

FIRE
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Dangerous Substances

Guidance on dealing with
fires and spillages

Home Office

Dangerous Substances

Guidance on dealing with fires and spillages

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Introduction

An increasing variety of dangerous substances is daily being conveyed by road in the United Kingdom in substantial quantity, and from time to time the emergency services are called upon to deal with accidents involving vehicles carrying loads of this kind. The personal protection required by members of the emergency services, and the extinguishing media required in the event of fire, will tend to vary in relation to the nature of the individual substance concerned, even as regards substances presenting the same primary hazard (eg. inflammability, corrosiveness, toxicity). The Home Office Standing Advisory Committee on Dangerous Substances has therefore recommended that guidance should be prepared for the emergency services, and in particular the fire service, as to appropriate means of dealing with fires or spillages involving dangerous substances.

The purpose of this handbook is to present, in ready reference form, for use in an emergency, information about any special hazards presented by dangerous substances conveyed by road in commercial quantities, together with guidance on the personal protection required and the fire extinguishing media to be used. To facilitate reference, the synonyms for each substance have been inserted not only under the chemically correct name of the substance, but also in the full alphabetical sequence, and the relevant information has been shown against each synonym, as well as against each chemically correct name.

Notes explaining the guidance given in each column of the information will be found at the beginning of each section, and guidance on means of dealing with spillages, where appropriate, at the end of the section.

The first section of the guidance relates to inflammable liquids with a flashpoint below 73° F. Subsequent sections will relate to corrosive substances, and other classes of dangerous substances.

Section **1**

Inflammable liquids

Section 1

Fire extinguishing media and personal protection required when dealing with fires or spillages involving inflammable liquids with a flash-point below 73° F.

This is an alphabetical list of inflammable liquids with a flash-point below 73° F (22·8° C). An indication of the toxicity of each substance is given, together with brief notes on the personal protection required and the fire extinguishing media to be used in the event of a road accident or other incident. The following notes explain the information given in each column:

(Column 1)

Name of substance

Certain substances are known by a number of names: in such cases, any commonly accepted synonyms have been inserted after the correct chemical name of the substance. These synonyms have also been included in the full alphabetical sequence.

(Column 2)

Toxicity

T is indicated where the threshold limit value (TLV) given in the Department of Employment and Productivity's booklet 'Dust and Fumes in Factory Atmosphere' is less than 200 parts per million or where other data indicate that there may be a toxicity risk to personnel, either from inhalation of vapour or contact with the liquid concerned. All the liquids listed may be said to have some toxic potentiality.

The particular toxicity hazard presented by a leakage or spillage without fire of any one of the substances listed is dependent on many factors, including the toxicity value of the substance, its volatility, the quantity of liquid exposed and the atmospheric conditions (eg. temperature and wind) prevailing at the time.

In order to determine which liquids, although toxic to some degree, offer a negligible toxicity hazard to personnel and therefore would not, under normal conditions, require the use of BA, an arbitrary level of 200 ppm in the TLV scale was selected, because liquids such as methanol and ethyl methyl ketone, which have a TLV of 200 ppm or more, are generally regarded as coming within this category.

Although a number of substances in the list are not in normal conditions regarded as toxic (as arbitrarily defined), nevertheless a change in the physical circumstances, such as are described above, may result in a considerable toxic hazard and this should be borne in mind when dealing with emergencies in conveyance.

If a leakage is accompanied by fire, the toxicity hazards may be considerably increased and even after the fire is extinguished vapour from hot residues may present a higher than normal hazard. Such factors should be taken into account.

(Column 3)

Personal protection

- A indicates that breathing apparatus should be used to give protection against inhalation of vapour or fumes.
- B Indicates that breathing apparatus should be used to give protection against inhalation of vapour or fumes and that, in addition, suitable protection against contact with the skin should be worn. In an incident involving a liquid in respect of which protection B is recommended, personnel who have suffered contact with, or splashes from, the liquid should be withdrawn. Contaminated clothing should be removed as soon as possible and any affected parts of the skin washed immediately with running water. In case of doubt or where severe contamination has occurred, personnel should receive immediate medical attention. Removed clothing should not be worn again until it has been cleaned.

(Column 4)

Fire extinguishing media

The extinguishing media which may be used are given for each substance but the circumstances of particular incidents may

call for the use of certain of these media rather than others.

