'. The main content area features a grid of nine product category tiles, each with an image and a list of products. A warning about poisoning is displayed below the grid, and a footer contains navigation links and the URL [hpd.nlm.nih.gov](http://hpd.nlm.nih.gov).

[hpd.nlm.nih.gov](http://hpd.nlm.nih.gov)

Household Products Database is designed to help answer the following questions:

- ▶ What are the chemical ingredients and their percentage in specific brands?
- ▶ Which products contain specific chemical ingredients?
- ▶ Who manufactures a specific brand? How do I contact this manufacturer?
- ▶ What are the acute and chronic effects of chemical ingredients in a specific brand?

## Searching Household Products Database

The Household Products Database is divided into four categories: **Products**, **Manufacturers**, **Ingredients**, and **Health Effects**.

- ▶ Navigate to a category by clicking the appropriate tab at the top of the page.
- ▶ Search Household Products by using the **Quick Search** box on the homepage (see left sidebar). For a more detailed search, select the **Advanced Search** link. Clicking the **Health Effects** tab will bring up the Advanced Search screen with the Health Effects category preselected for searching.
- ▶ Browse Household Products by product category or alphabetically by product names, types of products, manufacturers, or ingredients (see left sidebar).

## Additional Resources

For further information, review these additional resources:

### MSDS Information Resources

- ▶ SIRI MSDS Archive  
[hazard.com/msds](http://hazard.com/msds)
- ▶ MSDSprovider: Free Access to Manufacturer-Direct MSDSs  
[msdsprovider.com](http://msdsprovider.com)

### Government Information Resources

- ▶ OSHA's MSDS Regulation – Hazard Communication 1910.1200  
[osha.gov/pls/oshaweb/owadisp.show\\_document?p\\_table=standards&p\\_id=10099](http://osha.gov/pls/oshaweb/owadisp.show_document?p_table=standards&p_id=10099)
- ▶ Read the Label First! Campaign (EPA)  
[epa.gov/pesticides/regulating/labels/consumer-labeling.htm#read](http://epa.gov/pesticides/regulating/labels/consumer-labeling.htm#read)
- ▶ Household Hazardous Waste (EPA)  
[epa.gov/epawaste/conserva/materials/hhw.htm](http://epa.gov/epawaste/conserva/materials/hhw.htm)

### From the National Library of Medicine

- ▶ TOXNET®—databases in toxicology and environmental health  
[toxnet.nlm.nih.gov](http://toxnet.nlm.nih.gov)
- ▶ Tox Town®—an interactive guide to commonly encountered toxic substances  
[toxtown.nlm.nih.gov](http://toxtown.nlm.nih.gov)

### Product Recalls

- ▶ Product Safety and Recall Lists  
[hpd.nlm.nih.gov/recalls.htm](http://hpd.nlm.nih.gov/recalls.htm)

## HPD Search Exercises

### Search Exercises

-  Go to [toxnet.nlm.nih.gov](http://toxnet.nlm.nih.gov).
-  Click **Household Products Database**.

**Exercise 1: How can I find information about specific brands of teeth whiteners, including their manufacturing information, ingredients, and health effects?**

Suggested Solution:

- Click **Personal Care**
- Click **toothpaste** in the Personal Care column
- Click **Oral Hygiene** in the Type column
- Click the **Brand Name** of choice and under Product Name
- Review the product information
- Click the **Home** tab to prepare for the next search

**Exercise 2: What household products are associated with cyanosis?**

Suggested Solution:

- Click the **Health Effects** tab at the top right
- Type **cyanosis** in the Search box
- Click **Search** and view the list of products
- Click a product of choice and review the information under **Health Effects**
- Review the information under **Health Effects**
- Click the **Home** tab to prepare for the next search

**Exercise 3: How can I do a quick search to find information on color-safe bleach?**

Suggested Solution:

- Type **color safe bleach** in the Quick Search box to the left of the homepage
- Click **Go**
- Click **Color safe oxygen bleach** under Search Results in the **As Ingredient** section

- Click **Search TOXNET** in the Chemical Information section to the right of **Toxicity Information** to launch a search in TOXNET
- Click the **Sodium percarbonate** link in the TOXNET databases to display the record in HSDB
- Review the information provided
- Close the HSDB window and return to Household Products Database
- Click **Home** to prepare for the next search

#### Exercise 4: What auto products contain oleic acid?

Suggested Solution:

- Click the **Ingredients** tab
- Click **Q** in the alphabetic list at the top
- Select **Oleic acid** from the list of ingredients
- Click the **brand name** of choice with Auto Products listed in the **Category** column
- Review the information retrieved
- Click **Home** to prepare for the next search

#### Scenario – Browse by Category

Cassie, an avid home gardener, adopted a puppy to enjoy with her grandchildren. She is concerned about a weed killer product she uses in spring and fall because the children and puppy will be playing in the yard. She uses a popular brand of extended residual fertilizer with weed control. Are there any health effects of which Cassie should be aware?

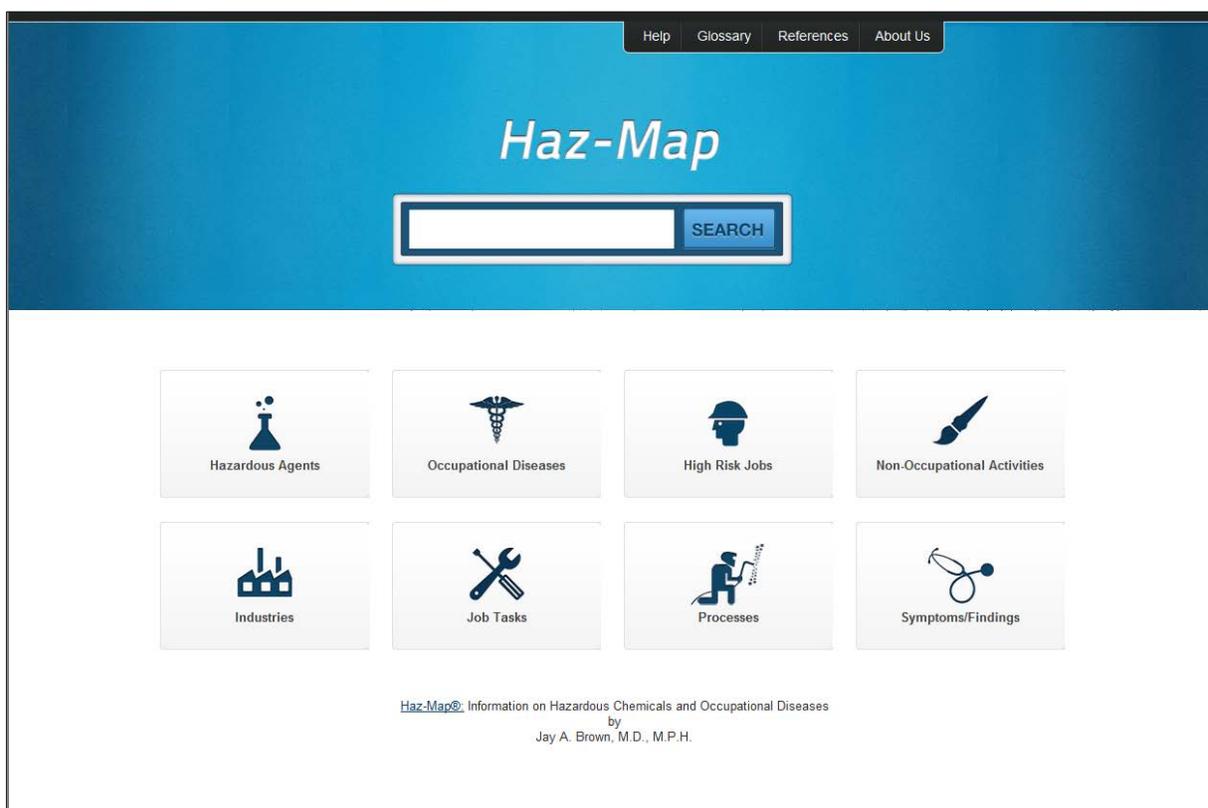
**Browse the Household Products Database to find information. Select the appropriate product category. Select the appropriate Landscape/Yard product category. Select the appropriate type of product. Select the appropriate product.**

Suggested Solution:

- Click **Landscape/Yard** in the left margin or next to the picture on the main page
- Click **fertilizer w/weed control**
- Click **Herbicide** under Type
- Click an extended residual product with weed control under Product Name
- View the Health Effects and Handling/Disposal information
- Click the **Home** tab at the top of the page to prepare for the next search

## Haz-Map®

**Haz-Map** is an occupational health database designed for health and safety professionals and for consumers seeking information about the adverse effects of workplace exposures to chemical and biological agents. The main links in Haz-Map are between chemicals and occupational diseases. Haz-Map shows the diseases linked to each agent and the agents linked to each disease. Agents are chemicals, such as formaldehyde, or biological, such as grain dust. Haz-Map links jobs and hazardous job tasks with occupational diseases and their symptoms. In Haz-Map, chronic occupational diseases are linked to both jobs and industries, while acute diseases and infectious diseases are linked only to jobs. Cancers are not linked to jobs, industries, or findings.



