

Appendix D:

Data Sources

Appendix D:

D1 Data Sources

This appendix provides guidance on where users of the Technical Guidance may find data not contained in the Approved Supply List (ASL)¹.

The appendix:

- identifies the types of alternative reputable data sources available;
- documents the scope of the information available from these sources;
- provides a brief outline of the origin and content of a number of these sources.

D1.1 Using Further Data Sources

The Hazardous Waste Assessment Framework requires identification of hazardous properties/ risk phrases and threshold concentrations for any waste, that is a "*mirror entry*" on the EWC 2002, in order to determine if the waste is hazardous. The ASL is the primary source for classification of dangerous substances: where a substance within the waste is identified on the ASL, the classification given must be used. Although the ASL will supply classifications for some hazardous materials, there will be occasions when wastes cannot be classified by this data source.

Further data sources will need to be accessed for the assessment of "*mirror entry*" wastes when ASL data are not available.

Given a mixture of substances some can be found on the ASL but not for others. The waste holder should first identify the classification of the ASL listed substances. It is a requirement under Duty of Care² to identify all hazards pertinent to the waste, even if the waste is an absolute hazardous entry on the EWC. The waste holder must try to classify the substances which are not listed on the ASL. Further data sources will need to be examined.

Some general points:

- Not all the potential sources are listed here. Many sources could be consulted for the necessary information.
- The data sources included here are not ranked in order of importance. The appropriateness of the data source will vary depending on the substance of concern.
- Many of the sources (particularly the Internet sources) refer back to primary databases for their information. The primary database (i.e. the sourced reference(s) for the data) is the preferred source of information from a data quality perspective, and where possible should be accessed.
- Data quality is important. The information used is from a peer-reviewed authoritative source. The source of any information should be recorded as part of a data audit trail.
- Check that the most recent data are being used.

¹ Approved Supply List (7th edition) – Information approved for the classification and labelling of substances and preparations dangerous for supply. HSE Books, ISBN 0 7176 2368 8

² Section 34, Environmental Protection Act 1990

- Particular care should be exercised when using information from the world wide web. The home page and specific site URL (uniform resource locator, i.e. Internet address) should be referenced in addition to the date the information was accessed. For example, if using the USEPA IRIS (Integrated Risk Information System) database the home page URL is <http://www.epa.gov> and the site specific URL is <http://www.epa.gov/iris>. Be aware that URLs may change.
- A number of the data sources referred to in this guidance contain information in different formats or with different slants, for different users' perspectives and needs. Some data sources include information on risk phrases and physical hazards, e.g. ICSC (International Chemical Safety Cards), whereas others are simply toxicological databases, e.g. IRIS.
- Some data sources may be available in both electronic and published hard copy formats. In terms of legal standing, the hard copy format will usually take precedence (particularly if there are found to be differences between the data from the same data provider in different formats). However, online or CD-ROM-based databases often provide the quickest way of securing a lot of information.

In order to agree an assessment with the regulator, the data should therefore be:

- referenced to a reputable source;
- of known data quality; and
- of good data quality.

D1.2 Technical Data Sources

D1.2.1 Types of data sources

The types of data source which may be used to supplement the ASL are listed in Table D1.1 below.

Table D1.1: Types of Data Sources

Type	Cost	Advantages	Disadvantages
Books/hard copy	Fixed	Reliability Easy to reference	Not usually updateable unless replaced
Safety Data Sheets (SDSs)	Usually free	Reliability Easy to reference May be updated UK sourced SDSs should be used where practicable as the classifications should be in accordance with CHIP.	US sourced SDSs may not be consistent with CHIP. Therefore US sourced SDSs should be used to obtain chemical/physical properties and toxicological information to assess against the criteria in the Approved Guide. Risk phrase information should not be taken from US SDSs.
CD-ROM (may also include 3 1/2" disks) and downloadable databases	Usually requires a subscription fee	Reliability - usually updated on a regular basis as part of the subscription fee May contain information from a number of databases	Cost
Internet sources	Some are free to access online. Others require registration and payment for online access	Easily accessible Generally updated regularly	Not all are reliable, as data sources are not always available May be difficult to check on the reliability

D1.2.2 Hard copy sources

These are the original reference texts. Table D1.2 gives titles and bibliographic details of some of the most useful sources of data and information that may be of help to waste assessors in their classification of wastes. These texts are likely to be found in the libraries of larger companies, and in the reference section of public and university libraries, learned societies, trade associations, or in the British Library.

Environmental Health Criteria Documents (EHCs) and Health and Safety Guides prepared under the International Programme on Chemical Safety provide detailed information on a number of chemicals.

Safety Data Sheets (SDSs) on substances and preparations are available from the manufacturers and/or suppliers. Schedule 4 of the CHIP Regulations provides a list of 16 obligatory headings under which information is to be provided in SDSs for chemical substances supplied within Europe.³ CHIP obliges any person who supplies a dangerous chemical for use at work to also provide a SDS. These include hazard identification, risk phrases, handling and toxicological information, ecological information and disposal considerations. An example of a UK SDS supplied by a manufacturer is provided in Figure D2.1. US sourced Material Safety Data Sheets (MSDS) may not be consistent with CHIP. Therefore US sourced SDSs should be used to obtain chemical/physical properties and toxicological information to assess against the criteria in the Approved Guide. Risk phrase information should not be taken from US SDSs. Table D1.3 provides an example of a US MSDS for perchloroethylene downloaded from the Internet. Figure D1.2 provides an example (calcium hydroxide) of how a web-based SDS may appear; however, the source of web-based SDSs needs to be considered.

The main drawback to hard copy sources is that they can get out of date, particularly their toxicological information.