Where the use of water or other particular media would be dangerous, a note to this effect is given in column 6

Otherwise, the omission of particular media from Column 4 indicates that their use would be less effective but not usually hazardous. The use of water spray as an extinguishing medium has been recommended in the case of substances which are not less than 10 per cent soluble in water.

Where Column 4 indicates that vaporising liquids may be used, the reference is only to such vaporising liquids as satisfy the Home Office recommendations with regard to standards of toxicity (see Fire Service Circular No. 45/1968).

In the absence of alcohol-resistant foam, the use of protein foam at several times the normal rate may prove effective.

(Column 5)

Packing

An indication is given of the most usual kinds of containers used for conveyance:

- W** Carried in bulk in containers with a capacity exceeding 50 gallons (eg. road tankers).
 - D** Carried in containers with a capacity not exceeding 50 gallons. The maximum size, where known, is indicated.
 - WD** Carried both in bulk and in smaller individual containers.
-

(Column 6)

Other information

Any special precautions with regard to personal protection and fire extinguishing media are noted here, together with notes on spillages which present special problems. Guidance on dealing with spillages of inflammable liquids generally is given at the end of this section.

Each of the substances listed gives off vapour which, with air, forms explosive mixtures within the limits of its inflammability range. Some have a very wide inflammability range and are thus potentially a greater hazard. Those having an upper inflammability limit in excess of 20 per cent are indicated.

Spillages of inflammable liquids

Wherever possible, spillages of inflammable liquids should be prevented from entering drains or sewers.

The spillage should be retained on the ground surface by improvising dams with sand or earth, or by other means, protecting it as necessary against the possibility of accidental ignition (eg. by covering with a layer of foam).

Where spillage has already entered drains, or in the case of a large spillage where some part will inevitably find its way into sewers, flushing the remaining liquid through the drains may present a lesser hazard.

In any event, all services which might be affected should be notified of the presence of the liquid.

Reference should also be made to 'Dear Chief Officer' letter No. 674 of 4 July 1963, headed 'Spillages of Petroleum on Highways'.

Name of substance (1)	Toxicity (2) Personal protection (3)	Fire extinguishing media (4)				Packing (5)	Other information (6)
		Water spray Foam	Alcohol- resistant foam	Dry powder	CO ₂ or vaporis- ing liquids		
Acetal	T A	x x -	x x		D		
Acetaldehyde Ethanal	- -	x - x	x x			Beware explosion risk of released vapour. Wide inflammability range.	
Acetaldehyde oxime Acetaldoxime	- -	- - -	x x		D (50kg)		
Acetaldoxime	- -	- - -	x x		D (50kg)		
Acetone Dimethyl ketone Propanone	- -	x - x	x x		WD		
Acetylene dichloride	T A	x x -	x x				
Acraldehyde	T B	x - x	x x			Beware explosion risk of released vapour. Wide inflammability range.	
Acrolein	T B	x - x	x x			Beware explosion risk of released vapour. Wide inflammability range.	
Acrolein acetal	T A	- - x	x x				
Acrylaldehyde Acraldehyde Acrolein Allyl aldehyde Propenal	T B	x - x	x x			Beware explosion risk of released vapour. Wide inflammability range.	
Acrylonitrile Propenenitrile Vinyl cyanide	T B	x - x	x x		WD		
Allyl acetate	T B	- x -	x x				
Allyl alcohol Prop-2-en-1-ol 2-Propen-1-ol	T B	x - x	x x		D		

Beware explosion risk of
released vapour. Wide
inflammability range.

Allyl aldehyde	T B	x - x	x x		Beware explosion risk of released vapour. Wide inflammability range.
Allylamine 2-Propenylamine	T B	x x -	x x	D	
Allyl bromide 3-Bromopropene	T B	x x -	x x	D	
Allyl chloride 3-Chloropropene	T B	x x -	x x	D	
Allyl ethyl ether 3-Ethoxypropene	T A	- - -	x x	2.5litres	
Allyl formate 2-Propenyl methanoate	T B	- x -	x x	D (50kg)	
1-Aminobutane	T B	x - x	x x	D (45galls)	
2-Aminobutane	T B	x - x	x x	D (45galls)	
2-Aminoisobutane	T B	x - x	x x		
Aminocyclohexane	T B	x x -	x x	D	
2-Amino-4-methylpentane	T A	x x -	x x	D (45galls)	
1-Amino-2-methylpropane	T B	x - x	x x		
2-Amino-2-methylpropane	T B	x - x	x x	D (45galls)	
1-Aminopentane	T B	- - -	x x	25kg	
isoAmyl acetate	- -	- - x	x x		
secAmyl alcohol	T B	x x -	x x		
tertAmyl alcohol	T A	x - x	x x		
isoAmyl alcohol	T A	x - x	x x	D	
isoAmyl aldehyde	T A	- - -	x x		
n-Amylamine	T B	- - -	x x	25kg	
isoAmylamine	T B	- - -	x x	2.5litres	
secAmyl bromide	T A	x - -	x x	2.5litres	
isoAmyl bromide	T A	x - -	x x	2.5litres	
Acetal—isoAmyl bromide					

