The Physical and Theoretical Chemistry Laboratory Oxford University

How to interpret MSDS information

This web page provides a little gudiance on the interpretation of MSDS data sheets. These sheets may at first seem complicated and difficult to understand, but they are a reliable source of the data you need to handle chemicals safely.

We discuss here the different sections into which MSDS sheets are generally divided, using portions of a sheet provided by a commercial supplier.

Extracts from the MSDS for benzene (note that these are only extracts - the complete data sheet is long) are shown in blue, with a commentary (in black) where necessary.

Section 1 gives details of the company issuing the data sheet....

1 Identification of substance:

Trade name: Benzene
Manufacturer/Supplier:
Alfa Aesar, A Johnson Matthey Company Johnson Matthey Catalog Company, Inc. 30 Bond Street Ward Hill, ...

.... and, often, emergency call-out information.

Emergency information: During normal hours the Health, Safety and Environmental Department. After normal hours call .....

The second section identifies the material, and gives the CAS and other registry numbers.

2 Composition/Data on components:

Benzene (CAS# 71-43-3); 100%
Identification number(s):
EINECS Number: 200-753-7
EU Number: 601-020-00-8

The third section summarizes the major hazards assoicated with use of the chemical. The R and S codes in this section are followed by explanatory text.

3 Hazards identification

Hazard description:
T Toxic F Highly flammable
Information pertaining to particular dangers for man and environment
R 45 Can cause cancer - Group I (extremely hazardous)
R 11 Highly flammable.
R 48/23/24/25 Toxic: danger of serious damage to health by prolonged exposure through inhalation, in contact with skin and if swallowed.

The fourth section outlines first aid measures

4 First aid measures

After inhalation: Supply fresh air. If required, provide artificial respiration. Keep patient warm. Seek immediate medical advice. After skin contact .....

Section 5 covers fire fighting and protective equipment.

5 Fire fighting measures

Suitable extinguishing agents Carbon dioxide, extinguishing powder or water spray. Fight larger fires .....

Section 6 outlines the procedures to be followed in case of accidental release of the chemical, including methods to be used to clean up spills. Note that these measures are unlikely to be sufficiently detailed if the chemical is particularly hazardous, and local procedures should be drawn up to supplement what is given in the MSDS sheet.

6 Accidental release measures

Person-related safety precautions: Wear protective equipment.....
Measures for environmental protection..... Do not allow material to be released to the environment without proper governmental permits. Measures for cleaning/collecting: Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust). Dispose contaminated material as waste according to item 13 .....

Section 7 is self-explanatory. This is an important section, sometimes overlooked by those using chemicals in the laboratory. It contains information about the possible formation of peroxides in storage, flammability, explosive risks, etc. Pay particular attention to the possible need for flammable storage cabinets, explosion-proof fridges, and also the need to avoid storage near incompatible chemicals.

7 Handling and storage

Information for safe handling:
Keep container tightly sealed. Store in cool, dry place in tightly closed containers. Ensure good ventilation at the workplace. Information about protection against explosions and fires: Keep ignition sources away. Protect against electrostatic charges. Fumes can combine with air to form an explosive mixture.

Storage
Requirements to be met by storerooms and receptacles: Store in a cool location. Store away from oxidizing agents .....

Section 8 provides information on regulator standards for exposure, in other words, the maximum permitted concentration of the material in the environment to which you are allowed to be exposed. It also usually contains information on suitable types of PPE (personal protective equipment)

8 Exposure controls and personal protection

Additional information about design of technical systems: Properly operating chemical fume hood designed for hazardous chemicals and having an average face velocity of at least 100 feet per minute. Components with limit values that require monitoring at the workplace: Benzene mg/m3 ml/m3 ACGIH TLV short term 1.6 0.5 ACGIH TLV long term 8 2.5 B VME 1,6 0,5 .....

Personal protective equipment General protective and hygienic measures The usual precautionary measures for handling chemicals should be followed. Keep away from foodstuffs, beverages and feed. Remove all soiled and contaminated clothing immediately..... Wash hands before breaks and at the end of work. Breathing equipment:.....
Protection of hands: Impervious gloves
Eye protection: Safety glasses, Full face protection .....

Section 9 is self-explantory

9 Physical and chemical properties:

Form: Liquid
Color: Colorless

Odor: Aromatic
Change in condition
Melting point/Melting range: 5.51 ° C
Boiling point/Boiling range: 80.1 ° C
.....

The next section is also largely self-explanatory.