³ US SDSs normally are in a different format with fewer headings

Table D1.2: Some hard copy sources of data

Title	Publisher and ISBN No
Agrochemicals Handbook and updates	Royal Society of Chemistry (Cambridge) ISBN 0 85186 416 3
Approved Supply List (7th edition). Information approved for the classification and labelling of substances and preparations dangerous for supply.	Health and Safety Commission. HSE Books, ISBN 0 7176 2368 8
BDH-Hazard Data Sheets (1990) + Addendum	Merck Ltd, Broome Road, Poole, BH12 4NN, BDH Product No. 57053 1 S and 5703 2T
Chemical Safety Data Sheets Vol. 1. Solvents (1989) Vol. 2. Main Group of Metals and Compounds (1990). Vol. 3. Corrosives and Irritants. Vol. 4A. Toxic Chemicals (A-L) (1991). Vol. 4B. Toxic Chemicals (M-Z) (1992). Vol. 5. Flammable Chemicals (1992).	Royal Society of Chemistry (Cambridge) ISBN 0 85186 903 3 ISBN 0 85186 913 0 ISBN 0 85186 923 8 ISBN 0 85186 311 6 ISBN 0 85186 321 3 ISBN 0 85186 411 2
Compendium of Safety Data Sheets for Research and Industrial Chemicals (Vols. I-III).	L H Keith and D B Walters. ISBN 0 89573 313 7
Dictionary of Substances and their Effects (DOSE)	Royal Society of Chemistry, Information Services, Thomas Graham House, Science Park, Milton Road, Cambridge, CB4 4WF
Environmental Hazard Assessment: A review of the distribution, fate and effects of particular chemicals on the environment	Building Research Establishment (BRE), BRE Bookshop, Garston, Watford
Fire Protection Guide to Hazardous Chemical Substances (1991)	US National Fire Protection Association. ISBN 0 87765 366 6
Handbook of Chemistry and Physics (1993/4)	D R Lide (Ed.). ISBN 0 8493 0474 1
Handbook of Reactive Chemical Hazards	L Bretherick, Butterworths (London). ISBN 0 408 013887 5
International Programme on Chemical Safety (IPCS).	World Health Organisation (WHO)
Merck Index - An Encyclopaedia of Chemicals, Drugs and Biologicals.	Merck & Co., Inc., Rahway, NJ, USA
Register of Toxic Effects of Chemical Substances (RTECS).	NIOSH, Microinfo Ltd., PO Box 3, Omega Park, Hants GU34 2PG
Sax's Dangerous Properties of Industrial Materials (1992) 3 volumes.	R J Lewis Snr. (Ed.), Van Nostrand Reinhold (London). ISBN 0 442 01132 6

Figure D1.1: Example of a UK manufacturer supplied SDS

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SAFETY DATA SHEET

Print Date 24.10.2000 Version 2 Revision Date 18.07.2000

1 Identification of substance:

- Product details:
- Trade name: MICROETCH SF
- Product Code: 9639
- Manufacturer/Supplier:

MANUFACTURER/SUPPLIER'S ADDRESS & CONTACT DETAILS

- Information department:
Quality, Health, Safety and Environment Department
- Emergency information:
Out of hours transport emergency 01865 407333
CEAS NCEC CULHAM

Atotech Hazard Code:R2

2 Composition/Data on components:

- Chemical characterization
- Description:

Mixture of the substances listed below with non-hazardous additions.

Dangerous components:

7775-27-1 sodium persulphate	< 90 %
Xn, O; R 8-22-36-37-38-42-43	
7681-38-1 sodium bisulphate	< 30 %
Xi; R 41	

3 Hazards identification

- Hazard description:

	Xn Harmful O Oxidizing
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- Information pertaining to particular dangers for man and environment

R 8 Contact with combustible material may cause fire.
 R 22 Harmful if swallowed.
 R 37/38 Irritating to respiratory system and skin.
 R 41 Risk of serious damage to eyes.
 R 42/43 May cause sensitization by inhalation and skin contact.

- Classification system

The classification was made according to the latest editions of the Chemicals (Hazard Information and Packaging for Supply) Regulations and expanded upon from company and literature data.

4 First aid measures

- General information
Immediately remove any clothing soiled by the product.
- After inhalation
Supply fresh air and to be sure call for a doctor.
In case of unconsciousness place patient in the recovery position and obtain immediate medical attention.

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SAFETY DATA SHEET

Print Date 24.10.2000

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Revision Date 18.07.2000

Trade name: MICROETCH SF	
	(Contd. of page 1)
<ul style="list-style-type: none"> · After skin contact Immediately wash with water and soap and rinse thoroughly. If skin irritation continues, consult a doctor. · After eye contact Irrigate opened eye for 10 minutes minimum (timed) under running water. Obtain immediate medical attention. · After swallowing Rinse out mouth and then drink plenty of water. Call for a doctor immediately. 	
5	<p><u>Fire fighting measures</u></p> <ul style="list-style-type: none"> · Suitable extinguishing agents CO₂, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam. · Special hazards caused by the material, its products of combustion or resulting gases: Formation of toxic gases is possible during heating or in case of fire. · Protective equipment: Firefighters should wear self contained breathing apparatus and full personal protective clothing.
6	<p><u>Accidental release measures</u></p> <ul style="list-style-type: none"> · Person-related safety precautions: Wear protective equipment. Keep unprotected persons away. · Measures for environmental protection: Do not allow to enter sewers/ surface or ground water. · Measures for cleaning/collecting: Dispose contaminated material as waste according to item 13. Ensure adequate ventilation.
7	<p><u>Handling and storage</u></p> <ul style="list-style-type: none"> · Handling · Information for safe handling: Ensure good local exhaust ventilation at the workplace. Open and handle receptacle with care. Always wear the recommended PPE. Prevent formation of dust. Thorough dedusting. · Information about protection against explosions and fires: No special measures required. · Storage · Requirements to be met by storerooms and receptacles: Store only in original receptacles. · Information about storage in one common storage facility: Do not store with alkalis (caustic solutions). Store away from foodstuffs. Do not store with combustible / organic materials. · Further information about storage conditions: Keep container tightly sealed. · Storage class · Class according to regulation on flammable liquids: Void
8	<p><u>Exposure controls and personal protection</u></p> <ul style="list-style-type: none"> · Additional information about design of technical systems: No further data; see item 7. <p><u>Components with limit values that require monitoring at the workplace:</u></p> <p align="right">(Contd. on page 3)</p>