[hazmap.nlm.nih.gov](http://hazmap.nlm.nih.gov)

### Searching Haz-Map

Text words can be searched in all Haz-Map text fields. Search results display in relevancy ranked order. Users can also browse alphabetically in each category or by Types of Agents, Adverse Effects, Types of Diseases, Jobs and Symptoms, or Types of Jobs.

## Browse agents by adverse effects

Users can search for all agents that have one or more potential adverse effects. Adverse effects in some categories are displayed in a list of radio buttons. For radio buttons, select only one option in each group. When checkboxes are used, it means that each agent may have one or more of the listed adverse effects. When radio buttons are used, it means that each agent may have only one of the adverse effects. On the **Search Results** page, click the **Search Details** link to see the conditions that were checked for the search.

## Find diseases by jobs and symptoms

- ▶ **Search by Jobs:** Search diseases related to a job by selecting a job from the drop-down menu.
- ▶ **Search by Symptoms:** Search diseases from their symptoms by checking the symptoms grouped by organ/tissue systems.
- ▶ **Search by Jobs and Symptoms:** By selecting both Job and Symptoms, users can find diseases related to both. For example: searching carpenters and cough.

## Haz-Map Mobile

A mobile-friendly version of the Haz-Map Web site is available at [hazmap.nlm.nih.gov](http://hazmap.nlm.nih.gov). The site automatically adapts to the size of the device or browser window.



## Additional Resources

For further information, review these additional resources:

- ▶ Haz-Map Help  
[hazmap.nlm.nih.gov/help](http://hazmap.nlm.nih.gov/help)
- ▶ Haz-Map Fact Sheet  
[nlm.nih.gov/pubs/factsheets/hazmap.html](http://nlm.nih.gov/pubs/factsheets/hazmap.html)

## Haz-Map Search Exercises

### Search Exercises

 Go to [toxnet.nlm.nih.gov](http://toxnet.nlm.nih.gov).

 Click **Haz-Map**.

#### Exercise 1: What are some high risk tasks associated with sheet metal workers?

Suggested Solution:

Click **High Risk Jobs**

Click **Alphabetically**

Select **S** from the Select a Letter drop-down menu

Click **Sheet Metal Workers**

Click the high risk job task of choice under Related Information in Haz-Map

Review the information about this job task

Click **Home** to prepare for the next search

#### Exercise 2: What are some of the agents, diseases, and jobs associated with asthma? Perform a text search.

Suggested Solution:

Type **asthma** in the Search box

Click **Search**

Click the record of choice in the **Agents** list

Review the information about the selected record

Click the browser's **Back** button to return to the search results page

Click **Diseases Results** and select the record of choice

Review the information about the selected record

Click the browser's **Back** button to return to the search results page

Click **Jobs Results** and select the record of choice

Review the information about the selected record

Click **Home** to prepare for the next search

## Scenario – Jobs and Agents Associated with Disease

Gloria, an occupational analyst, performs research used to assist in the processing of employee compensation claims for a government agency. Gloria has a list of specific chemicals from various work sites where certain job tasks were performed. She needs to determine if specific conditions/diseases are associated with these chemicals and job tasks. Gloria needs to begin her research by determining if aplastic anemia is associated with aviation mechanics that performed maintenance on fuel tanks.

**Search Haz-Map to identify associations: Browse the High Risk Jobs by type. Select the appropriate job category. Select the appropriate job name. Select the appropriate job task. Browse related information.**

Suggested Solution:

- Click **High Risk Jobs**
- Click **By Types of Jobs**
- Click **Installation, Maintenance & Repair**
- Click **Aircraft Mechanics & Service Technicians**
- Click **Repair or maintain gasoline or jet fuel tanks**
- Review the job task record and note any chemicals and diseases listed
- Click **Aplastic anemia** under Diseases associated with this job task
- Review the disease record and note additional information and references
- Click **Home** to prepare for the next search

## Pathways for Public Health Information

**Enviro-Health Links**, **Disaster Health Links**, and **Targeted Populations**, available from the National Library of Medicine® (NLM) Environmental Health and Toxicology Portal, are curated guides to Web resources on environmental health and toxicology, disasters, chemicals, and special populations. Resources can include background information, laws and regulations, and pre-formulated searches of relevant National Library of Medicine databases. All resources are evaluated and selected according to selection criteria that were designed to find appropriate and trustworthy health information.

U.S. Department of Health & Human Services | www.hhs.gov

Specialized Information Services | National Library of Medicine | National Institutes of Health | NLM

SIS Home | About Us | Site Map & Search | SIS News | Contact Us

Pathways for Public Health Information

Selected links to information on environmental health and toxicology, disasters, chemicals, drugs, and special populations

See our [Selection Criteria](#) to learn how we choose the materials for these guides

Enviro-Health Links	Disaster Health Links	Targeted Populations
▶ Arsenic and Human Health	▶ Animals in Disasters	▶ American Indian Health
▶ Climate Change and Health	▶ Biological Warfare	▶ Arctic Health
▶ Developing and Using Medicines for Children	▶ Chemical Emergencies	▶ Asian American Health Web Site
▶ Dietary Supplements	• Chemical Warfare	▶ Children's Environmental Health Information Resources
▶ Education, Careers and Outreach in Toxicology and Environmental Health	• Crude Oil Spills and Health	▶ K-12 Science and Health Education
▶ Environmental Justice Internet Guide	• TVA Kingston Fossil Plant Coal Ash Spill	▶ Multi-Cultural Resources for Health Information
▶ Epigenomics	▶ Community Preparedness	▶ Refugee Health Information Network (RHIN®)
▶ Hexavalent Chromium and Other Chromium Compounds	▶ Coping with Disasters, Violence and Traumatic Events	▶ Women's Health Resources
▶ Imported (Chinese) Drywall	▶ Disaster Apps and Mobile Optimized Web Pages	
▶ Indoor Air	▶ Disaster Recovery	
▶ Keeping the Artist Safe: Hazards of Arts and Crafts Materials	▶ Disaster-Related Competencies for Healthcare Providers	
▶ Laboratory Safety	▶ Ethics in Disaster Medicine and Public Health	
▶ Land and Human Health	▶ Fires and Wildfires	
	▶ Floods	

[sis.nlm.nih.gov/pathway.html](https://sis.nlm.nih.gov/pathway.html)

### Links to information of special interest include:

- ▶ Arsenic and Human Health
- ▶ Climate Change and Health
- ▶ Coping with Disasters, Violence, and Traumatic Events
- ▶ Dietary Supplements
- ▶ Disaster and Emergency Response Tools
- ▶ Disaster Recovery
- ▶ Environmental Justice
- ▶ Fires and Wild Fires
- ▶ Geological Hazards
- ▶ Health Effects from the Collapse of the World Trade Center
- ▶ Indoor Air
- ▶ Infectious Diseases: Pandemic, Epidemic and Disaster-Related Outbreaks
- ▶ Laboratory Safety
- ▶ Mercury and Human Health
- ▶ Nanotechnology
- ▶ Public Health Preparedness for Mass Gatherings
- ▶ Special Populations: Emergency and Disaster Preparedness
- ▶ Tobacco, Smoking, and Health
- ▶ Water Pollution

## Enviro-Health Links Search Exercise

### Scenario – Electronic Cigarettes

A high school teacher is concerned because he notices that many of his students have started using electronic cigarettes. He would like to know more about how e-cigarettes work and how exposure to nicotine and other chemicals in tobacco compares to e-cigarettes.