10 Stability and reactivity

Thermal decomposition / conditions to be avoided: Decomposition will not occur if used and stored according to specifications.
Materials to be avoided: Oxidizing agents
Dangerous reactions No dangerous reactions known
Dangerous products of decomposition: Carbon monoxide and carbon dioxide

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Section 11 outlines the risks to which you may be exposed when using the chemical. It is therefore a section of crucial importance!

11 Toxicological information

Acute toxicity: **(The acute toxicity gives an indication of the kind of quantities of the chemical which may cause immediate damage to health if swallowed, inhaled or absorbed through the skin.)**

LD/Lc50 values that are relevant for classification: **If you have never heard of LD50s, look in the glossary on this site.**

Oral: LD50: 3306 mg/kg (rat)
Dermal: LD50: 48 mg/kg (mus)
Inhalative: LC50/7H: 10.000 ppm/7H (rat)

(There follows a section which gives, often in some detail, an indication of the health effects which may be attributable to this chemical. This section should be read particularly carefully, since the range of health effects may be broad, and may include carciongenic or sensitizer effects.)

Primary irritant effect:
on the skin: Irritant to skin and mucous membranes.
on the eye: Irritating effect.
Sensitization: No sensitizing effects known. **(Chemical sensitisation, for example by platinum compounds, is a potentially debilitating problem. Pay particular attention to any information which may suggest that the chemical is a sensitiser.)**

Subacute to chronic toxicity: **(Here we find details of the possible long-term effects of**

exposure to the chemical.)

Benzene has a strong irritating effect, producing erythema and burning. Edema and blistering is possible in more severe cases. Absorption through the skin may cause the same symptoms as inhalation or ingestion. These include gastrointestinal irritation, low blood pressure, headache, blurred vision, nausea, vomiting, dizziness, loss of balance and coordination, confusion, unconsciousness, coma, respiratory failure and death. Blood, liver and kidney damage is possible. Benzene is a recognized leukemogen and an experimental mutagen and teratogen.

Additional toxicological information:
To the best of our knowledge the acute and chronic toxicity of this substance is not fully known.
(For this chemical there now follow important comments regarding the carcinogenicity. The acronyms such as IARC refer to regulatory or health agencies.)

EPA-A: human carcinogen: sufficient evidence from epidemiologic studies to support a causal association between exposure and cancer.

IARC-2A: Probably carcinogenic to humans: limited human evidence; sufficient evidence in experimental animals

NTP-2: Reasonably anticipated to be a carcinogen: limited evidence from studies in humans or sufficient evidence from studies in experimental animals.

ACGIH A2: Suspected human carcinogen: Agent is carcinogenic in experimental animals at dose levels, by route(s) of administration, at site(s), of histologic type(s), or by mechanism(s) considered relevant to worker exposure. Available epidemiologic studies are conflicting or insufficient to confirm an increased risk of cancer in exposed humans.

Section 12 is largely self-explanatory

12 Ecological information:

General notes: Do not allow material to be released to the environment without proper governmental permits.

Section 13, which deals with disposal, is often not sufficiently detailed for you to be able to undertake dispoasl yourself. If you need to dispose of the chemical after use, ensure that you know how to do this safely.

13 Disposal considerations

Consult state, local or national regulations for proper disposal.

Section 14 gives transport information, generally as a list of codes indicating the dangers associated with the chemical (flammable, radioactive, very toxic, etc) and the type of transport which may be used.

14 Transport information

DOT regulations:
Hazard class: 3 Identification number: UN1114 Packing group: II .....

Section 15 lists the hazard codes (see glossary if you are not familiar with these) which indicate the principle hazards associated with the chemical and the precuations which should be taken when working with it.

15 Regulations

Hazard symbols:
T Toxic F Highly flammable

Risk phrases:
45 Can cause cancer - Group I (extremely hazardous)
11 Highly flammable.
48/23/24/25 Toxic: danger of serious damage to health by prolonged exposure through inhalation, in contact with skin and if swallowed.

Safety phrases:
20 When using do not eat or drink.
28 After contact with skin, wash immediately with plenty of ... .
36/37/39 Wear suitable protective clothing, gloves and eye/face protection.
45 In case of accident or if you feel unwell, seek medical advice immediately.

National regulations **(This may include a variety of country-specific detail)** All components of this product are listed in the U.S. Environmental Protection Agency Toxic Substances Control Act Chemical Substance Inventory .....
This product contains a chemical known to the state of California to cause cancer or reproductive toxicity.
This product contains benzene and is subject to the reporting requirements of section 313 of the Emergency Planning and Community Right to Know Act of 1986 and 40CFR372.