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SAFETY DATA SHEET

Print Date 24.10.2000

Version 2

Revision Date 18.07.2000

Trade name: MICROETCH SF			
(Contd. of page 2)			
7775-27-1 sodium persulphate OEL: 1 (as S2O8) mg/m ³			
7681-38-1 sodium bisulphate OES - DUST: 8hr:10 mg/m ³ , total inhalable; 4 mg/m ³ , respirable			
<ul style="list-style-type: none"> • Additional information: The information is based on data valid at the time of compilation. 			
<ul style="list-style-type: none"> • Personal protective equipment • General protective and hygienic measures Keep away from foodstuffs, beverages and animal feedstuff. Immediately remove all soiled and contaminated clothing. Wash hands before breaks and at the end of work. Avoid contact with the eyes and skin. • Breathing equipment: Use suitable respiratory protective device in case of insufficient ventilation. • Protection of hands: Protective gloves. • Eye protection: Safety glasses or goggles to BS 2092C • Body protection: Protective work clothing. 			
9 <u>Physical and chemical properties:</u>			
<ul style="list-style-type: none"> • Form: Powder • Colour: White • Odour: Characteristic 			
	<u>Value/Range</u>	<u>Unit</u>	<u>Method</u>
• Change in condition			
• Melting point/Melting range:	undetermined		
• Boiling point/Boiling range:	undetermined		
• Flash point:	Not applicable		
• Flammability (solid, gaseous) Contact with combustible material may cause fire.			
• Self igniting:	Product is not self-igniting.		
• Danger of explosion: Product does not present an explosion hazard.			
• Density:	Not determined		
• Solubility in / Miscibility with			
• Water:	Soluble		
10 <u>Stability and reactivity</u>			
<ul style="list-style-type: none"> • Thermal decomposition / conditions to be avoided: No decomposition if used according to specifications. • Dangerous reactions Reacts with alkali (lyes) Acts as an oxidizing agent on organic materials such as wood, paper and fats. • Dangerous products of decomposition: No dangerous decomposition products known 			

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Trade name: MICROETCH SF

11 Toxicological information

- Acute toxicity:
LD/LC50 values that are relevant for classification:
7775-27-1 sodium persulphate
Oral: LD50: 920 mg/kg (RAT)
- Primary irritant effect:
 - on the skin: Irritant to skin and mucous membranes.
 - on the eye: Strong irritant with the danger of severe eye injury.
- Sensitization:
Sensitization possible through inhalation.
Sensitisation possible through skin contact.
- Additional toxicological information:
The product shows the following dangers according to the calculation method of the General EU Classification Guidelines for Preparations as issued in the latest version:
Harmful
Irritant

12 Ecological information:

- General notes:
Water hazard class 1 (German Regulation) (Self-assessment): slightly hazardous for water.
Do not allow undiluted product or diluted product to reach ground water, water course or sewage system.

13 Disposal considerations

- Product:
- Recommendation
Must not be disposed of together with household garbage. Do not allow product to reach sewage system.
Flush spillage to effluent treatment plant with copious amounts of water.
- Uncleaned packagings:
- Recommendation:
Disposal must be made according to official regulations.
- Recommended cleansing agent: Water, if necessary with cleansing agents.

14 Transport information

- Land transport ADR/RID (cross-border)
- ADR/RID class: 5.1
- Item: 31c
- Danger code (Kepler): 58
- UN-Number: 3085
- Label: 5.1+8
- Description of goods: Oxidizing solid, corrosive, n.o.s. (sodium persulphate, sodium bisulphate)
- Maritime transport IMDG:
- IMDG Class: 5.1
- Page: 5164
- UN Number: 3085
- Packaging group: III
- EMS Number: 5.1-05
- MFAG: 760
- Marine pollutant: No
- Proper shipping name: Oxidizing solid, corrosive, n.o.s. (sodium persulphate, sodium bisulphate)

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SAFETY DATA SHEET

Print Date 24.10.2000

Version 2

Revision Date 18.07.2000

Trade name: MICROETCH SF

(Contd. of page 4)
persulphate, sodium bisulphate)

- Air transport ICAO-TI and IATA-DGR:
- ICAO/IATA Class: 5.1
- UN/ID Number: 3085
- Packaging group: III
- Proper shipping name: Oxidizing solid, corrosive, n.o.s. (sodium persulphate, sodium bisulphate)

15 Regulations

- **Markings according to EU guidelines:**
The product has been classified and marked in accordance with EU Directives / Ordinance on Hazardous Materials

- **Code letter and hazard designation of product:**



Xn Harmful
O Oxidizing

- **Hazard-determining components of labelling:** sodium persulphate
- **Risk phrases:**
8 Contact with combustible material may cause fire.
22 Harmful if swallowed.
37/38 Irritating to respiratory system and skin.
41 Risk of serious damage to eyes.
42/43 May cause sensitization by inhalation and skin contact.
- **Safety phrases:**
17 Keep away from combustible material.
22 Do not breathe dust.
24 Avoid contact with skin.
26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
37/39 Wear suitable gloves and eye/face protection.
- **National regulations**
- **Water hazard class:**
Water hazard class 1 (Self-assessment): slightly hazardous for water.

16 Other information:

IMPORTANT NOTE TO BE READ BY ALL CONCERNED
The data given here is based on current knowledge and experience. The purpose of this MSDS is to describe the product in terms of its safety requirements. The data does not signify any warranty with regard to the product's properties. The product is used singly or as one of a number of products used in combination in industrial surface treatment processes. For assessment of the PROCESS hazards, evaluation of all of the product MSDS'S required for the process will be necessary. Product use is described in the relevant Process Technical Data Sheet. Sections of this MSDS which have been modified since the last Version are indicated by an asterisk (*).