**Use the Enviro-Health Links on Tobacco, Smoking, and Health to find the information about electronic cigarettes and how they compare to regular cigarettes.**



Go to [sis.nlm.nih.gov/pathway.html](https://sis.nlm.nih.gov/pathway.html).

Suggested Solution:

- Click **Tobacco, Smoking, and Health** under Enviro-Health Links
- Click on **Electronic Cigarettes**
- Click on a link in the Electronic Cigarettes section
- Review the information provided.
- Click the browser's **Back** button to return to the list of resources
- Review some of the other links provided under Electronic Cigarettes
- Scroll down to the list of **Topic-related Searches of National Library of Medicine Resources**
- Review the list of topic-related searches
- Click on the **Electronic Cigarettes** link in the PubMed section
- Review the search results
- Click the browser's **Back** button to return to the list of resources
- Scroll down to the **TOXLINE** section
- Click on the **Electronic Cigarettes** link in the TOXLINE section
- Review the search results
- Click the browser's **Back** button to return to the list of resources

## Tox Town®

**Tox Town** provides an introduction to toxic chemicals and environmental health risks that may be encountered in everyday life, in everyday places. Tox Town allows visitors to tour a Town, City, Farm, Port, US Border, and US Southwest region to identify common environmental hazards. It is a companion to the extensive information in the TOXNET® collection of databases that are typically used by toxicologists and health professionals. Tox Town is also available in Spanish.

**April is a busy month for environmental and public health observances!**

- Celebrate [Earth Day](#) on April 22 by visiting the [Climate Change](#) page. An Earth Day handout is available on the Tox Town [Clip Art and Promotional Materials](#) page.
- Visit the [School](#) and [School Bus](#) pages in honor of [National Healthy Schools Day](#) on April 30.
- "Be Air Aware" during [Air Quality Awareness Week](#) April 29 - May 3. Visit the [Outdoor Air](#), [Indoor Air](#) and [Homes](#) pages.
- [National Environmental Education Week](#) is April 14 - 20.

**New Tox Town-Based Curriculum Units Available**

- [Discovering the Connection: Your Environment, Your Health](#) is an afterschool science club curriculum for middle school students that can also be used in the classroom.

[toxtown.nlm.nih.gov](http://toxtown.nlm.nih.gov)

Tox Town is highly interactive, with graphics, animation, and sound to enhance learning about the connections between chemicals, the environment, and the public's health. It is recommended for high school and college students, educators, and the concerned public. This is an excellent resource for health educators to find easy-to-understand information about environmental toxins in their community.

The Tox Town Web site is designed to provide information on the following:

- ▶ Everyday locations where toxic chemicals might be found
- ▶ Non-technical descriptions of chemicals
- ▶ Links to selected, authoritative chemical information on the Internet
- ▶ How the environment can impact human health
- ▶ Internet Resources on environmental health topics

## Tox Town Search Exercises

### Scenario 1 – Uranium Tailings

Merissa is aware of uranium tailings in the Western United States. She would like to know if they can be found in any other parts of the country.

**Use Tox Town to determine the locations of uranium tailings.**



Go to [toxtown.nlm.nih.gov](http://toxtown.nlm.nih.gov).

Suggested Solution:

- Click **US Southwest** on the homepage *OR* select it from the **Neighborhoods** menu
- Click **Uranium Tailings** in the lower right area below the illustration
- Review the information provided along the right
- Click **What are uranium tailings?**
- Review the information provided in the pop-up to find the locations of uranium tailings in the United States.
- Close the pop-up window
- Click the **Home** tab in the upper left to prepare for the next scenario

### Scenario 2 – Shellfish Contaminated with Algae Blooms

Cam's local health department issued an advisory about local shellfish possibly being contaminated with algae blooms. It sounds harmless, but he is curious whether people could get sick from eating the shellfish.

**Use Tox Town to determine whether shellfish contaminated with algae blooms can cause food poisoning.**

Suggested Solution:

- Click **Port** on the homepage *OR* select it from the **Neighborhoods** menu
- Click **Algae Blooms** in the lower left area below the illustration, or click the pockets of algae showing in the water portion of the illustration
- Review the information provided along the right
- Click **What are algae blooms?** to learn more about them
- Review the information provided in the pop-up to determine if consuming shellfish contaminated with algae blooms can make people sick
- Close the pop-up window
- Click the **Home** tab in the upper left to prepare for the next scenario

### Scenario 3 – Chemicals Found in Funeral Homes

Formaldehyde is perhaps the most commonly known chemical used in funeral homes. Mona would like to know if funeral homes use any other potentially harmful chemicals.

#### Use Tox Town to identify chemicals found in funeral homes.

Suggested Solution, Method 1:

- Click the **Locations** tab at the top of the page
- Click **Funeral Home** in the list of locations under City
- Review the information in the **Why are funeral homes a concern?** section to see other chemicals used in funeral homes.

Suggested Solution, Method 2:

- Click **City** on the Tox Town homepage or select it from the **Neighborhoods** menu
- Click the **Funerals** building to the left of the hospital in the illustration, or click the **City Locations** button and select **Funeral Home**
- Click **Why are funeral homes a concern?** in the right column
- Review the information to see other chemicals used in funeral homes.

# Section 9: Drugs

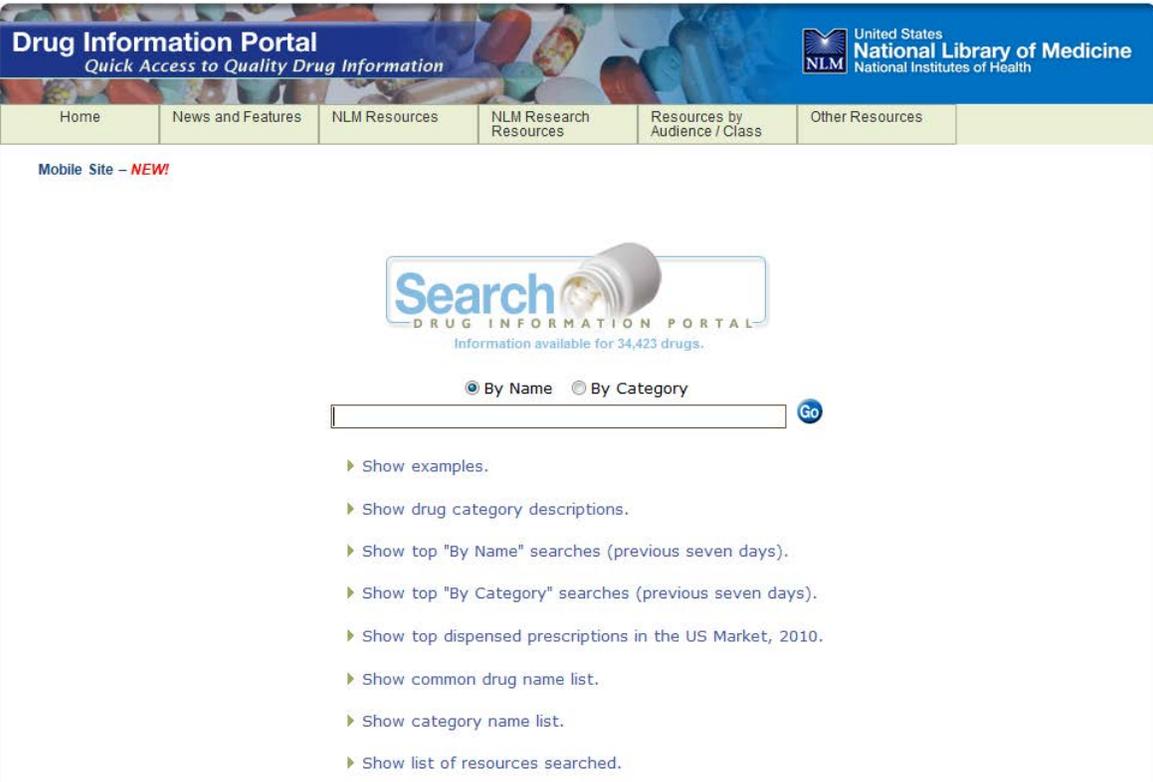
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## Drug Information Portal

**Drug Information Portal** provides current information on more than 53,000 selected drugs from their entry into clinical trials through entry into the marketplace. Information includes consumer health, clinical trials, AIDS-related drug information, MeSH<sup>®</sup> pharmacological actions, PubMed<sup>®</sup> biomedical literature. The Drug Information Portal is also available as a mobile site. Smartphones accessing the main Drug Portal site will be redirected to the mobile site.