Name of substance (1)	Toxicity (2) Personal protection (3)	Fire extinguishing media (4)				Packing (5)	Other information (6)
		Water spray Foam	Alcohol- resistant foam	Dry powder	CO ₂ or vaporis- ing liquids		
Amyl chloride	T A	x x	-	x x			
<i>tert</i> Amyl chloride	T A	x x	-	x x	D		
<i>iso</i> Amyl chloride	T A	x x	-	x x	D		
Amyl mercaptan	T B	x x	-	x x			
n-Amyl nitrite	T B	- - -		x x	90oz		
<i>iso</i> Amyl nitrite	T B	- - -		x x			
Aziridene	T B	x x	-	x -		Liable to exothermic reaction with some metals. Do not use CO ₂ . Beware of explosion risk of released vapour. Wide inflammability range.	
Benzenethiol Thiophenol	T B	x x	-	x x			
Benzotrifluoride Trifluoromethylbenzene	T B	x x	-	x x	D (45galls)		
Bicycloheptadiene	T B	x x	-	x x	D		
Boron trifluoride diethyl etherate	T B	- - -		x x	D	Reacts with water or steam to produce toxic, corrosive and inflammable vapours. For spillages use dry sand or earth.	
2-Bromobutane <i>sec</i> Butyl bromide	T A	x - -		x x	2.5litres		
1-Bromo-2,3-epoxypropane Epibromohydrin	T A	x - x		x x	D		
2-Bromoethyl ethyl ether	T A	- - x		x x			

1-Bromo-3-methylbutane <i>isoAmyl bromide</i>	T A	x - -	x x	2.5litres	
1-Bromo-2-methylpropane <i>isoButyl bromide</i>	T A	x - -	x x	2.5litres	
2-Bromo-2-methylpropane <i>tertButyl bromide</i>	T A	x - -	x x	2.5litres	
2-Bromopentane <i>secAmyl bromide</i>	T A	x - -	x x	2.5litres	
1-Bromopropane Propyl bromide	T B	x x -	x x	D	
2-Bromopropane <i>isoPropyl bromide</i>	T B	x x -	x x	D	
3-Bromopropene	T B	x x -	x x	D	
3-Bromopropyne Propargyl bromide	T B	- x -	- x	D	Beware explosion risk if subjected to heat; keep container cool with water spray. Danger of explosion in contact with copper alloys with a high copper content, silver or mercury.
Butanal	T A	x x -	x x		
Butanedione Diacetyl	- -	x x -	x x		
n-Butane thiol	T B	- x -	x -	D	
Butane-1-thiol n-Butane thiol Butyl mercaptan	T B	- x -	x -	D	
Butan-2-ol <i>secButanol</i> <i>secButyl alcohol</i>	T A	x - x	x x	WD	
<i>secButanol</i>	T A	x - x	x x	WD	
<i>tertButanol</i>	T A	x - x	x x		
2-Butanol acetate	T A	- x -	x x	WD	

Name of substance (1)	Toxicity (2) Personal protection (3)	Fire extinguishing media (4)				Packing (5)	Other information (6)
		Water spray Foam	Alcohol- resistant foam	Dry powder	CO ₂ or vaporis- ing liquids		
Butanone Ethyl methyl ketone Methyl ethyl ketone	T A	x - x	x x		WD		
Butanoyl chloride	T B	- - -	x x			Reacts with water or steam to produce toxic and corrosive fumes. For spillage use dry sand or earth.	
<i>iso</i> Butanoyl chloride	T B	- - -	x x				
2-Butenal	T B	x x -	x x				
But-3-en-2-one 3-Butene-2-one Methyl vinyl ketone	T B	x x -	x x		D		
3-Butene-2-one	T B	x x -	x x		D		
2-Butine	- -	x x -	x x				
<i>sec</i> Butyl acetate 2-Butanol acetate	T A	- x -	x x		WD		
<i>iso</i> Butyl acetate	T A	- x -	x x		WD		
<i>sec</i> Butyl alcohol	T A	x - x	x x		WD		
<i>tert</i> Butyl alcohol	T A	x - x	x x				
Butylamine 1-Aminobutane	T B	x - x	x x		D(45galls)		
<i>sec</i> Butylamine 2-Aminobutane	T B	x - x	x x		D(45galls)		
<i>tert</i> Butylamine 2-Amino-2-methylpropane 2-Amino <i>isobutane</i>	T B	x - x	x x				
<i>iso</i> Butylamine 1-Amino-2-methylpropane	T B	x - x	x x		D(45galls)		