- **Department issuing MSDS:**
Quality, Health, Safety and Environment Department

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Table D1.3: An example MSDS for perchloroethylene (Direct Reproduction of US MSDS)

<p>1. Product Identification</p>	<p>Synonyms: ethylene tetrachloride; tetrachloroethene; perchloroethylene; carbon bichloride; carbon dichloride CAS No.: 127-18-4 Molecular Weight: 165.83 Chemical Formula: Cl₂C:CCl₂ Product Codes: J.T. Baker: 9218, 9360, 9453, 9465, 9469 Mallinckrodt: 1933, 8058</p>
<p>2. Hazard Identification</p>	<p>Emergency Overview</p> <hr/> <p>WARNING! HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM, LIVER AND KIDNEYS. SUSPECT CANCER HAZARD. MAY CAUSE CANCER. Risk of cancer depends on level and duration of exposure.</p> <p>J.T. Baker SAF-T-DATA^(tm) Ratings (Provided here for your convenience)</p> <hr/> <p>Health Rating: 3 - Severe (Cancer Causing) Flammability Rating: 0 - None Reactivity Rating: 1 - Slight Contact Rating: 2 - Moderate Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES Storage Colour Code: Blue (Health)</p> <hr/> <p>Potential Health Effects</p> <p>Inhalation: Irritating to the upper respiratory tract. Giddiness, headache, intoxication, nausea and vomiting may follow the inhalation of large amounts while massive amounts can cause breathing arrest, liver and kidney damage, and death. Concentrations of 600 ppm and more can affect the central nervous system after a few minutes.</p> <p>Ingestion: Not highly toxic by this route because of low water solubility. Used as an oral dosage for hookworm (1 to 4 ml). Causes abdominal pain, nausea, diarrhoea, headache, and dizziness.</p> <p>Skin Contact: Causes irritation to skin. Symptoms include redness, itching, and pain. May be absorbed through the skin with possible systemic effects.</p> <p>Eye Contact: Causes irritation, redness, and pain.</p> <p>Chronic Exposure: May cause liver, kidney or central nervous system damage after repeated or prolonged exposures. Suspected cancer risk from animal studies.</p> <p>Aggravation of Pre-existing Conditions: Persons with pre-existing skin disorders or eye problems or impaired liver or kidney function may be more susceptible to the effects of the substance. The use of alcoholic beverages enhances the toxic effects.</p>

3. Ecological Information	<p>Environmental Fate: When released into the soil, this material is expected to quickly evaporate. When released into the soil, this material may leach into groundwater. When released into the soil, this material may biodegrade to a moderate extent. When released to water, this material is expected to quickly evaporate. When released into water, this material is not expected to biodegrade. This material is not expected to significantly bioaccumulate. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals.</p> <p>Environmental Toxicity: The LC₅₀/96-hour values for fish are between 1 and 10 mg/l. The LC₅₀/96-hour values for fish are between 10 and 100 mg/l. This material is expected to be toxic to aquatic life.</p>								
4. Toxicological Information	<p>Oral rat LD50: 2629 mg/kg; inhalation rat LC50: 34.2 g/m³/8H; investigated as a tumorigen, mutagen, reproductive effector.</p> <p style="text-align: center;">\Cancer Lists\ NTP Carcinogen </p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Ingredient</th> <th style="text-align: center;">Known</th> <th style="text-align: center;">Anticipated</th> <th style="text-align: center;">IARC Category</th> </tr> </thead> <tbody> <tr> <td>Tetrachloroethylene (127-18-4)</td> <td style="text-align: center;">No</td> <td style="text-align: center;">Yes</td> <td style="text-align: center;">2A</td> </tr> </tbody> </table>	Ingredient	Known	Anticipated	IARC Category	Tetrachloroethylene (127-18-4)	No	Yes	2A
Ingredient	Known	Anticipated	IARC Category						
Tetrachloroethylene (127-18-4)	No	Yes	2A						
5. Disposal Information	<p>Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.</p>								
6. Handling and Storage	<p>Store in a cool, dry, ventilated area away from sources of heat or ignition. Isolate from flammable materials. Protect from direct sunlight. Wear special protective equipment (Sec. 8) for maintenance break-in or where exposures may exceed established exposure levels. Wash hands, face, forearms and neck when exiting restricted areas. Shower, dispose of outer clothing, change to clean garments at the end of the day. Avoid cross-contamination of street clothes. Wash hands before eating and do not eat, drink, or smoke in workplace. Containers of this material may be hazardous when empty since they retain product residues (vapours, liquid); observe all warnings and precautions listed for the product.</p>								
7. Exposure	<p>Airborne Exposure Limits: -OSHA Permissible Exposure Limit (PEL): 100 ppm (TWA), 200 ppm (ceiling), 300 ppm/5min/3-hour (max) -ACGIH Threshold Limit Value (TLV): 25 ppm (TWA), 100 ppm (STEL); listed as A3, animal carcinogen</p>								