**Drug Information Portal**  
Quick Access to Quality Drug Information

United States  
National Library of Medicine  
National Institutes of Health

Home | News and Features | NLM Resources | NLM Research Resources | Resources by Audience / Class | Other Resources

Mobile Site – **NEW!**

**Search**  
DRUG INFORMATION PORTAL  
Information available for 34,423 drugs.

By Name  By Category

- ▶ Show examples.
- ▶ Show drug category descriptions.
- ▶ Show top "By Name" searches (previous seven days).
- ▶ Show top "By Category" searches (previous seven days).
- ▶ Show top dispensed prescriptions in the US Market, 2010.
- ▶ Show common drug name list.
- ▶ Show category name list.
- ▶ Show list of resources searched.

**[druginfo.nlm.nih.gov](http://druginfo.nlm.nih.gov)**

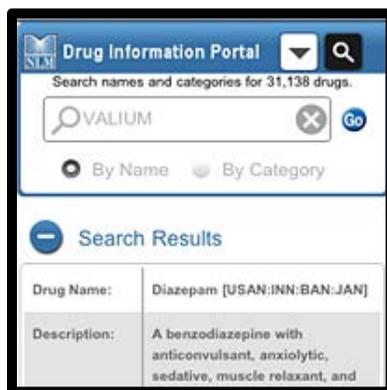
Resources include summaries tailored to various audiences, National Library of Medicine<sup>®</sup> (NLM) search systems useful in searching for a drug, NLM research resources, resources organized by drug audience and class, and other National Institutes of Health (NIH) and government resources such as US Federal Drug Administration (FDA) and the Centers for Disease Control and Prevention (CDC). Resources are shown as links at the top of the page. Experimental drugs or untested folk remedies not covered by NIH, and government resources are not covered in this portal.

## Searching the Drug Information Portal

Search on a drug's trade name or generic name by entering the search term(s) in the search box on the homepage to search many resources simultaneously. A spellchecker provides suggestions for misspelled names. Find embedded portions of names by using an asterisk (\*) at the beginning and/or end of a search term. Results will include the drug's type and usage as well as links leading to further information. JavaScript must be enabled in the browser for the NLM Drug Information Portal to work properly.

## Drug Information Portal Mobile

A mobile-friendly version of the Drug Information Portal can be accessed at [druginfo.nlm.nih.gov/m.drugportal/m.drugportal.jsp](http://druginfo.nlm.nih.gov/m.drugportal/m.drugportal.jsp). The mobile site automatically adapts to the size of the device or browser window.



## Additional Resources

For further information, review these additional resources:

- ▶ Drug Information Portal Mobile site  
[druginfo.nlm.nih.gov/m.drugportal/m.drugportal.jsp](http://druginfo.nlm.nih.gov/m.drugportal/m.drugportal.jsp)
- ▶ Drug Information Portal Fact Sheet  
[nlm.nih.gov/pubs/factsheets/druginfoportal/fs.html](http://nlm.nih.gov/pubs/factsheets/druginfoportal/fs.html)
- ▶ MedlinePlus®  
[medlineplus.gov](http://medlineplus.gov)
- ▶ PubMed  
[pubmed.gov](http://pubmed.gov)
- ▶ DailyMed®  
[dailymed.nlm.nih.gov/dailymed](http://dailymed.nlm.nih.gov/dailymed)
- ▶ AIDSinfo®  
[aidsinfo.nih.gov](http://aidsinfo.nih.gov)

- ▶ Federal Drug Administration Center for Drug Evaluation and Research  
[fda.gov/Drugs/](http://fda.gov/Drugs/)
- ▶ CDC Drug Service Scientific Resources Program  
[cdc.gov/ncidod/srp/drugs/drug-service.html](http://cdc.gov/ncidod/srp/drugs/drug-service.html)
- ▶ US Drug Enforcement Administration Drug Information  
[justice.gov/dea/index.shtml](http://justice.gov/dea/index.shtml)
- ▶ USA.gov – Prescription Drugs  
[usa.gov/Citizen/Topics/Health/Prescription\\_Drugs.shtml](http://usa.gov/Citizen/Topics/Health/Prescription_Drugs.shtml)
- ▶ National Guideline Clearing house  
[guideline.gov](http://guideline.gov)

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## Drug Information Portal Search Exercises

 Go to [druginfo.nlm.nih.gov](http://druginfo.nlm.nih.gov).

### Exercise 1: View the NLM Medical Subject Headings (MeSH) drug category descriptions.

Suggested Solution:

- Click the **Show drug category descriptions** link
- Review the list of MeSH drug category descriptions
- Click the **Home** button in the upper left corner to prepare for the next exercise

### Exercise 2: Review the resources that the Drug Information Portal searches and how the resources are displayed in a drug record.

Suggested Solution:

- Click the **Show list of resources searched** link
- Scroll down and review the list of resources searched
- Click the **Information** icon () next to a resource to see information about the resource
-  Resource links are only displayed in a drug record if information is available from that resource for a particular drug, thus results may vary.
- Click the **Hide list of resources searched** link to prepare for the next scenario

## Scenario – Naltrexone and Parkinson’s Disease

A woman is reading Medical News Today online and comes across an article titled *Naltrexone may be effective in diminishing impulse control disorder in Parkinson’s disease*. She knows someone with Parkinson’s disease and would like to learn more about the drug and new uses.

### Use the Drug Information Portal to research naltrexone.

Suggested Solution:

- Type **naltrexone** in the search field
-  Note the site automatically suggests search terms as you type to help with spelling errors.
- Click **Go**

## What is the MeSH drug category for naltrexone?

Suggested Solution (continued):



View the **Categories** section to identify the drug category.

## Use MedlinePlusDrug to see what naltrexone has been used for previously.

Suggested Solution (continued):

- |       |   |
|-------|---|
| Click | the <b>Summary of drug information (MedlinePlusDrug)</b> link in the <u>Summary</u> section             |
|       | The information opens in a new tab  |
| View  | the information to determine prior uses, noting the information in the <u>Important Warning</u> section |
| Close | the <b>MedlinePlusDrug</b> tab or window when finished reviewing the information                        |

## Review biological and physical data from HSDB.

Suggested Solution (continued):

- |        |   |
|--------|---|
| Click  | the <b>Summary of reviewed biological and physical data (HSDB)</b> link in the <u>Detailed Summary</u> section  |
|        | The information opens in a new tab  |
| Review | the table of contents and some of the information provided  |
|        | Note that HSDB offers more technical information for professionals and researchers, as do the other links in the <u>Detailed Summary</u> section of the Drug Information Portal search results. |
| Close  | the HSDB tab or window when finished reviewing the information  |

## View information about clinical trials performed with naltrexone.

Suggested Solution (continued):

- |        |   |
|--------|---|
| Click  | the <b>Clinical trials (ClinicalTrials.gov)</b> link in the <u>Summary</u> section                                    |
|        | The information opens in a new tab  |
| Browse | the results to see other uses for naltrexone  |
| Type   | <b>naltrexone AND parkinson's</b> in the <u>Search</u> field in the upper right of the <b>ClinicalTrials.gov</b> page |
| Click  | <b>Search</b>   |

View	the list of clinical trials
Click	the name of the study ( <b>Naltrexone for Impulse Control Disorders in Parkinson's disease</b> ).