<i>sec</i> Butyl bromide	T A	x - -	x x	2·5litres
<i>tert</i> Butyl bromide	T A	x - -	x x	2·5litres
<i>iso</i> Butyl Bromide	T A	x - -	x x	2·5litres
Butyl chloride	T A	x x -	x x	D
<i>sec</i> Butyl Chloride	T A	x x -	x x	D
<i>tert</i> Butyl chloride	TA	x x -	x x	D
<i>iso</i> Butyl chloride	TA	x x -	x x	D
Butyl ethyl ether 1-Ethoxybutane	- -	- - x	x x	50kg
Butyl formate Butyl methanoate	- -	x x -	x x	50kg
<i>iso</i> Butyl formate	- -	x x -	x x	50kg
<i>sec</i> Butyl iodide	T B	- - -	x x	2·5litres
<i>tert</i> Butyl iodide	T B	- - -	x x	2·5litres
<i>iso</i> Butyl iodide	T B	- - -	x x	2·5litres
Butyl mercaptan	T B	- x -	x -	D
Butyl methanoate	- -	x x -	x x	50kg
Butyl methyl ether 1-Methoxybutane	T A	- - -	x x	2·5litres
<i>iso</i> Butyl methyl ketone	T B	x - x	x x	WD
Butyl nitrite	- -	- x -	x x	50kg
<i>iso</i> Butyl propionate	- -	- x -	x x	
Butyl vinyl ether	- -	- - x	x x	D(45galls)
<i>iso</i> Butyl vinyl ether	- -	- - x	x x	D(45galls)
But-2-yne 2-Butine Crotonylene Dimethyl acetylene	- -	x x -	x x	
Butyraldehyde Butanal	T A	x x -	x x	

Name of substance (1)	Toxicity (2) Personal protection (3)	Fire extinguishing media (4)				Packing (5)	Other information (6)
		Water spray Foam	Alcohol- resistant foam	Dry powder	CO ₂ or vaporis- ing liquids		
<i>iso</i> Butyraldehyde 2-Methyl propanal	T A	x x -	x x		D(45galls)		
<i>iso</i> Butyric ether	- -	x x -	x x		D		
Butyronitrile Propyl cyanide	T B	- - -	x x			For spillage use dry sand or earth. For disposal seek manufacturer's assistance.	
Butyryl chloride Butanoyl chloride	T B	- - -	x x			Reacts with water or steam to produce toxic and corrosive fumes. For spillage use dry sand or earth.	
<i>iso</i> Butyryl chloride <i>iso</i> Butanoyl chloride	T B	- - -	x x				
1-Chlorobutane Butyl chloride	T A	x x -	x x		D		
2-Chlorobutane <i>sec</i> Butyl chloride	T A	x x -	x x		D		
Chlorodimethyl ether	T A	- - x	x x		D		
Chloromethoxy methane	T A	- - x	x x		D		
1-Chloro-3-methylbutane <i>iso</i> Amyl chloride	T A	x x -	x x		D		
2-Chloro-2-methylbutane <i>tert</i> Amyl chloride	T A	x x -	x x		D		
Chloromethyl ethyl ether	T A	- - x	x x				
Chloromethyl methyl ether Chlorodimethyl ether Chloromethoxy methane	T A	- - x	x x		D		
1-Chloro-2-methylpropane <i>iso</i> Butyl chloride	T A	x x -	x x		D		