Finally, a section of an additional information, such as the name of the person preparing the data sheet, a list of references from which data have been drawn, disclaimers, etc.

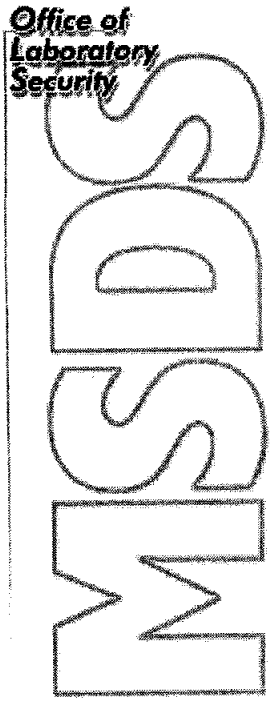
16 Other information:

Employers should use this information only as a supplement to other information gathered by them, and should make independent judgement of suitability of this information to ensure proper

use and protect the health and safety of employees ....
Contact:

[Return to Physical & Theoretical Chemistry Lab. Safety home page.]

This information was last updated on October 26, 2001. We have tried to make it as accurate and useful as possible, but can take no responsibility for its use, misuse, or accuracy. We have not verified this information, and cannot guarantee that it is up-to-date.



Material Safety Data Sheets (MSDS), regulated under Workplace Hazardous Materials Information System (WHMIS) legislation, for chemical products have been available to workers for many years. However because many laboratory workers, whether in research, public health, teaching, etc., are exposed to not only chemicals but infectious substances as well, there was a large gap in the readily available safety literature for employees. These MSDS are produced for personnel working in the life sciences as quick safety reference material relating to infectious micro-organisms.

The MSDS are organized to contain health hazard information such as infectious dose, viability (including decontamination), medical information, laboratory hazard, recommended precautions, handling information and spill procedures. The intent of these documents is to provide a safety resource for laboratory personnel working with these infectious substances. Because these workers are usually working in a scientific setting and are potentially exposed to much higher concentrations of these human pathogens than the general public, the terminology in these MSDS is technical and detailed, containing information that is relevant specifically to the laboratory setting. It is hoped along with good laboratory practises, these MSDS will help provide a safer, healthier environment for everyone working with infectious substances.

Please note that although the information, opinions and recommendations contained in these Material Safety Data Sheets are compiled from sources believed to be reliable, we accept no responsibility for the accuracy, sufficiency, or reliability or for any loss or injury resulting from the use of the information. Newly discovered hazards are frequent and this information may not be completely up to date.

MENU

A | B | C | D | E | F | G | H | I | J | K | L | M
N | O | P | Q | R | S | T | U | V | W | X | Y | Z

A

- Actinobacillus spp.
- Actinomyces spp.
- Adenovirus (types 1, 2, 3, 4, 5 and 7)
- Adenovirus (types 40 and 41)
- Aerococcus spp.
- Aeromonas hydrophila
- Ancylostoma duodenale
- Angiostrongylus cantonensis
- Ascaris lumbricoides
- Ascaris spp.
- Aspergillus spp.

B

top

- Bacillus anthracis

- Bacillus cereus
- Bacteroides spp.
- Balantidium coli
- Bartonella bacilliformis
- Blastomyces dermatitidis
- Bluetongue virus
- Bordetella bronchiseptica
- Bordetella pertussis
- Borrelia burgdorferi
- Branhamella catarrhalis
- Brucella spp. (B. abortus, B. canis, B. melitensis, B. suis)
- Brugia spp.
- Burkholderia (Pseudomonas) mallei
- Burkholderia (Pseudomonas) pseudomallei

C

top

- California serogroup
- Campylobacter fetus subsp. fetus
- Campylobacter jejuni, C. coli, C. fetus subsp. jejuni
- Candida albicans
- Capnocytophaga spp.
- Chikungunya virus
- Chlamydia psittaci
- Chlamydia trachomatis
- Citrobacter spp.
- Clonorchis sinensis
- Clostridium botulinum
- Clostridium difficile
- Clostridium perfringens
- Clostridium tetani
- Clostridium spp. (with the exception of those species listed above) *(currently under revision)*
- Coccidioides immitis
- Colorado tick fever virus
- Corynebacterium diphtheriae
- Coxiella burnetii
- Coxsackievirus
- Creutzfeldt-Jakob agent, Kuru agent *(currently under revision)*
- Crimean-Congo hemorrhagic fever virus
- Cryptococcus neoformans
- Cryptosporidium parvum
- Cytomegalovirus

