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## Occupational Medicine Forum. Question: What online toxicology resources are available at no cost from the (U.S.) National Library of Medicine to assist practicing OEM physicians?

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The National Library of Medicine (<http://www.nlm.nih.gov/>, NLM) in Bethesda, Maryland is the world's largest biomedical library and the world leader in biomedical information. NLM's resources are searched billions of times each year by scientists, researchers, public health professionals, practicing physicians, and the general public.<sup>1</sup> Most readers are likely familiar with NLM's flagship database PubMed (<http://www.pubmed.gov>), and may use it to conduct literature searches in their regular practice. Others may use the MedlinePlus<sup>®</sup> (<http://www.nlm.nih.gov/medlineplus/>) to help themselves or their patients locate trustworthy patient-friendly medical information. However, many physicians are unaware of the additional resources that NLM makes available online, particularly those features that may be helpful for those practicing in occupational and environmental medicine (OEM), or medical toxicology.

The National Library of Medicine's (NLM) Toxicology and Environmental Health Information Program (TEHIP) is composed of information professionals and scientists who specialize in providing environmental health and toxicology resources for physicians, scientists, public health professionals, first responders, and the general public. TEHIP maintains an extensive system of online toxicology and environmental health databases that are available free of charge.<sup>2</sup> The organization is continually expanding these resources in an effort to better serve these end-users. Practicing OEM physicians may find several current resources helpful as references for clinical and public health practice.

OEM physicians wishing to become familiar with available resources might begin by visiting the TEHIP webpage titled "Especially for Healthcare Professionals" (<http://>

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Dr. Downs: none declared

Dr. Hakkinen: Declares relationship with the National Library of Medicine, Division of Specialized Information Services from which the resources described here originate.

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[sis.nlm.nih.gov/enviro/especiallyprofessionals.html](http://sis.nlm.nih.gov/enviro/especiallyprofessionals.html)) (Figure 1). This page provides links to all the resources referenced below as well as access to many additional resources. To briefly illustrate these resources, we will use the chemical vinyl chloride, a classic carcinogen and hepatotoxicant, in example searches of the resources.

### **Haz-Map®** <http://hazmap.nlm.nih.gov/>

Some readers may already be familiar with this occupational health and hazards database. Haz-Map® was designed by a practicing OEM physician, Dr. Jay A. Brown, with the needs of occupational safety and health professionals in mind, and includes biological and physical hazards in addition to chemical hazards.<sup>3</sup> Since its start at NLM in 2002, Haz-Map has grown to include over 10,000 chemical and biological agents. Users can rapidly search by occupation, exposure, disease, or signs and symptoms. Alternatively, users can scroll through lists of occupationally-related diseases, and/or potentially hazardous occupations or processes (Figure 2). For example, a basic search for vinyl chloride provides a condensed record that provides information on potential associated health hazards, carcinogenicity, jobs or tasks with potential exposure, exposure limits, and chemical characteristics (Figure 3). Scrolling a bit further allows users to then link quickly to PubMed/MEDLINE searches for the queried substance, ATSDR medical management pages, and another useful TEHIP reference, the Hazardous Substance Data Bank® (HSDB).

### **Hazardous Substance Data Bank® (HSDB)** <http://toxnet.nlm.nih.gov/newtoxnet/hsdb.htm>

The HSDB® (Figure 4) is a more exhaustive database of over 5500 potentially hazardous substances that has been in continuous existence and review now for over 30 years. The data bank is peer-reviewed by the NLM's Scientific Review Panel, a group comprised of advisors outside NLM with expertise in animal and human toxicology, industrial hygiene, occupational and environmental medicine, and emergency medicine, among others.<sup>4</sup> Entries in the HSDB® include chemicals, drugs, dietary supplements, venoms, and heavy metals. These entries can be nominated by members of the NLM staff, scientific and regulatory agencies, the public, or may be included in response to a crisis event such as an accidental chemical release into a water supply.<sup>4</sup>