2-Chloro-2-methylpropane <i>tert</i> Butyl chloride	T A	x x -	x x	D
3-Chloro-2-methylprop-1-ene	T A	x x -	x x	D(45galls)
1-Chloropentane Amyl chloride	T A	x x -	x x	
1-Chloropropane Propyl chloride	T A	x x -	x x	D
2-Chloropropane <i>iso</i> Propyl chloride	T A	x x -	x x	
3-Chloropropene	T B	x x -	x x	D
Crotonaldehyde 2-Butenal β -Methyl acrolein Propylene aldehyde	T B	x x -	x x	
Crotonylene	--	x x -	x x	
Cycloheptatriene	T A	- x -	x x	D(45galls)
Cyclohexene Tetrahydrobenzene	--	x x -	x x	10galls
Cyclohexylamine Aminocyclohexane	T B	x x -	x x	D
Cyclo-octatetraene	--	x x -	x x	
Diacetone, technical	T A	x - x	x x	WD
Diacetone alcohol Diacetone, technical 4-Hydroxy-2-keto-4-methylpentane 4-Hydroxy-4-methylpentan-2-one	T A	x - x	x x	WD
Diacetyl	--	x x -	x x	
Diallylamine Di-2-propenylamine	T B	x - -	x x	D
Diallyl ether	T B	- - x	- x	2.5litres
Diisobutene Diisobutylene	T A	- x -	x x	WD

Name of substance (1)	Toxicity (2) Personal protection (3)	Fire extinguishing media (4)				Packing (5)	Other Information (6)
		Water spray Foam	Alcohol- resistant foam	Dry powder	CO ₂ or vaporis- ing liquids		
Diisobutylamine	T B	x x	-	x x			
Diisobutylene	T A	- x	-	x x	WD		
1,1-Dichloroethane Ethylidene chloride	T A	x x	-	x x	WD		
1,2-Dichloroethane Ethylene dichloride	T B	x x	-	x x	WD		
1,1-Dichloroethylene Vinylidene chloride	T A	x x	-	x x			
1,2-Dichloroethylene Acetylene dichloride	T A	x x	-	x x			
1,2-Dichloropropane Propylene chloride Propylene dichloride	T B	x x	-	x x	WD		
1,2-Di(dimethylamino)ethane Tetramethyl ethylene diamine	- -	x x	-	x x	D		
1,1-Diethoxythane Acetal Diethyl acetal Ethylidene diethyl ether	T A	x x	-	x x	D		
Diethoxymethane Diethyl formal Ethylal methylene diethyl ether Formaldehyde diethyl acetal	- -	- -	x	x -			
3,3-Diethoxypropene Acrolein acetal	T A	- -	x	x x			
Diethyl acetal	T A	x x	-	x x	D		

Diethyl acetaldehyde	--	x x -	x x	50kg	
Diethylamine	T B	x x -	x x	WD	
1,4-Diethylene dioxide	T B	x - x	x x	D	Beware of explosion risk of released vapour. Wide inflammability range.
Diethyl ether Diethyl oxide Ethoxyethane Ethyl ether	T A	-- x	x x	WD	
Diethyl formal	--	-- x	x -		
Diethyl ketone	--	x - x	x x		
Diethyl oxide	T A	-- x	x x	WD	Beware of explosion risk of released vapour. Wide inflammability range.
Diethyl sulphide	T A	---	x x	D(45galls)	
2,3-Dihdropyran	T A	x - x	x x		
1,1-Dimethoxyethane Dimethyl acetal Ethylidene dimethyl ether	T A	x - x	x x		
Dimethoxymethane Methylal Methylene dimethyl ether	--	-- x	x x	D(45galls)	
Dimethyl acetal	T A	x - x	x x		
Dimethyl acetylene	--	x x -	x x		
Dimethylamine solutions in alcohol or water	T B	x x -	x x		
2-Dimethylaminoacetonitrile 2-Dimethylaminoethyl cyanide	T B	x x -	x x		
2-Dimethylaminoethyl cyanide	T B	x x -	x x		
1,3-Dimethyl butylamine 2-Amino-4-methylpentane	T A	x x -	x x	D(45galls)	
Dimethyl carbinol	--	x - x	x x	WD	
Diisobutylamine—Dimethyl carbinol					