<p>8. Personal Safety</p>	<p>Ventilation System: A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, <i>Industrial Ventilation, A Manual of Recommended Practices</i>, most recent edition, for details.</p> <p>Personal Respirators (NIOSH Approved): If the exposure limit is exceeded, wear a supplied air, full-facepiece respirator, airtight hood, or full-facepiece self-contained breathing apparatus.</p> <p>Skin Protection: Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.</p> <p>Eye Protection: Use chemical safety goggles and/or full-face shield where dusting or splashing of solutions is possible. Maintain eye wash fountain and quick-drench facilities in work area.</p>
<p>9. Chemical and Physical Properties</p>	<p>Appearance: Clear, colourless liquid.</p> <p>Odour: Ethereal odour.</p> <p>Solubility: 0.015 g in 100 g of water.</p> <p>Specific Gravity: 1.62 @ 20C/4C</p> <p>pH: No information found.</p> <p>% Volatilise by volume @ 21C (70F): 100</p> <p>Boiling Point: 121C (250F)</p> <p>Melting Point: -19C (-2F)</p> <p>Vapour Density (Air=1): 5.7</p> <p>Vapour Pressure (mm Hg): 18 @ 25C (77F)</p> <p>Evaporation Rate (BuAc=1): 0.33 (trichloroethylene = 1)</p>
<p>10. Stability and Reactivity</p>	<p>Stability: Stable under ordinary conditions of use and storage. Slowly decomposed by light. Deteriorates rapidly in warm, moist climates.</p> <p>Hazardous Decomposition Products: Carbon dioxide and carbon monoxide may form when heated to decomposition. Hydrogen chloride gas and phosgene gas may be formed upon heating. Decomposes with moisture to yield trichloroacetic acid and hydrochloric acid.</p> <p>Hazardous Polymerisation: Will not occur.</p> <p>Incompatibilities: Strong acids, strong oxidisers, strong alkalis, especially NaOH, KOH; finely divided metals, especially zinc, barium, lithium. Slowly corrodes aluminium, iron and zinc.</p>

	<p>Conditions to Avoid: Moisture, light, heat and incompatibles.</p>																																						
11. Transport Information	<p>Domestic (Land, D.O.T.) Proper Shipping Name: TETRACHLOROETHYLENE Hazard Class: 6.1 UN/NA: UN1897 Packing Group: III Information reported for product/size: 20L</p> <p>International (Water, I.M.O.) Proper Shipping Name: TETRACHLOROETHYLENE Hazard Class: 6.1 UN/NA: UN1897 Packing Group: III Information reported for product/size: 20L</p> <p>International (Air, I.C.A.O.) Proper Shipping Name: TETRACHLOROETHYLENE Hazard Class: 6.1 UN/NA: UN1897 Packing Group: III Information reported for product/size: 20L</p>																																						
12. Regulatory Information	<p>Chemical Inventory Status - Part 1</p> <table border="0"> <tr> <td>Ingredient</td> <td>TSCA</td> <td>EC</td> <td>Japan</td> <td>Australia</td> </tr> <tr> <td>Tetrachloroethylene (127-18-4)</td> <td>Yes</td> <td>Yes</td> <td>Yes</td> <td>Yes</td> </tr> </table> <p>Chemical Inventory Status - Part 2 Canada</p> <table border="0"> <tr> <td>Ingredient</td> <td>Korea</td> <td>DSL</td> <td>NDSL</td> <td>Phil.</td> </tr> <tr> <td>Tetrachloroethylene (127-18-4)</td> <td>Yes</td> <td>Yes</td> <td>No</td> <td>Yes</td> </tr> </table> <p>Federal, State & International Regulations - Part 1 -SARA 302- -SARA 313-</p> <table border="0"> <tr> <td>Ingredient</td> <td>RO</td> <td>TPQ</td> <td>List</td> <td>Chemical Catg.</td> </tr> <tr> <td>Tetrachloroethylene (127-18-4)</td> <td>No</td> <td>No</td> <td>Yes</td> <td>No</td> </tr> </table> <p>Federal, State & International Regulations - Part 2 -RCRA- -TSCA-</p> <table border="0"> <tr> <td>Ingredient</td> <td>CERCLA</td> <td>261.33</td> <td>8(d)</td> </tr> <tr> <td>Tetrachloroethylene (127-18-4)</td> <td>100</td> <td>U210</td> <td>No</td> </tr> </table> <p>Chemical Weapons Convention: No TSCA 12(b): No CDTA: No SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No Reactivity: No (Pure / Liquid)</p> <p>WARNING: THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.</p> <p>Australian Hazchem Code: 2[Z] Poison Schedule: No information found. WHMIS: This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.</p>	Ingredient	TSCA	EC	Japan	Australia	Tetrachloroethylene (127-18-4)	Yes	Yes	Yes	Yes	Ingredient	Korea	DSL	NDSL	Phil.	Tetrachloroethylene (127-18-4)	Yes	Yes	No	Yes	Ingredient	RO	TPQ	List	Chemical Catg.	Tetrachloroethylene (127-18-4)	No	No	Yes	No	Ingredient	CERCLA	261.33	8(d)	Tetrachloroethylene (127-18-4)	100	U210	No
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Ingredient	RO	TPQ	List	Chemical Catg.																																			
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Tetrachloroethylene (127-18-4)	100	U210	No																																				

<p>13. Fire Fighting Measures</p>	<p>Fire: Not considered to be a fire hazard but becomes hazardous in a fire situation because of vapour generation and possible degradation to phosgene (highly toxic) and hydrogen chloride (corrosive). Vapours are heavier than air and collect in low-lying areas.</p> <p>Explosion: Not considered to be an explosion hazard. Containers may explode when involved in a fire.</p> <p>Fire Extinguishing Media: Use any means suitable for extinguishing surrounding fire. Water spray may be used to keep fire-exposed containers cool.</p> <p>Special Information: In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.</p>
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Source: <http://www.jtbaker.com/msds/t0767.htm>

Figure D1.2. Web screenshot examples of an SDS for calcium hydroxide

CALCIUM HYDROXIDE ICSC: 0408

CALCIUM HYDROXIDE
 Calcium dihydrate
 Calcium hydroxide
 Hydrated lime
 Slaked lime
 $\text{Ca}(\text{OH})_2$
 Molecular mass: 74.1