For the OEM physician, the HSDB® provides ready access to information regarding human and animal toxicity, metabolism and pharmacology, occupational exposure limits from OSHA, NIOSH, and ACGIH where available, exposure sampling method, medical management of exposures, and environmental regulations when applicable. Using vinyl chloride again as an example, we find this information available for review in the table of contents in the left margin of the page (Figure 5). Under "Human Health Effects," users can locate full text abstracts of case reports and human epidemiological studies involving the queried chemical. These abstracts can be read directly within the HSDB® chemical profile, or hyperlinks can be used to link to PubMed for further literature review as needed. The "Manufacturing/Use" link can provide information on the ways that the substance may be used, and what manufacturers produce or import these chemicals. In the case of vinyl chloride, contact information for seven US manufacturers or importers is listed, as well as

information regarding historical volumes of US vinyl chloride production, and vinyl chloride monomer's use in plastic piping and other household construction materials. If users are then interested in knowing what potential household products or materials might contain vinyl chloride, the Household Products Database (HPD) can be of assistance.

## Household Products Database <http://hpd.nlm.nih.gov/>

The HPD serves as a resource to assist with determining the potential toxic effects of household consumer products (Figure 6). The HPD currently references over 13,000 consumer brands of household chemicals and products, including cleaning, automotive, agricultural, home care, and some commercial grade products among others. The information is mostly from the manufacturers of the household consumer products, e.g., the Safety Data Sheets and/or product labels. The HPD can quickly provide a listing of products containing a specified chemical, or conversely can provide chemical component information by percentage, and Safety Data Sheet links for queried consumer products. Users are able to search by consumer product names, or by individual components. A condensed review of acute and chronic health effects, carcinogenicity, and first aid is also included under each consumer product.<sup>5</sup> A query for vinyl chloride containing household products in the HPD locates vinyl chloride containing pipe sealant products (Figure 7). Since vinyl chloride is not the only component of these products, the HPD links to the additional component information for review. The component products can then be queried for their individual chemical information (Figure 8).

## Summary

The NLM offers a multitude of open-access resources available at no cost to users, including practicing OEM physicians. In addition to the above noted examples for quick access to toxicologic information, the NLM TEHIP program also offers LiverTox (<http://livertox.nlm.nih.gov/>), an emerging resource cataloging medications and supplements associated with hepatotoxicity<sup>6</sup>, and LactMed (<http://toxnet.nlm.nih.gov/newtoxnet/lactmed.htm>) a resource for characterizing the effects of drugs or other chemicals on breastfeeding mothers and breast milk. We believe that occupational health professionals will find NLM's Environmental Health and Toxicology resources useful in clinical practice, and we welcome suggestions to improve the content to better serve the occupational and environmental medicine community.

## Acknowledgments

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U.S. Department of Health & Human Services

www.hhs.gov

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**Especially for Healthcare Professionals**

**Starting Points**

**TOXLINE - TOXicology Literature OnLINE**  
References from the toxicology literature, including MEDLINE/PubMed and meeting abstracts

**HSDB - Hazardous Substances Data Bank**  
Comprehensive, peer-reviewed toxicological data and other information on chemicals

**Haz-Map**  
Links jobs and hazardous tasks with occupational diseases and their symptoms

**LiverTox**  
Information on liver injury caused by drugs, herbals and dietary supplements, including diagnosis, management and a registry of clinical case reports