Name of substance (1)	Toxicity (2) Personal protection (3)	Fire extinguishing media (4)		Packing (5)	Other information (6)			
		Water spray foam	Alcohol- resistant foam	Dry powder	CO ₂ or vaporis- ing liquids			
Dimethyl carbonate Methyl carbonate	T A	x	x	-	x	x		
Dimethyldichlorosilane	T B	-	-	-	x	x	D(45galls)	<p>Reacts with water to give toxic, corrosive and inflammable vapours. May ignite spontaneously on contact with air. For fire use CO₂, dry powder, dry sand or earth. For a small spillage use dry sand or earth. For a larger spillage of shallow depth (less than 1in) use copious water (not jets). For a deeper spillage use fine water spray.</p>
Dimethyldiethoxysilane	T B	-	-	-	x	x		<p>Reacts with water to give toxic, corrosive and inflammable vapours. May ignite spontaneously on contact with air. For fire use CO₂, dry powder, dry sand or earth. For a small spillage use dry sand or earth. For a larger spillage of shallow depth (less than 1in) use copious water (not jets). For a deeper spillage use fine water spray.</p>
Dimethyl disulphide	T B	-	-	-	x	x		
Dimethyleneimine	T B	x	x	-	x	-		<p>Liable to exothermic reaction with some metals. Do not use CO₂. Beware of explosion risk of released vapour. Wide inflammability range.</p>

NN-Dimethylhydrazine 1,1-Dimethylhydrazine	T B	x x -	x x		
NN¹-Dimethylhydrazine 1,2-Dimethylhydrazine	T B	x x -	x x		
1,1-Dimethylhydrazine	T B	x x -	x x		
1,2-Dimethylhydrazine	T B	x x -	x x		
Dimethyl ketone	- -	x - x	x x	WD	
Dimethyl sulphide Methanthiomethane Methyl sulphide	T A	x x -	x x	D(45galls)	
Dioxan	T B	x - x	x x	D	Beware of explosion risk of released vapour. Wide inflammability range.
1,4-Dioxan 1,4-Diethylene dioxide Dioxan Dioxyethylene ether	T B	x - x	x x	D	
Dioxolane	- -	x - x	x x	D	
Dioxyethylene ether	T B	x - x	x x	D	
Di-2-propenylamine	T B	x - -	x x	D	
Dipropylamine	T B	- - -	x x	D(45galls)	
Diisopropylamine	T B	- - -	x x	D(45galls)	
Dipropyl ether	T B	- - -	x x	D	
Diisopropyl ether 2-isoPropoxypropane isoPropyl ether	T A	- - x	x x	WD	Beware of explosion risk of released vapour. Wide inflammability range.
Divinyl ether Vinyl ether	T A	- - x	x x	25ml	
Epibromohydrin	T A	x - x	x x	D	
1,2-Epoxy propane	T B	x - x	x x	WD	Beware explosion risk of released vapour. Wide inflammability range.
Ethanal	- -	x - x	x x		

Name of substance (1)	Toxicity (2) Personal protection (3)	Fire extinguishing media (4)				Packing (5)	Other information (6)
		Water spray Foam	Alcohol- resistant foam	Dry powder	CO ₂ or vaporis- ing liquids		
Ethane thiol Ethyl mercaptan	T B	x x -	x x		D		
Ethanol Ethyl alcohol	--	x - x	x x		WD		
Ethenoxy ethane	--	-- x	x x				
1-Ethoxybutane	--	-- x	x x		50kg		
Ethoxyethane	T A	-- x	x x		WD	Beware of explosion risk of released vapour. Wide inflammability range.	
3-Ethoxypropene	T A	-- -	x x		2.5litres		
Ethyl acetate	--	x x -	x x		WD		
Ethyl acrylate Ethyl propenoate	T B	x x -	x x				
Ethyl alcohol	--	x - x	x x		WD		
Ethylal methylene diethyl ether	--	-- x	x -				
Ethylamine solutions in alcohol or water	T B	x - x	x -		WD		
Ethylborate	T B	x - -	x x				
2-Ethylbutyraldehyde Diethyl acetaldehyde	--	x x -	x x		50kg		
Ethyl <i>isobutyrate</i> <i>iso</i> Butyric ether Ethyl 2-methylpropanoate	--	x x -	x x		D		
Ethyl chlorocarbonate	T B	x x -	x x		10galls		