CAS # 1305-62-0
 EINECS # EW2800000
 ICSC # 0408

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Not combustible.		In case of fire in the surroundings: all extinguishing agents allowed.
EXPLOSION			
EXPOSURE		PREVENT DISPERSION OF DUST!	
INHALATION	Rare throat; Cough; Burning sensation.	Local exhaust or breathing protection.	Fresh air, rest. Refer for medical attention.
SKIN	Redness; Roughness; Pain; Dry skin; Skin burns; Blister.	Protective gloves; Protective clothing.	Remove contaminated clothes. Rinse skin with plenty of water or shower. Refer for medical attention.
EYES	Redness; Pain; Severe deep burns.	Safety goggles, or face shield, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
INGESTION	Burning sensation; Abdominal pain; Abdominal cramps; Vomiting.	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Give nothing to drink. Refer for medical attention.
SPILLAGE DISPOSAL		STORAGE	PACKAGING & LABELLING
Sweep spilled substance into containers, then remove to safe place (with personal protection: P2 filter respirator for harmful particles).		Separated from strong acids.	
SEE IMPORTANT INFORMATION ON BACK			
ICSC: 0408 <small>Depend on the content of preparation before the International Programme on Chemical Safety & the Commission of the European Communities © ILO/ICSC 2002</small>			

International Chemical Safety Cards

CALCIUM HYDROXIDE ICSC: 0408

I	PHYSICAL STATE, APPEARANCE: COLOURLESS CRYSTALS OR WHITE POWDER.	ROUTES OF EXPOSURE: The substance can be absorbed into the body by inhalation of its aerosol and by ingestion.
H	PHYSICAL DANGERS:	INHALATION RISK: Evaporation at 20°C is negligible, a harmful concentration of airborne particles can, however, be reached quickly when dispersed.
F	CHEMICAL DANGERS: The substance decomposes on heating producing calcium oxide. The solution in water is a medium strong base. Reacts violently with acids. A flammable gas (hydrogen) may evolve in presence of water forming flammable/explosive gas (hydrogen) - see ICSC # 0301.	EFFECTS OF SHORT-TERM EXPOSURE: The substance irritates the respiratory tract and is corrosive to the eyes and the skin. Medical observation is indicated.
O	OCCUPATIONAL EXPOSURE LIMITS (OELs): TLV: 3 ppm, mg/m ³ (ACGIH 1998).	EFFECTS OF LONG-TERM OR REPEATED EXPOSURE: Repeated or prolonged contact with skin may cause dermatitis. Lungs may be affected by repeated or prolonged exposure to dust particles.
R		
T		
A		
N		
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A		
PHYSICAL PROPERTIES	Melting point (decomposes): 580°C Relative density (water = 1): 1.2	Solubility in water: none
ENVIRONMENTAL		

Source: <http://siri.org/msds/mf/cards/file/0408.html>

D1.2.3 Databases

Table D1.4 shows a matrix of common databases and database providers which are available over the Internet or by CD-ROM. Table D1.5 expands on Table D1.4 with details of:

- who provides the database;
- whether it is free or by subscription;
- the web address;
- the type of information which the database provides;
- how easy it is to find relevant information; and
- the reliability of the data.

CD-ROM databases

The main advantage of CD-ROMs is that many original databases can be found on one or two CDs, and the information is regularly updated. The main disadvantage is their ongoing subscription cost. Table D1.5 shows some sources of CD-ROM-based information.

Internet database sources

Internet sources are becoming more widely used due mainly to the ease of accessibility and the comprehensive range of information available. The main disadvantages are that data quality needs consideration every time and a number of sites may need to be visited. Table D1.5 shows a number of Internet sources. It should be noted that Internet sources of information may change without warning. Some database hosts may change the URLs or, worse, may no longer support the database. New or additional sites may support these databases also. The listing in Table D1.5 cannot therefore be guaranteed to be complete or accurate. If a particular database or URL cannot be located, a search for the specific database using an Internet search engine may relocate the new host/URL.

Table D1.4: Matrix of Common Databases and Free (F) or Subscription (S) Data Providers

Databases	Database Providers																	
	ATSDR	Cambridgesoft	US Coastguard	ERG 2000	Knovel	International Labour Organisation	WHO	European Chemicals Bureau	Merck	National Chemical Emergency Centre	NISC (CIS)	NIOSH	Van Nostran Reinhold	Silver Platter (Chembank)	Safety Information Resources and Material Safety	Chemical Abstracts Service	USEPA	US National Library of Medicine
ATSDR	F																	
CSElite										F								
CSE										S								
CHEMFINDER	F	F																
CHEMID <i>plus</i>																		F
CHRIS2000			F								S			S				
DOSE					S													
EINECS								F						S				
ERG2000				F										S				
HSDB											S			S				F
ICSC						F												
IPCS INCHEM							F											
IRIS											S			S			F	F
IUCLID								S										
Merck Index		S							S									
OHMTADS														S			F	
RTECS											S	S		S				
SIRI MSDS	F														F			
Sax's			S										S					
STN																S		
TOXNET																		F
TSCA														S			F	