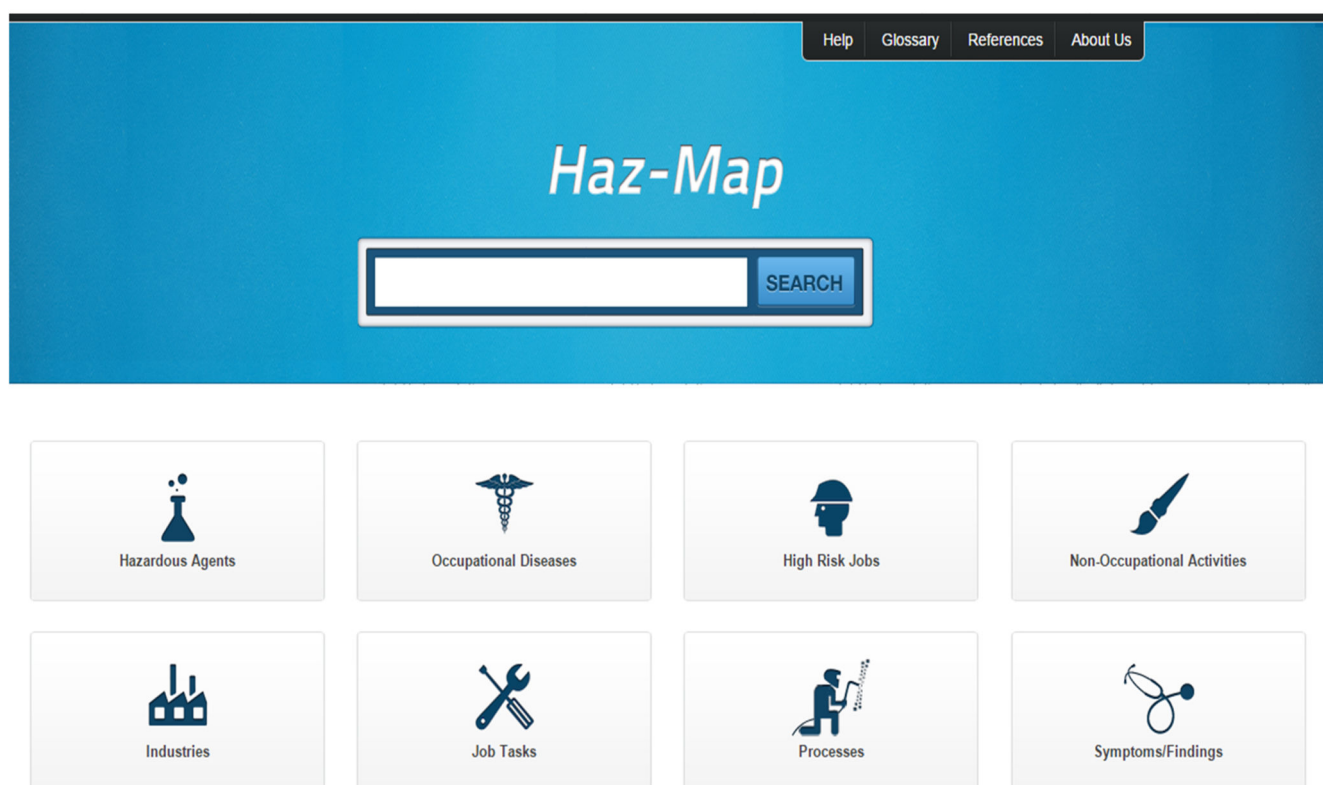
**Drug Information Portal**  
Information from the National Library of Medicine and other key government agencies  
Mobile version

**Pillbox**  
Rapid identification of unknown tablets/capsules using physical features and images

**TOXMAP**  
Geographic representation of TRI data with links to other TOXNET resources  
▪ TRI - Toxics Release Inventory Annual releases of chemicals and waste management activities reported by facilities to the U.S. EPA

**Household Products Database**  
Safety and health information for products used in and around the home

**Figure 1.**  
Environmental Health and Toxicology Especially for Healthcare Professionals page



**Figure 2.**  
Haz-Map® Occupational Health Database

Comments	Increased incidence of liver cancer (angiosarcoma) was found in workers who had high exposure to vinyl chloride monomer while cleaning reaction vessels. [LaDou, p. 233] There is limited evidence that vinyl chloride caused increased birth defects in exposed human populations. [ATSDR Case Studies #29] Vinyl chloride was once evaluated as an anesthetic; it can cause central nervous system depression after inhalation of high concentrations. [ATSDR Medical Management] Possible frostbite from contact with liquid; [NIOSH]
Restricted	See 29 CFR 1910.1017;
Reference Link	<a href="#">ATSDR Medical Management - Vinyl chloride</a>
Exposure Assessment	
Skin Designation (ACGIH)	Insufficient data
PEL (OSHA)	1 mg/m <sup>3</sup> , STEL(OSHA) = 5 ppm (avg. not exceeding any 15 min)
Odor Threshold Low	10 ppm
Odor Threshold High	20 ppm
Explanatory Notes	Odor threshold from AIHA; Flash point = -78 deg C;

**Figure 3.**  
Snapshot of Haz-Map<sup>®</sup> vinyl chloride file



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NIH U.S. National Library of Medicine

TOXNET TOXICOLOGY DATA NETWORK

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Welcome to TOXNET

Your resource for searching databases on toxicology, hazardous chemicals, environmental health, and toxic releases