Ethyl chloroformate Ethyl chlorocarbonate	T B	x x -	x x	10galls	
Ethyl crotonate	T B	- x -	x x	2.5litres	
Ethyl cyanide	T B	- - -	x x		For spillage use dry sand or earth. For disposal seek manufacturer's assistance.
Ethyl dichlorosilane	T B	- - -	x x		Reacts with water to give toxic, corrosive and inflammable vapours. May ignite spontaneously on contact with air. For fire use CO ₂ , dry powder, dry sand or earth. For a small spillage use dry sand or earth. For a larger spillage of shallow depth (less than 1 in) use copious water (not jets). For a deeper spillage use fine water spray.
Ethyl dimethyl carbinol	T A	x - x	x x		
Ethylene dichloride	T B	x x -	x x	WD	
Ethyleneimine Aziridene Dimethyleneimine	T B	x x -	x -		Liable to exothermic reaction with some metals. Do not use CO ₂ . Beware of explosion risk of released vapour. Wide inflammability range.
Ethyl ether	T A	- - x	x x	WD	Beware of explosion risk of released vapour. Wide inflammability range.
Ethyl formate Ethyl methanoate	T A	x x -	x x	D	
Ethylidene chloride	T A	x x -	x x	WD	
Ethylidene diethyl ether	T A	x x -	x x	D	
Ethylidene dimethyl ether	T A	x - x	x x		
Ethyl mercaptan	T B	x x -	x x	D	
Ethyl methanoate	T A	x x -	x x	D	

Name of substance (1)	Toxicity (2) Personal protection (3)	Fire extinguishing media (4)				Packing (5)	Other information (6)
		Water spray Foam	Alcohol- resistant foam	Dry powder	CO ₂ or vaporis- ing liquids		
Ethyl methyl ketone	T A	x - x	x x		WD →		
Ethyl 2-methyl propanoate	- -	x x -	x x		D		
Ethyl nitrite	T A	x x -	x x			Beware of explosion risk of released vapour. Wide inflammability range.	
1-Ethyl piperidine N-Ethyl piperidine	- -	x x -	x x		D		
N-Ethyl piperidine	- -	x x -	x x		D		
Ethyl propenoate	T B	x x -	x x				
Ethyl propionate	- -	x x -	x x				
Ethyl propionyl	- -	x - x	x x				
Ethyltrichlorosilane	T B	- - -	x x			Reacts with water to give toxic, corrosive and in- flammable vapours. May ignite spontaneously on contact with air. For fire use CO ₂ , dry powder, dry sand or earth. For a small spillage use dry sand or earth. For a larger spillage of shallow depth (less than 1in) use copious water (not jets). For a deeper spillage use fine water spray.	
Ethyl vinyl ether	- -	- - x	x x		D(45galls)	Beware of explosion risk of released vapour. Wide inflammability range.	
Fluorobenzene	T B	- - -	x x		D		

2-Fluorotoluene o-Fluorotoluene	T B	- - -	x x	2·5litres	
3-Fluorotoluene m-Fluorotoluene	T B	- - -	x x		
m-Fluorotoluene	T B	- - -	x x		
o-Fluorotoluene	T B	- - -	x x	2·5litres	
Formaldehyde diethyl acetal	- -	- - x	x -		
Form-methylamide	T B	- - -	x x	D	
Furan	T B	x x -	x x	D(45galls)	
Fuseloil	T A	x - x	x x	D	
Glyceryl trinitrate solutions in alcohol (not exceeding 5% of glyceryl trinitrate)	- B	- - -	x x		Protection required against skin absorption, and against clothing contamination, which would become highly inflammable when the alcohol evaporated.
Hexone	T B	x - x	x x	WD	
4-Hydroxy-2-keto-4-methylpentane	T A	x - x	x x	WD	
4-Hydroxy-4-methylpentan-2-one	T A	x - x	x x	WD	
2-Iodobutane <i>sec</i> Butyl iodide	T B	- - -	x x	2·5litres	
1-Iodo-2-methylpropane <i>iso</i> Butyl iodide	T B	- - -	x x	2·5litres	
2-Iodo-2-methylpropane <i>tert</i> Butyl iodide	T B	- - -	x x	2·5litres	
1-Iodopropane Propyl iodide	T B	- - -	x x	2·5litres	
2-Iodopropane <i>iso</i> Propyl iodide	T B	- - -	x x	2·5litres	