Table D1.5: Some available databases and their relevance

Database	Data Provider	Subscription / Free	Web / CD-ROM	Notes
ATSDR	Agency for Toxic Substances and Disease Registry	Free web access Free CD-ROM	www.atsdr.cdc.gov http://www.atsdr.cdc.gov/hazdat.html and CD-ROM	ATSDR's HazDat database provides access to ATSDR toxicology profiles, and ToxFaq sheets. HazDat also contains data from the USEPA's CERCLIS database. ATSDR contains 250 published toxicological profiles. All profiles have been peer reviewed. Relevant subject areas: chemical and physical information; environmental fate; human health effects. ToxFAQs™ are a two-page summary about hazardous substances developed by ATSDR. Links to more external safety and chemistry information such as Chemfinder, National Fire Protection Association (NFPA) and the Vermont SIRI Material Safety Data Sheet (MSDS) Archive.
CHEM-FINDER (pseudo database)	Cambridgesoft	Limited free web access to individuals Subscription access to institutions CD-ROM is not free	www.cambridgesoft.com CD-ROM (ChemFinderUltra 6.0) Includes additional features and databases	Contains index to >75,000 substances from over 350 sites. Chemfinder is a chemical database which searches the world wide web for references to the hazardous substances of concern. The searches will bring up a range of web pages which contain information on the substance in question. Relevant subject areas: health; miscellaneous; SDS; pesticides/herbicides; physical properties. A disadvantage of Chemfinder is that it can be time consuming searching the sources of information.
CSE and CSElite	National Chemical Emergency Centre (NCEC)	CSE Lite is a free but incomplete database CSE is a complete database but is not free	www.the-ncec.com/index.html www.the-ncec.com/cselite/	These databases are downloadable for use on individual computers. Relevant subject areas: Carriage Labels, Supply Labels, Exposure Limit Information. Contains chemical classification data and applicable risk phrases. There are two databases, CSE and CSE Lite. CSE Lite is free but is not a complete database, whereas CSE is a complete database but is not free.

Database	Data Provider	Subscription / Free	Web / CD-ROM	Notes
CHEM-BANK (pseudo database)	Silver Platter	Subscription based	www.silverplatter.com/index.html and CD-ROM	Silver Platter provide a collection of databases of reference material in electronic form. Chembank includes the following databases: CHRIS, EINECS, ERG, HSDB, IRIS, OHMTADS, RTECS and TSCA.
CHEMID <i>plus</i>	US National Library of Medicine	Free web access	http://chem.sis.nlm.nih.gov/chemidplus/	ChemIDplus is a free web-based search system that provides access to numerous chemical synonyms, structures, regulatory list information and links to other databases containing information about the chemicals.
Chemical Hazard Response Information System (CHRIS 2000)	US Coastguard	Free web access	http://www.chrismanual.com/Default.htm http://www.chrismanual.com/findform.htm	Contains 1,150 chemicals. Designed for use in spill situations. The database provides no indication of data quality. Relevant subject areas: physico-chemical properties; toxicity; threshold values for BOD and food chain, and concentration for aquatic toxicity and irritancy.
	CIS	Subscription-based web access	http://www.nisc.com/cis/cisfacts.html	
	Silver Platter	Subscription-based	www.silverplatter.com/index.html and CD-ROM	
Chemical Information System (CIS) (pseudo database)	NISC	Subscription-based web access	http://www.nisc.com/cis/cisfacts.htm	CIS covers >500,000 different chemicals from 30 different databases including AQUIRE, BIODEG, BIOLOG, BRS, CCRIS, CERCLIS, CHRIS , DATALOG, DOCKET, ENVIROFATE, FINDS, GENE-TOX, GIABS, HSDB , IRIS , ISHOW, MALLIN, MEDLINE Toxicology subset, NIOSHTIC®(subset, PHYTOTOX, RCRIS, RTECS ®, SANSS, TERRETOX, TRI, TSCAINV, TSCAPP and TSCATS. Further databases (e.g. DERMAL, OHMTADS) will be added. Those of relevance are highlighted in BOLD

Database	Data Provider	Subscription / Free	Web / CD-ROM	Notes
Dictionary of Substances and their Effects (DOSE)	Royal Society of Chemistry via Knovel	Subscription-based web access	http://www.knovel.com/knovel2/	<p>The database combines environmental impact and toxicological data on over 4,000 chemicals.</p> <p>Relevant subject areas: identifiers and basic chemistry; physical properties; mammalian and avian toxicity- carcinogenicity, mutagenicity, teratogenicity, irritancy, acute effects, genotoxicity; environmental fate - inhibition effects, degradation, absorption, removal, anaerobic fate; occupational exposure - risk and safety phrases, limit values, supply and conveyance, classification; ecotoxicity - fish, invertebrate, bioaccumulation; legislation and references.</p> <p>It also contains the risk phrases and safety phrases assigned to each substance.</p>
European Inventory of Chemicals on European Inventory of Existing Chemicals (EINECS)	European Chemicals Bureau (ECB)	Free web access, limited information	http://ecb.jrc.it/existing-chemicals/	<p>EINECS-Plus includes: the European List of Notified Chemical Substances (ELINCS 5th edition), which contains over 100,000 records; the list of Dangerous Substances whose classification and labelling is prescribed by EC legislation; the European Customs Inventory of Chemical Substances; the European Cosmetics Inventory; the EINECS corrections list from the EC; and a summary of EC Legislation on Dangerous Substances.</p>
	Silver Platter	Subscription-based web access	www.silverplatter.com/index.html and CD-ROM	
Emergency Response Guide 2000 (ERG 2000)	Developed jointly by Transport Canada, the Secretariat of Communications and Transportation of Mexico and the US Department of Transportation	Free web access	http://www.tc.gc.ca/canutec/erg_gmu/erg2000_menu.htm	<p>ERG has been designed for use by emergency services personnel at incidents involving dangerous goods.</p> <p>It provides information on the following: potential hazards with regards to human health effects and fire and explosion issues; public safety such as protective clothing; emergency response measures.</p>
	Silver Platter	Subscription based	www.silverplatter.com/index.html and CD-ROM	