SEARCH TOXNET Search all or select specific databases

BROWSE ADVANCED SEARCH

e.g. benzene, endocrine disruptor

ALL DATABASES Search

TOXNET Databases

**MOST VISITED BY TOXNET USERS**

**HSDB**  
Hazardous Substances Data Bank. Peer-reviewed toxicology data for over 5,000 hazardous chemicals

**TOXLINE**  
4 million references to literature on biochemical, pharmacological, physiological, and toxicological effects of drugs and other chemicals

**ChemIDplus**  
Dictionary of over 400,000 chemicals (names, synonyms, and structures)

**BREASTFEEDING & DRUGS**

**LactMed**  
Drugs and Lactation Database. Drugs and other chemicals to which breastfeeding mothers may be exposed

**DEVELOPMENTAL TOXICOLOGY LITERATURE**

**DART**  
Developmental and Reproductive Toxicology Database. References to developmental and reproductive toxicology literature

**CHEMICAL RELEASES & MAPPING**

**TOXMAP**  
TOXMAP: Environmental Health Maps provides searchable, interactive maps of EPA TRI and Superfund data, plus US Census and NCI health data

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

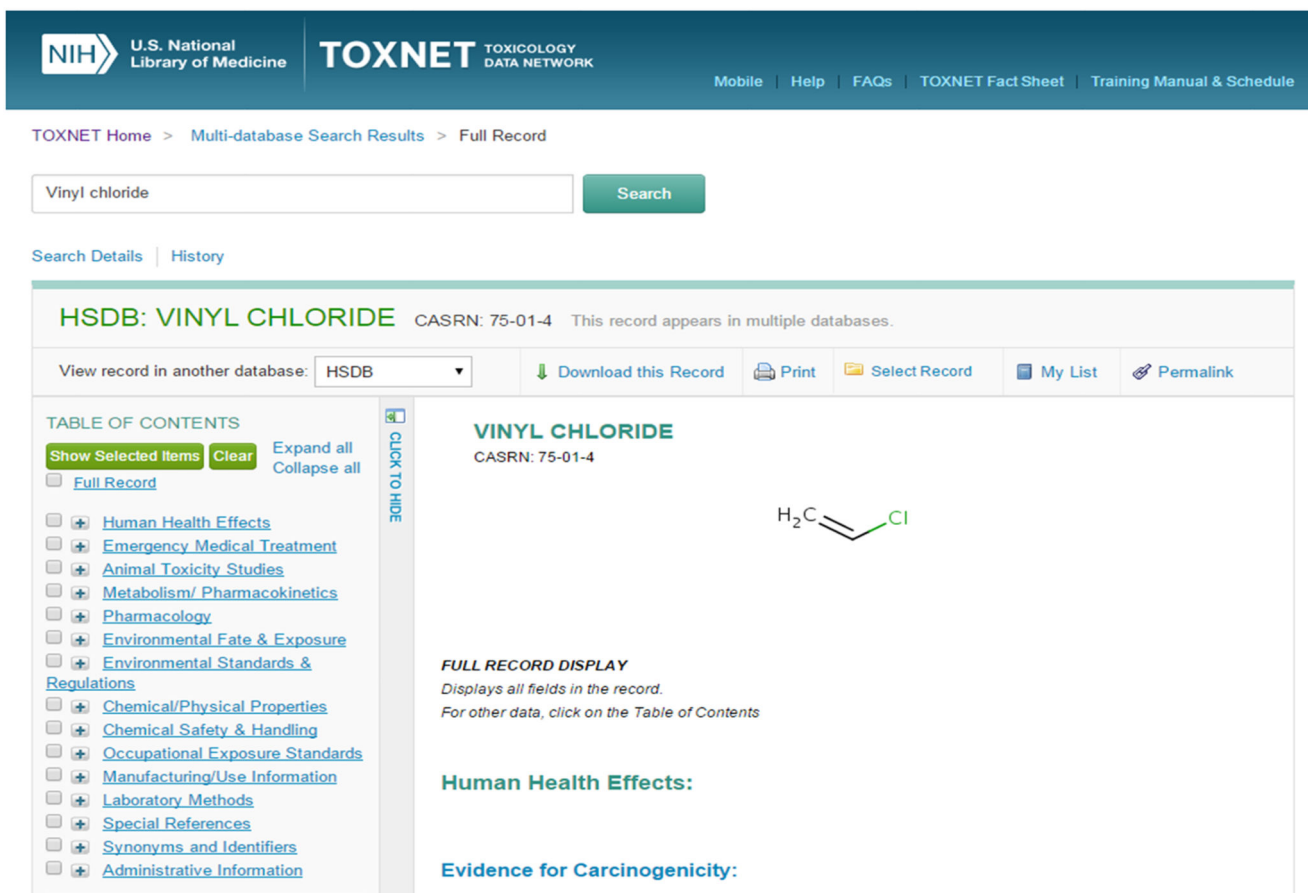
**Did you know**

There is a guide to choosing a database

Which Resource Should I Use can help you pick the right resource for your search.  
More FAQs

**Figure 4.**  
TOXNET® Toxicology Data Network page





**Figure 5.**  
Snapshot of TOXNET<sup>®</sup>/HSDB<sup>®</sup> vinyl chloride file



**Figure 6.**  
Household Products Database (HPD) page

U.S. Department of Health & Human Services [www.hhs.gov](http://www.hhs.gov)

**Household Products Database**  
Health & Safety Information on Household Products

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

[Home](#) [Products](#) [Manufacturers](#) [Ingredients](#) [Health Effects](#)

**Quick Search**  
Search  as  in  [Go](#)  
Product, Manufacturer etc...

**Advanced Search**

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[Arts & Crafts](#)  
[Pet Care](#)  
[Home Office](#)  
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**Browse A-Z**  
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[Types of Products](#)  
[Manufacturers](#)  
[Ingredients](#)

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[Product Recalls](#)  
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**Chemical Information**  