D

top

- Dengue virus (1, 2, 3, 4)
- Diphtheroids *(currently under revision)*

E

top

- Eastern (Western) equine encephalitis virus
- Ebola virus
- Echinococcus granulosus
- Echinococcus multilocularis
- Echovirus
- Edwardsiella tarda
- Entamoeba histolytica
- Enterobacter spp.
- Enterovirus 70
- Epidermophyton floccosum, Microsporum spp. Trichophyton spp.
- Epstein-Barr virus
- Escherichia coli, enterohemorrhagic

- Escherichia coli, enteroinvasive
- Escherichia coli, enteropathogenic
- Escherichia coli, enterotoxigenic

F top

- Fasciola hepatica
- Francisella tularensis
- Fusobacterium spp.

G top

- Gemella haemolysans
- Giardia lamblia

H top

- Haemophilus ducreyi
- Haemophilus influenzae (group b)
- Hantavirus
- Hepatitis A virus
- Hepatitis B virus
- Hepatitis C virus
- Hepatitis D virus
- Hepatitis E virus
- Herpes simplex virus
- Herpesvirus simiae
- Histoplasma capsulatum
- Human coronavirus
- Human immunodeficiency virus *(currently under revision)*
- Human papillomavirus
- Human rotavirus
- Human T-lymphotrophic virus

I top

- Influenza virus

J top

- Japanese encephalitis virus
- Junin virus / Machupo virus *(currently under revision)*

K top

- Klebsiella spp.
- Kyasanur Forest disease virus

L top

- Lactobacillus spp.
- Legionella pneumophila
- Leishmania spp.
- Leptospira interrogans
- Listeria monocytogenes
- Lymphocytic choriomeningitis virus

M top

- Marburg virus *(currently under revision)*
- Mayaro virus
- Measles virus
- Micrococcus spp.
- Moraxella spp.
- Murray Valley encephalitis virus
- Mycobacterium spp. (other than M. bovis, M. tuberculosis, M. avium, M. leprae) *(currently under revision)*
- Mycobacterium tuberculosis, M. bovis
- Mycoplasma hominis, M. orale, M. salivarium, M. fermentans
- Mycoplasma pneumoniae

N top

- Naegleria fowleri
- Necator americanus
- Neisseria gonorrhoeae
- Neisseria meningitidis
- Neisseria spp. (other than N. gonorrhoeae and N. meningitidis)
- Nocardia spp.
- Norwalk virus

O top

- Omsk hemorrhagic fever virus
- Onchocerca volvulus
- O'Nyong-Nyong virus
- Opisthorchis spp.

P top

- Parvovirus B19
- Pasteurella spp.
- Peptococcus spp. *(currently under revision)*
- Peptostreptococcus spp.
- Plesiomonas shigelloides
- Powassan encephalitis virus
- Proteus spp.
- Pseudomonas spp. (excluding B. mallei, B. pseudomallei)

R top

- Rabies virus
- Respiratory syncytial virus
- Rhinovirus
- Rickettsia akari
- Rickettsia prowazekii, R. canada
- Rickettsia rickettsii
- Ross river virus
- Rubella virus

S top

- Salmonella choleraesuis
- Salmonella paratyphi
- Salmonella typhi
- Salmonella spp. (with the exception of those species listed above)
- Schistosoma spp.
- Serratia spp.
- Shigella spp.
- Sindbis virus

- Sporothrix schenckii
- St. Louis encephalitis
- Staphylococcus aureus
- Streptobacillus moniliformis
- Streptococcus agalactiae
- Streptococcus faecalis
- Streptococcus pneumoniae
- Streptococcus pyogenes
- Streptococcus salivarius

T

top

- Taenia saginata
- Taenia solium
- Toxocara canis, T. cati
- Toxoplasma gondii
- Treponema pallidum
- Trichinella spp.
- Trichomonas vaginalis
- Trichuris trichiura
- Trypanosoma brucei

U

top

- Ureaplasma urealyticum

V

top

- Vaccinia virus
- Varicella-zoster virus *(currently under revision)*
- Venezuelan equine encephalitis
- Vesicular stomatitis virus
- Vibrio cholerae, serovar 01
- Vibrio parahaemolyticus

W

top

- Wuchereria bancrofti

Y

top

- Yellow fever virus
- Yersinia enterocolitica, Yersinia pseudotuberculosis
- Yersinia pestis

[Office of Laboratory Security]

top

Last Updated: 2001-10-15 Important Notices