Using the information provided, answer the following questions about this clinical trial:

- a. Was the trial completed?
- b. What will be measured as a primary outcome?
- c. Who is eligible for this trial?
- d. What are two factors that would exclude a person from this trial?
- e. Where is the trial being conducted?
- f. What phase is this trial in and what does that mean?
- g. Have the results been posted?

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## LiverTox

**LiverTox** is a central repository of up-to-date, accurate, and easily accessed information on the diagnosis, cause, frequency, patterns, and management of liver injury attributable to prescription and nonprescription medications, herbals, and dietary supplements. LiverTox is a joint effort of the Liver Disease Research Branch of the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) and the Division of Specialized Information Services (SIS) of the National Library of Medicine® (NLM).

The screenshot shows the LiverTox website interface. At the top, there are logos for the United States National Library of Medicine (NLM) and the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK). The main header area contains the title 'LiverTox' and the subtitle 'Clinical and Research Information on Drug-Induced Liver Injury'. A navigation bar includes links for Home, NIDDK, NLM, SIS Home, About Us, Contact Us, and a search box with the placeholder text 'Enter a drug name'. Below the navigation bar, a vertical menu on the left lists various categories. The main content area features a search section with the heading 'SEARCH THE LIVERTOX DATABASE' and the instruction 'Search for a specific medication, herbal or supplement:'. This is followed by a search input field and a 'Search' button. Below the search section, there is a browsing section with the heading 'Browse by first letter of medication, herbal or supplement:' and an alphabetical list of letters from A to Z. At the bottom of the page, there is a paragraph of text describing the database's purpose and a link to 'About Us'.

[livertox.nih.gov](http://livertox.nih.gov)

## Searching LiverTox

Use the search box at the top of each page to search for a specific prescription and nonprescription medications, herbals, and dietary supplements or browse using the alphabetical listing on the homepage.

## LiverTox Components

LiverTox has three major components:

- ▶ Introduction and overview of drug induced liver injury
- ▶ Specific drug records that provide concise data on the hepatotoxicity of medications, herbals, and dietary supplements
- ▶ Case submission registry that allows users to provide comments about the LiverTox database and submit clinical cases to the LiverTox Website and US Food and Drug Administration (FDA)

## Additional Resources

For further information, review these additional resources:

- ▶ The National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK)  
[\*\*niddk.nih.gov\*\*](http://niddk.nih.gov)

## LiverTox Search Exercises



Go to [livertox.nih.gov](http://livertox.nih.gov).

### Exercise 1: Use LiverTox to determine uses and effects of Tylenol.

Suggested Solution:

Type **Tylenol** in the Search box

Click **Search**



In this case, the search term is a brand name. The record that was retrieved is for acetaminophen, the active ingredient in Tylenol.

Click the **Acetaminophen** link

Use the information provided to answer the following questions:

#### a. Can taking acetaminophen be fatal?

Suggested Solution (continued):

Refer to the **Introduction** section

#### b. What is this drug recommended for?

Suggested Solution (continued):

Refer to the **Background** section

#### c. What life-threatening effects have resulted from the standard use of acetaminophen?

Suggested Solution (continued):

Refer to the **Hepatotoxicity** section

#### d. What factors may increase the metabolism of acetaminophen and predispose individuals to toxicity?

Suggested Solution (continued):

Refer to the **Mechanism of Injury** section

**e. How many case reports are listed for acetaminophen?**

Suggested Solution (continued):

Browse the case reports for this record.



Note the case reports contain a description, key points, laboratory values, comments, and references with links to PubMed.

**f. Can you access the product label information?**

Go to the following site to view product label information  
**[dailymed.nlm.nih.gov/dailymed/search.cfm?query=ACETAMINOPHEN](http://dailymed.nlm.nih.gov/dailymed/search.cfm?query=ACETAMINOPHEN)**

Return to the Acetaminophen record in LiverTox.

# Section 10: Emergencies and Disasters

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## Chemical Hazards Emergency Medical Management (CHEMM)

**CHEMM** (Chemical Emergency Medical Management) is a comprehensive Web-based resource designed to enable first responders, first receivers, and other health care providers and planners to plan for, respond to, and recover from the effects of mass-casualty incidents involving chemicals. CHEMM offers resources, tools, and guidelines to help responders make safer decisions and provide them with the right information when it is needed most. CHEMM is downloadable in advance for use when Internet is not accessible.

U.S. Department of Health & Human Services

# CHEMM

CHEMICAL HAZARDS EMERGENCY MEDICAL MANAGEMENT

CHEMM Home | About CHEMM | Site Map | Contact Us

SEARCH:

**First Responder** | **Hospital Provider** | **Incident Preparedness**

- Quick Chemical Identification
- Acute Patient Care Guidelines
- Types of Emergencies
- Initial Event Activities
- Patient Management
- Medical Treatment Modifiers
- Tools, Guidelines, and Planning
- References/Data Center

**Detecting airborne hazardous chemicals and radiation**

**Get the Latest CHEMM**

- Download CHEMM
- Join CHEMM ListServ

**Quick Links**

- New Users: Where Do I Start?
- CHEMM Intelligent Syndromes Tool: **CHEMM-IST**
- Acute Patient Care Guidelines
- Types and Categories of Hazardous Chemicals
- Emergency Contacts
- Dictionary

**About CHEMM**

- Goals of this site
- Who produced this site?
- Disclaimers
- List of consultants
- Join the CHEMM ListServ
- Contact us: provide feedback
- System requirements
- More...

**CHEMM for You**

- First responders in the field
- Healthcare providers at the hospitals/poison centers
- Mental health professionals
- Public information officers
- Industrial hygienists/toxicologists
- Response planners
- Trainers
- The public

**Other Resources**

- CDC
- CHEMTREC
- CounterACT
- DHS
- DOD
- DOE
- EPA
- FBI
- FDA
- FEMA
- HHS
- NIOSH
- NOAA
- NRC
- AAPCC

[chemm.nlm.nih.gov](http://chemm.nlm.nih.gov)

**CHEMM** content is extensively hyperlinked, interconnected, and organized in multiple ways. Customized information can be accessed by selecting the tab for first responder, hospital provider, or incident preparedness on the homepage. Information organized by role is also available under **CHEMM for You** on the home page.

The types of information in CHEMM that can be accessed using the left side menu on the homepage include:

- ▶ Quick Chemical Information
- ▶ Acute Patient Care Guidelines
- ▶ Initial Event Activities
- ▶ Patient Management
- ▶ Medical Treatment Modifiers
- ▶ Tools, Guidelines, and Planning
- ▶ References/Data Center

CHEMM was produced by the US Department of Health and Human Services, Office of Assistant Secretary for Preparedness and Response, Office of Planning and Emergency Operations, in cooperation with the National Library of Medicine, Division of Specialized Information Services, and medical, emergency response, toxicology, and other types of experts.

## Additional Resources

For further information, review these additional resources:

- ▶ CHEMM Quick Tour  
[youtube.com/watch?v=IOf406KMIqA](https://www.youtube.com/watch?v=IOf406KMIqA)
- ▶ CHEMM Listserv  
[chemm.nlm.nih.gov/email.htm](https://chemm.nlm.nih.gov/email.htm)
- ▶ Download CHEMM to Your Computer  
[chemm.nlm.nih.gov/download.htm](https://chemm.nlm.nih.gov/download.htm)

## CHEMM Exercises



Go to [chemm.nlm.nih.gov](http://chemm.nlm.nih.gov).

### Exercise 1: View the “Where Do I Start” information for new users and the CHEMM Quick Tour.

Suggested Solution:

- Click **New Users: Where Do I Start?** in the Quick Links section to the right of the page
- Review the information provided
- Click **Take a CHEMM Quick Tour**
- Review the video tour
- Click the browser’s **Back** button to return to CHEMM
- Click the **CHEMM Home** tab in the upper left corner of the page to prepare for the next activity

### Exercise 2: What are some hospital management and prehospital management implications for ammonia?

Suggested Solution:

- Type **ammonia** in the Search box in the upper right corner of the page
- Press **Enter**
- Select **Ammonia Emergency Department/Hospital Management**
- Review the information provided
- Click the browser’s **Back** button to return to the search results
- Select **Ammonia Prehospital Management**
- Review the information provided

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## Radiation Emergency Medical Management (REMM)

REMM provides easy-to-follow algorithms on clinical diagnosis, treatment, and management of radiation contamination and exposure during mass casualty radiological/nuclear emergencies. REMM is primarily for physicians with little to no formal radiation training. REMM also provides information for those who may be involved in responding to a radiation emergency in other capacities. REMM is available for download for multiple types of mobile devices including Apple iPhone, iPod touch and iPad, Android, and BlackBerry devices.