Chemical Name: **Vinylchloride, vinyl acetate, maleic anhydride polymer**  
CAS Registry Number: 025085-82-9  
Synonyms: Vinyl chloride acetate resin; Acetic acid ethenyl ester, polymer with chloroethene and 2,5-furandione

**Information from other National Library of Medicine databases**  
Health Studies: \*\*\*No information available in HSDB at this time\*\*\*  
Toxicity Information: [Search TOXNET](#)  
Chemical Information: [Search ChemIDplus](#)

**Products that contain this ingredient**

Brand	Category	Form	Percent
<a href="#">Oatey Pipe Seal-06/06/2000-Old Product</a>	Home maintenance	paste	7.0-15.0
<a href="#">Oatey Pipe Seal-Old Product</a>	Home maintenance	paste	7.0-11.0
<a href="#">Oatey Pipe Seal-06/10/2005</a>	Home maintenance	paste	7.0-15.0

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[Home](#) | [Brands](#) | [Manufacturers](#) | [Ingredients](#) | [Health Effects](#)

**Figure 7.**  
Snapshot of HPD vinyl chloride page

**Handling/Disposal**

**Handling:** Avoid contact with eyes, skin and clothing. Avoid breathing vapors or mists. Use with adequate ventilation (equivalent to outdoors). Wash thoroughly after handling. Do not eat, drink or smoke in the work area. Keep product away from heat, sparks, flames and all other sources of ignition. No smoking in storage or use areas. Keep containers closed when not in use. Store in a cool, dry, well-ventilated area away from incompatible materials. Keep containers closed when not in use. \*\*\*Empty\*\*\* containers retain product residue and can be hazardous. Follow all MSDS precautions in handling empty containers. Do not cut or weld on or near empty or full containers.

**Disposal:** Dispose in accordance with current local, state and federal regulations.

**Ingredients from MSDS/Label**

Chemical	CAS No / Unique ID	Percent
<a href="#">Methyl ethyl ketone</a>	000078-93-3	22-32
<a href="#">Kaolin clay</a>	001332-58-7	50-60
<a href="#">Vinylchloride, vinyl acetate, maleic anhydride polymer</a>	025085-82-9	7.0-15.0
<a href="#">Fumed silica, crystalline-free</a>	112945-52-5	0-2
<a href="#">Non-hazardous ingredient(s)</a>	999999-57-5	0-1

([Complete MSDS for this product](#))

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**Figure 8.**  
Snapshot of product information from HPD