Database	Data Provider	Subscription / Free	Web / CD-ROM	Notes
Hazardous Substances Data Bank (HSDB)	US National Library of Medicine	Free web access	http://www.nlm.nih.gov/	Contains over 4,500 chemicals. The information is referenced and peer reviewed.
	Silver Platter (part of Chembank suite)	Subscription based	www.silverplatter.com/index and CD-ROM	Relevant subject areas: substance identification; manufacturing information; environmental fate/exposure potential; chemical and physical properties; exposure standards and regulations; safety and handling; toxicity.
	NISC (part of CIS) online access	Subscription based	http://www.nisc.com/cis/cisfacts.htm	A large amount of detailed information is available and covers all areas necessary for hazard classification.
International Programme on Chemical Safety (IPCS INCHEM)	World Health Organisation (WHO)	Free web access	http://www.inchem.org/	Environmental Health Criteria (EHC) monographs are comprehensive data from scientific sources for the establishment of safety standards and regulations. The EHCs review and examine the literature and evaluate risks for human health and the effects on the environment. The information is peer reviewed.
Integrated Risk Information System (IRIS)	USEPA toxicology database covering exposure and health effects	Free web access	http://www.epa.gov/ http://www.epa.gov/iris	IRIS contains risk assessment data giving both values and details of studies carried out, with information covering the following key subject areas: substance identification; oral exposure; inhalation exposure; drinking water exposure; health risk assessment; Regulations and Acts.
	NISC	Subscription-based online access	http://www.nisc.com/cis/cisfacts.htm	
	Silver Platter	Subscription-based online access	http://www.silverplatter.com/index.html	The quality of the data provided can be assessed from the study data, but the information provided is specialised and is concerned only with exposure and health effects.

Database	Data Provider	Subscription / Free	Web / CD-ROM	Notes
International Uniform Chemical Information Database (IUCLID)	European Chemicals Bureau (ECB)	Available from the Office for Official Publications of the European Communities, L-2985 Luxembourg, through 80 sales agents worldwide.	http://ecb.jrc.it to order CD-ROM latest CD is IUCLID 2000.	The IUCLID CD-ROM is the tool to make the data collected under the Council Regulation (EEC) 793/93 on the "Evaluation and Control of the Risks of Existing Substances" available. It gives access to the documents and data sets in pdf format documents. It allows the waste assessor to find data sets via substance identifiers, e.g. CAS or EINECS numbers and also via the manufacturing companies or the given R-phrases. It contains legislative information such as the Existing Substances Regulation, the Risk Assessment Regulation, the Priority Lists and the English version of EINECS.
Merck Index (12th edition)	Merck and Co.Inc. (USA)	Subscription based	http://chemfinder.cambridgesoft.com/reference/TheMerckIndex.asp and CD-ROM	This database contains information on > 10,000 substances. It covers drugs, biological and natural products, agricultural compounds, commercial and laboratory chemicals and environmentally significant compounds. Complex searches on physico-chemical properties can be carried out, so it is more flexible than a simple direct search. The information available is the same as that found in the book version.
Oil and Hazardous Materials, Technical Assistance Data Systems (OHMTADS)	USEPA Silver Platter	Free web access Subscription (part of Chembank suite)	http://www.epa.gov/ http://www.silverplatter.com/catalog/cmbk.htm and CD-ROM	Contains 1,400 oily or hazardous materials, using data from published literature. It covers the following key subject areas: identification of substances and trade names; containers, storage, handling, producers and transport; physical properties including: flammability, corrosiveness, explosivity, solubility and vapour information; environmental characteristics including: persistency, BOD and bioaccumulation; toxicity and exposure limits for aquatic systems, animals, and plants. The database contains a basic indication of data quality for each compound.

Database	Data Provider	Subscription / Free	Web / CD-ROM	Notes
Registry of Toxic Effects of Chemical Substances (RTECS)	NIOSH	NIOSH last updated RTECS in 2001 and has now sold the distribution rights to a number of database vendors. A full list of vendors is given at the web address	http://www.cdc.gov/niosh/rtecs.html	<p>Contains over 120,000 chemicals.</p> <p>Relevant subject areas: class of compound and health effects: irritation, mutagenic, reproductive or tumorigenic effects; toxicology/cancer references; acute toxicity.</p> <p>The database is mainly concerned with health effects, and is therefore unlikely to provide much information on physico-chemical hazard properties.</p>
Safety Information Resources and Material Safety Data Sheets (SIRI MSDS)	Safety Information Resources and Material Safety	Free web access	<p>http://siri.org/msds/index.php (Florida site)</p> <p>http://siri.uvm.edu/msds/ (Vermont Site)</p> <p>http://www.vetmed.ucdavis.edu/msds/ (California Site)</p>	<p>The information included in each product reference was extracted from information published by the US Government. The site provides access to current information on chemical products. It contains archives of SDSs, which are kept up to date by manufacturers providing information. There are three "mirror sites" should one website be down, and an inquiry on a particular substance will give a number of SDSs on different websites.</p>
Sax's Dangerous Properties of Industrial Materials	Van Nostrand Reinhold of New York	CD-ROM only	N/A	<p>Contains entries identifying the hazardous properties of chemicals used in industry, published in both printed and CD-ROM form.</p> <p>Key subject areas are: identification of chemical names, synonyms and foreign languages names; physical properties; safety profile; listings of toxicities for a wide range of test species via a number of exposure routes.</p>
STN on the web	Chemical Abstracts Service (CAS)	Subscription-based web access	http://stnweb.cas.org/	<p>STN International is an online scientific and technical information service. STN provides a collection of databases in science and technology to give quick, direct links to the literature, patents, and chemical catalogues. STN databases cover a wide range of scientific and technical topics such as toxicology and health and safety.</p>

Database	Data Provider	Subscription / Free	Web / CD-ROM	Notes
TOXNET (pseudo database)	US National Library of Medicine	Free web access	http://toxnet.nlm.nih.gov/	This is an amalgamation of a number of free databases on toxicology, hazardous chemicals and related areas. Examples of the available databases are HSDB, IRIS, GENE-TOX, TOXLINE and ChemIDplus.
Toxic Substances Control Act (TSCA)	Publicly available inventory produced under the legislation	Free web access	http://www.epa.gov/opptintr/newchems/invntory.htm	TSCA lists public information on more than 63,000 chemicals manufactured in or imported into the US for commercial purposes. Searchable by topic, chemical substance, molecular formula etc.
	Silver Platter	Subscription (part of Chembank suite)	http://www.silverplatter.com/catalog/cmbk.htm and CD-ROM	