The screenshot displays the REMM website interface. At the top, it identifies the U.S. Department of Health & Human Services and provides navigation links for REMM Home, Contact Us, Site Map, and About REMM. The main header features the REMM logo and the title 'RADIATION EMERGENCY MEDICAL MANAGEMENT' with the subtitle 'Guidance on Diagnosis & Treatment for Health Care Providers'. Below the header is a search bar and a navigation menu with tabs: 'WHAT KIND OF EMERGENCY?', 'INITIAL INCIDENT ACTIVITIES', 'PATIENT MANAGEMENT', 'MANAGEMENT MODIFIERS', and 'TOOLS & GUIDELINES'. The main content area is organized into several columns:

- WHAT KIND OF EMERGENCY?**
  - Radiological Dispersal Devices: Dirty Bomb, Other Dispersal Methods
  - Radiological Exposure Devices
  - Nuclear Detonation: Weapons, Improvised Nuclear Devices
  - Nuclear Power Plant / Nuclear Reactor Incidents
  - Transportation Incidents
  - Discovering an Incident
  - Describing an Incident: Definition, Severity, Phases, Timeline
- INITIAL INCIDENT ACTIVITIES**
  - On-site Activities
  - Triage Guidelines
  - Transport Victims of Radiation Emergencies
  - Hospital Activities
- TOOLS & GUIDELINES**
  - Dose Estimator for Exposure
  - Template for Adult/Pediatric Orders
  - Use of Blood Products
  - Collection of Data
  - Follow-up Instructions
  - Population Monitoring
  - Management of the Deceased
  - Develop a Radiation Response Plan
  - Equip an Emergency Department for Decontamination
  - Recovery / Resilience after an Incident
  - How to Volunteer
- REFERENCE/DATA CENTER**
  - REMM Bibliography
  - Emergency Contacts
  - Multimedia Library: Animations, Illustrations, Photos
  - Dictionary of Radiation Terms
- PATIENT MANAGEMENT**
  - Choose Appropriate Algorithm: Evaluate for Contamination/Exposure
  - Contamination
  - Exposure (Acute Radiation Syndrome)
  - Exposure + Contamination
- MANAGEMENT MODIFIERS**
  - Radiation + Trauma (Combined Injury)
  - Burn Triage and Treatment
  - Mass Casualty
  - Psychological Issues
  - At-Risk / Special Needs Populations
- OTHER AUDIENCES**
  - First Responders in the Field
  - Mental Health Professionals
  - Hospital Staff
  - Public Information Officers
  - Radiation Safety Officers
  - Planners: Preparedness and Response
  - Trainers: Practices and Drills
  - Public Health Officers
  - Legal Advisors
  - Senior Leaders
  - Veterinarians
  - Medical Examiners / Coroners
  - Public Health Emergency Researchers
- ABOUT THIS SITE**
  - What Are the Goals of This Site?
  - Who Produced This Site?
  - Medical Disclaimers
  - Using REMM Assets
  - List of Consultants
  - Join the REMM ListServ
- QUICK LINKS**
  - Help on REMM
    - Top 10 Items for Radiation Emergencies
    - What's New on REMM? (4/2014)
    - Multimedia Library
  - Tools
    - Download REMM (4/2014)
    - Download Mobile REMM (4/2014)
    - Dictionary
    - Emergency Contacts
    - Dose Estimator for Exposure
    - Scarce Resources Triage Tool
    - Manage ARS Subsyndromes
    - Print Algorithms & Tables
  - Diagnosis & Treatment
    - Patient Management Algorithms
    - Acute Radiation Syndrome (ARS)
    - Hematopoietic Subsyndrome
    - Cutaneous Radiation Syndrome
    - Time/Dose Effects in ARS
    - Time Phases of ARS
    - Isotopes of Interest
    - Countermeasures: Internal Contamination
    - Countermeasures: Exposure
    - Decontamination Procedures
    - Strategic National Stockpile
- KEY GUIDANCE**
  - Improvised Nuclear Device Response and Recovery: Communicating in the Immediate Aftermath, 6/2013 (US Gov Interagency Group)
  - Communicating During and After a Nuclear Power Plant Incident, 6/2013 (US Gov Interagency Group)
  - Population Monitoring and Radionuclide Decorporation Following a Radiological or Nuclear Incident (NCRP Report No. 166, 2011)
  - Responding to a Radiological or Nuclear Terrorism Incident: A Guide for Decision Makers (NCRP Report No. 165, 2010)

[remm.nlm.gov](http://remm.nlm.gov)

REMM is extensively hyperlinked and interconnected. The hyperlinks are organized in eight content categories. The following are the most commonly used categories and appear across the top of the page beneath the REMM logo.

- **What Kind of Emergency?** —information relevant to each type of radiation emergency, including radiological dispersal devices, radiological exposure devices, nuclear explosions, nuclear reactor accidents, and transportation accidents

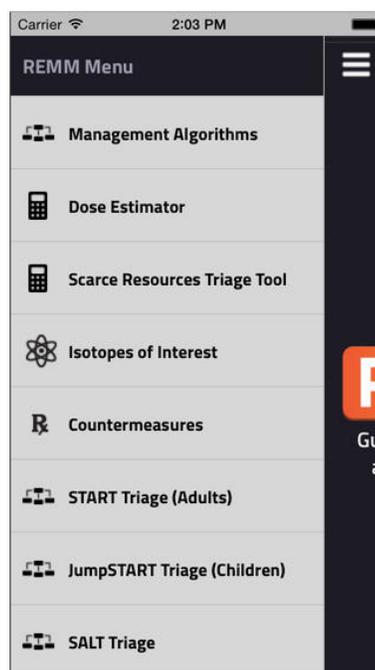
- ▶ **Initial Incident Activities**—information regarding activities that should occur as part of an initial response following an emergency, including onsite activities, triage guidelines, and hospital activities
- ▶ **Patient Management**—patient management procedures to assist medical responders following a radiological or nuclear emergency determine whether patients have been exposed, contaminated, or both
- ▶ **Management Modifiers**—provides detailed information about radiation + trauma (combined injury), burn triage and treatment, mass casualty, psychological issues, and specific populations
- ▶ **Tools & Guidelines**—tools to facilitate quick lookup of information

**Quick Links**, on the right side of most REMM pages, can help users navigate through the portal. Quick Links offers easy access to some of the portal's most important features and tools, including a link to all of the animations, illustrations, and photos founding REMM.

REMM was produced by the US Department of Health and Human Services, Office of the Assistant Secretary for Preparedness and Response, Office of Planning and Emergency Operations, in cooperation with the National Library of Medicine, Division of Specialized Information Services, with subject matter experts from the National Cancer Institute, the Centers for Disease Control and Prevention, and many US and international consultants.

## Mobile REMM

A mobile version of REMM is available as an app download for Android, Apple iOS, and BlackBerry devices. Simply visit [remm.nlm.gov/downloadmremm.htm](http://remm.nlm.gov/downloadmremm.htm) and follow the directions on the screen to download the appropriate app for your device.



## Additional Resources

For further information, review these additional resources:

- ▶ Sources of Radiological/Nuclear Information  
[remm.nlm.nih.gov/remm\\_SourcesofRadInfo.htm](http://remm.nlm.nih.gov/remm_SourcesofRadInfo.htm)
- ▶ Understanding Radiation  
[remm.nlm.gov/remm\\_RadPhysics.htm](http://remm.nlm.gov/remm_RadPhysics.htm)
- ▶ Multimedia Library  
[remm.nlm.gov/imagegallery.htm](http://remm.nlm.gov/imagegallery.htm)
- ▶ Download REMM to Your Computer  
[remm.nlm.gov/download.htm](http://remm.nlm.gov/download.htm)
- ▶ Download Mobile REMM  
[remm.nlm.gov/downloadmremm.htm](http://remm.nlm.gov/downloadmremm.htm)
- ▶ Join REMM Listserv  
[remm.nlm.gov/email.htm](http://remm.nlm.gov/email.htm)

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## REMM Exercises

### Scenario – Managing Internal Contamination

A radiation accident occurred in Samut Prakan Province in Thailand in January/February, 2000. The accident happened when scrap metal collectors recovered an insecurely stored, unlicensed cobalt-60 radiation source. The scrap metal collectors, together with a scrapyard worker, subsequently dismantled the container, unknowingly exposing themselves and others nearby to ionizing radiation. Over the following weeks, those exposed developed symptoms of radiation sickness and eventually sought medical attention (excerpt taken from Wikipedia's Samut Prakan radiation accident page, retrieved from [en.wikipedia.org/wiki/Samut\\_Prakan\\_radiation\\_accident](https://en.wikipedia.org/wiki/Samut_Prakan_radiation_accident)).

The victims got radiation sickness (acute radiation syndrome) by getting the gamma ray irradiation from the radiation source.

#### 1. What is the half-life of Cobalt-60?



Go to [remm.nlm.gov](https://remm.nlm.gov).

Suggested Solution:

Type **cobalt** in the Search box in the upper right corner of the page  
Press **Enter**  
Select **Managing Internal Contamination** from the list of search results  
Scroll to the **Isotopes of Interest: Properties, Treatment, and Fact Sheets** section  
Locate **Cobalt (Co-60)** in the table  
Review the radioactive half-life and treatment options for Cobalt (Co-60)

#### 2. What are the symptoms of acute radiation syndrome?

Suggested Solution:

Type **ARS** in the Search box  
Press **Enter**  
Select **"What is ARS..."**  
Review the information provided

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## Wireless Information System for Emergency Responders (WISER)

**WISER**® (**W**ireless **I**nformation **S**ystem for **E**mergency **R**esponders) is a mobile application designed to assist first responders in hazardous material incidents. Standalone versions are currently available for the Microsoft Windows™, Apple iOS, and Android platforms. A connected version of WISER supports the BlackBerry platform and a Web-based version (WebWISER) supports Web browsers for PCs and mobile devices.

Developed by the National Library of Medicine (NLM), **WISER** provides a wide range of information on hazardous substances, including chemical identification support, physical characteristics, and human health, containment, and suppression information. In addition to chemicals, **WISER** now includes radioisotopes and biological agents.



**U.S. National Library of Medicine**  
Specialized Information Services



Wireless Information System  
for Emergency Responders

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### Welcome to **WISER**

**Wireless Information System for Emergency Responders**

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**WISER** is a system designed to assist emergency responders in hazardous material incidents. WISER provides a wide range of information on hazardous substances, including substance identification support, physical characteristics, human health information, and containment and suppression advice.

**Latest News**

**New!** As of 5/13/2014, version 3.1 of [WISER for Android](#) is available. See [what's new](#) in version 3.1.

**New!** As of 12/20/2013, version 4.5 of [WebWISER](#) is available. See [what's new](#) in version 4.5.

As of 10/28/2013, version 4.5 of [WISER for Windows](#) is available. See [what's new](#) in version 4.5.

As of 3/27/2013, version 3.1 of [WISER for iOS](#) is available. See [what's new](#) in version 3.1.

**Download**

WISER is [available for download](#) as a standalone application on Microsoft Windows PCs, Apple iPhone and iPod Touch, Google Android devices, and BlackBerry devices.

Visit the [training page](#) to download materials that aid with training on the usage of WISER.

**WebWISER**

When an Internet connection is available, use your web browser to access the same functionality of the standalone applications. [WebWISER](#) supports both PC and mobile device browsers, including **BlackBerry, iPhone, and Android** devices.

**Join the E-mail List**

Want to get notices of WISER updates and news? [Join the WISER E-mail List](#) to automatically receive important announcements about WISER.

*Please note that the National Library of Medicine does not warrant or assume any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed.*

**Other Chemical Emergency Resources at NLM**

- Chemical Hazards Emergency Medical Management (CHEMM)
- Disaster Information Management Research Center
- Radiation Emergency Medical Management (REMM)
- TOXNET
- TOXMAP
- MedlinePlus offers trusted links to general health topics
  - Fire Safety
  - Disasters
  - Disaster Preparation and Recovery
  - Poisoning
  - and more...
- Household Products Database
- Tox Town
- Other Environmental Health Topics

**Other Chemical Emergency Resources**

- DOT ERG - (Department of Transportation - Emergency Response Guidebook)
- EPA Chemical Fact Sheets
- ATSDR ToxFAQs
- New Jersey Hazardous Substance Fact Sheets
- CHEMTREC
- CDC's Chemical Emergency Preparedness and Response

[wiser.nlm.nih.gov](http://wiser.nlm.nih.gov)

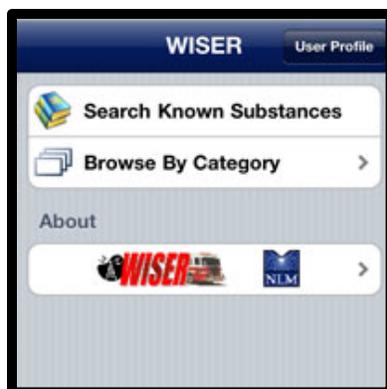
Section 10 – Emergencies and Disasters: WISER | 169

## Features

- ▶ **Rapid access to the most important information** about a hazardous substance
- ▶ **Intuitive, simple, logical user interface** developed by working with experienced first responders
- ▶ **Comprehensive decision support**, including assistance in identification of an unknown chemical or chemical syndrome and guidance on the immediate actions necessary to save lives and protect the environment
- ▶ **GIS support** provides for isolation/protective distance overlays on a map of the incident
- ▶ **Access to HSDB and CHEMM**, which contain a wealth of detailed, peer-reviewed information on hazardous substances
- ▶ **User Profiles** enable users to specify the role they are currently playing at the scene of an incident: first responder, HAZMAT specialist, EMS specialist, hospital provider, or preparedness planner. The application interface is customized so that the information most relevant to the respective job can be quickly accessed.
- ▶ **Tools and reference materials**, including triage tools, radiological incident support, WMD response guidelines, and the ERG 2012 electronic version
- ▶ **Mobile support**, providing first responders critical information where they need it, when they need it

## WISER Mobile App

WISER is available as a mobile app for Android, Apple iOS, and BlackBerry. To download the app, access WISER at [wiser.nlm.nih.gov/choose\\_platform.html](http://wiser.nlm.nih.gov/choose_platform.html) on your device. Follow the directions on the screen to locate the appropriate download.



## Additional Resources

For further information, review these additional resources:

- ▶ WISER Fact Sheet  
[nlm.nih.gov/pubs/factsheets/wiser.html](http://nlm.nih.gov/pubs/factsheets/wiser.html)
- ▶ WISER Training Resources  
[wiser.nlm.nih.gov/training.html](http://wiser.nlm.nih.gov/training.html)
- ▶ WISER updates and news  
[wiser.nlm.nih.gov/listserv\\_join.html](http://wiser.nlm.nih.gov/listserv_join.html)
- ▶ US Department of Transportation–Emergency Response Guidebook (DOT–ERG)  
[phmsa.dot.gov/hazmat/library/erg](http://phmsa.dot.gov/hazmat/library/erg)
- ▶ CHEMM Homepage  
[chemm.nlm.nih.gov](http://chemm.nlm.nih.gov)

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## WISER Search Exercises



Go to [wiser.nlm.nih.gov](http://wiser.nlm.nih.gov).



Select the **WebWISER** tab from the menu bar at the top of the page.

### Exercise 1: Should chemical extinguishers be used to put out a fire involving hydrogen peroxide?

Suggested Solution:

Select the **Known Substances** link

Type **hydrogen peroxide** in the Search Text field to the left

Click **Search**

Select the **Hydrogen Peroxide** link in the search results to the right

Select **Fire Fighting Procedures** in the list of links to the left

Review the information provided to answer the question

### Exercise 2: View a map of the protective distance area for a specific location.

Suggested Solution (continued from the previous search exercise):

Select the **Protective Distance Map** link to the left

Enter a street address or other location in the Location field at the top of the map

Click the **Submit** button

Select from the Materials drop-down (in the upper right area of the map) a material or worst case



The map automatically updates as additional items are selected along the right

Select a Wind Direction and any other desired options along the right side of the map

### Exercise 3: Review the help documentation for WISER.

Suggested Solution (continued from the previous search exercise):

Select the **Help** tab at the top of the page

Review the information provided, including links to the WISER User Guide

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## Disaster Information Management Research Center

The core purpose of the **Disaster Information Management Research Center (DIMRC)** is to develop and provide access to health information resources and technology for disaster preparedness, response, and recovery. The goal of DIMRC is to connect people to quality disaster health information and foster a culture of community resiliency.

The screenshot shows the website interface for the Disaster Information Management Research Center. At the top, it identifies the U.S. Department of Health & Human Services and the National Library of Medicine. The main navigation bar includes links for 'SIS Home', 'About Us', 'Site Map & Search', 'SIS News', and 'Contact Us'. A search bar is located on the right. The central content area features a large image of a hand holding a tablet displaying various disaster-related apps and web sites. To the left of the tablet is a vertical menu with categories such as 'Disaster Types and Topics', 'Emergency Response Tools', 'Disaster Health Literature', 'Disaster Information Specialist', 'Librarians & Disasters', 'NLM Projects & Research', 'Search TOXNET® Databases', and 'Health Organizations'. To the right of the tablet is a 'In the Spotlight' section with links to new pages and resources. Below the main content area, there are several widgets: 'Search Our Web Pages' with a search box; 'A to Z Index of Resources' with an alphabetical grid; 'Stay Connected' with social media links; 'About the Center' with a list of links; 'Find Disaster Organizations' with a search box and filters; 'Announcements' featuring a free webinar; 'Disaster Medicine and Public Health Literature' with a resource guide; 'PubMed' database link; 'HazMat/CBRN (Chem, Bio, Rad, Nuclear)' with WISER and REMM systems; and 'CHEMM' for chemical hazards. A 'Tweets' section at the bottom right shows recent tweets from @NLM\_DIMRC.

[disasterinfo.nlm.nih.gov](http://disasterinfo.nlm.nih.gov)

DIMRC is committed to help prepare for, respond to, recover from, and mitigate the adverse health effects of disasters in conjunction with Federal, State, and local governments, organizations, and local communities. To accomplish this, DIMRC is focused on several areas:

- ▶ Maintain access to health information during disasters
- ▶ Develop innovative products and services to serve health professionals and the public
- ▶ Conduct research to support disaster health information management
- ▶ Collaborate with other agencies and communities

### Additional Resources

For further information, review these additional resources:

- ▶ DIMRC Fact Sheet  
[nlm.nih.gov/pubs/factsheets/dimrcfs.html](https://nlm.nih.gov/pubs/factsheets/dimrcfs.html)
- ▶ Disaster Lit: Resource Guide for Disaster Medicine and Public Health  
[disasterlit.nlm.nih.gov](https://disasterlit.nlm.nih.gov)

## Appendix

### Environmental Health & Toxicology Portal Decision Tree

The National Library of Medicine® (NLM) Environmental Health and Toxicology Portal provides access to many resources. The following chart is a guide to selecting the appropriate resource or database depending on user information needs.

Database and resource links can be accessed at: [sis.nlm.nih.gov/enviro.html](http://sis.nlm.nih.gov/enviro.html)

#### Use this decision tree to choose the correct database or resource:

For this type of information...	Go to...
Journal references to toxicology literature including developmental/reproductive and teratology (birth defects) information	TOXLINE® or DART®
Summary of peer-reviewed human health effects and emergency medical treatment for chemicals	HSDB®
Animal Toxicity Studies	HSDB
Environmental Fate, Exposure, Standards and Regulations	HSDB
Chemical/Physical properties and safety/handling/disposal of chemicals	HSDB
Manufacturing, formulation and use of chemicals	HSDB
Chemical names and synonyms	ChemIDplus® or HSDB
Chemical structures and structure searching/drawing capability	ChemIDplus
InChI and/or SMILES structure notations	ChemIDplus
List of links to NLM/NIH and other government agency information for a single chemical	ChemIDplus
Carcinogenicity, mutagenicity, tumor promotion and tumor inhibition data from the National Cancer Institute (NCI)	CCRIS (covers 1985-2011; no longer updated)
Peer-reviewed mutagenicity test data from the US Environmental Protection Agency (EPA) including species, type of assay, test result and more	GENE-TOX (covers 1991-1998; no longer updated)
Hazard identification and dose-response risk assessment information from the EPA	IRIS
Cancer and noncancer oral and inhalation risk values and types from government and independent risk information groups worldwide	ITER
Results and analyses of chronic and long-term animal cancer test from NCI, the National Toxicology Program (NTP) and the general published literature	CPDB (covers 1980-2011; no longer updated)

<b>For this type of information...</b>	<b>Go to...</b>
Drug information related specifically to breastfeeding mothers and their nursing infants including maternal/infant drug levels, possible effects and more	LactMed®
Environmental releases of chemicals and waste management activities reported by facilities to the EPA	TRI
Electronic maps of chemical releases, Superfund sites, health, census, income data and more	TOXMAP®
Chemicals, occupations, job tasks, and associated diseases/conditions	Haz-Map
Drug information including names, descriptions, labels, drug categories and links to additional resources	Drug Information Portal
Safety and health information for products used in and around the home	HPD
Material Safety Data Sheets (MSDS) and consumer product recalls	HPD
Health information and research related to natural, accidental, or deliberate disasters	DIMRC
Tool about chemical, biological, and radiological agents of concern for emergency responders, with a focus on Hazmat and transportation incidents	WISER®
Diagnosis and treatment information for radiological events and emergencies	REMM
Interactive Web site on toxic chemicals and environmental health concerns in the community	ToxTown®
Resources for alternatives to the use of live vertebrates in biomedical research and testing	ALTBIB®
Selected links to internet resources on environmental issues of special interest	Enviro-Health Links
Directory of Health Organizations	DIRLINE®
Online tutorials on basic toxicology principles and concepts	Toxicology Tutorials
Interactive children's learning site about household chemical hazards	ToxMystery™
Information about drug induced liver injury caused by prescription and nonprescription drugs, herbals, and dietary supplements	LiverTox
Data explaining molecular mechanisms by which environmental chemicals affect human disease	CTD (updated several times a year)
Chemical emergency information with a focus on potential mass casualty chemicals: Chemical identification, acute patient care guidelines, and initial event activities	CHEMM

# Contact the National Library of Medicine<sup>®</sup> for Database Assistance

Toll-free: 888.FIND.NLM (346.3656)

E-mail: [custserv@nlm.nih.gov](mailto:custserv@nlm.nih.gov)

TOXNET<sup>®</sup> E-mail: [tehip@teh.nlm.nih.gov](mailto:tehip@teh.nlm.nih.gov)

## Online TOXNET Resources

Resource	URL
Training Manuals	<a href="http://sis.nlm.nih.gov/enviro/manuals.html">sis.nlm.nih.gov/enviro/manuals.html</a>
Toxicology Tutorials	<a href="http://sis.nlm.nih.gov/enviro/toxtutor.html">sis.nlm.nih.gov/enviro/toxtutor.html</a>
Fact Sheets	<a href="http://sis.nlm.nih.gov/sisfactsheets.html">sis.nlm.nih.gov/sisfactsheets.html</a>
Frequently Asked Questions	<a href="http://toxnet.nlm.nih.gov/newtoxnet/faq.html">toxnet.nlm.nih.gov/newtoxnet/faq.html</a>

See Help and FAQ links on each database homepage.

## National Network of Libraries of Medicine<sup>®</sup>

Toll-free number for all Regional Medical Libraries: 800.338.7657

Monday-Friday 8:30 a.m. – 5:00 p.m. in all time zones

Web site: [nmlm.gov](http://nmlm.gov)

## National Training Center

Toll-free number: 800.338.7657, press 2

Web site: [nmlm.gov/ntc](http://nmlm.gov/ntc)