Name of substance (1)	Toxicity (2) Personal protection (3)	Fire extinguishing media (4)				Packing (5)	Other information (6)
		Water spray Foam	Alcohol- resistant foam	Dry powder	CO ₂ or vaporis- ing liquids		
Iron carbonyl Iron pentacarbonyl	T B	- - -	x x			Reacts with moisture and may ignite spontaneously on contact with air. Beware explosion risk of released vapour or on heating of cylinders. For spillage use copious water to flush away.	
Iron pentacarbonyl	T B	- - -	x x			Reacts with moisture and may ignite spontaneously on contact with air. Beware explosion risk of released vapour or on heating of cylinders. For spillage use copious water to flush away.	
Isoprene monomer 2-Methyl-1,3-butadiene	T A	- x -	x x		WD		
Metacetone	- -	x - x	x x				
Methacraldehyde α -Methacrolein 2-Methylpropenal	T B	- x -	x x				
Methanol Methyl alcohol	- -	x - x	x x		WD	Beware of explosion risk of released vapour. Wide inflammability range.	
Methan thiomethane	T A	x x -	x x		1D(45galls)		
1-Methoxybutane	T A	- - -	x x		2.5litres		
Methyl acetate	- -	x x -	x x		WD		
Methyl acetone	- -	x - x	x x		WD		
β -Methyl acrolein	T B	x x -	x x				

Methyl acrylate	T B	x x - x x	
Methylal	--	-- x x x	D(45galls)
Methyl alcohol	--	x - x x x	WD Beware of explosion risk of released vapour. Wide inflammability range.
Methylamine solutions in alcohol or water	T B	x x - x x	
Methylated spirit	--	x - x x x	WD
2-Methyl-1,3-butadiene	T A	- x - x x	WD
3-Methyl butanal	T A	- - - x x	
3-Methylbutane-1-thiol Amyl mercaptan Pentanethiol	T B	x x - x x	
2-Methylbutan-2-ol <i>tert</i> Amyl alcohol Ethyl dimethyl carbinol 2-Methyl-2-butanol	T A	x - x x x	
2-Methyl-2-butanol	T A	x - x x x	
3-Methylbutan-1-ol <i>iso</i> Amyl alcohol	T A	x - x x x	D
3-Methylbutan-2-one 3-Methyl-2-butanone Methyl <i>isopropyl</i> kentone	T B	x - x x x	
3-Methyl-2-butanone	T B	x - x x x	
Methyl <i>isobutyl</i> ketone	T B	x - x x x	WD
Methyl butyrate	--	x x - x x	D(50kg)
Methyl carbonate	T A	x x - x x	
Methyl chlorocarbonate	T B	x x - x x	10galls
Methyl chloroformate Methyl chlorocarbonate	T B	x x - x x	10galls

Name of substance (1)	Toxicity (2) Personal protection (3)	Fire extinguishing media (4)				Packing (5)	Other information (6)
		Water spray Foam	Alcohol- resistant foam	Dry powder	CO ₂ or vaporis- ing liquids		
Methyldichlorosilane Methylhydrogen dichlorosilane	T B	- - -	- - -	- - -	D	Very difficult to fight. Low auto-ignition temperature. Do not use foam, CO ₂ or vaporising liquids. Use copious water on shallow spills. Otherwise use very fine spray (fog).	
Methylene dimethyl ether	- -	- - x	x x	x x	D(45galls)		
Methyl ethyl ketone	T A	x - x	x x	x x	WD		
N-Methylformamide Form-methylamide	T B	- - -	x x	x x	D		
Methyl formate	T B	- - -	x x	x x			
Methylhydrazine	T B	x x -	x x	x x	D		
Methylhydrogen dichlorosilane	T B	- - -	- - -	- - -	D	Very difficult to fight. Low auto-ignition temperature. Do not use foam, CO ₂ or vaporising liquids. Use copious water on shallow spills otherwise use very fine spray (fog).	
Methyl methacrylate, monomer	T A	x x -	x x	x x	D		
Methyloxiran	T B	x - x	x x	x x	WD	Beware of explosion risk of released vapour. Wide inflammability range.	
2-Methylpentan-2-ol	T A	- - -	x x	x x	D		
4-Methylpentan-2-one <i>iso</i> Butyl methyl ketone Hexone 4-Methyl-2-pentanone Methyl <i>iso</i> butyl ketone	T B	x - x	x x	x x	WD		

4-Methyl-2-pentanone	T B	x - x	x x	WD	
1-Methylpiperidine N-Methylpiperidine	T A	- - -	x x		
N-Methylpiperidine	T A	- - -	x x		
2-Methyl propanal	T A	x x -	x x	D(45galls)	
2-Methylpropan-2-ol <i>tert</i> Butanol <i>tert</i> Butyl alcohol 2-Methyl-2-propanol Trimethyl carbinol	T A	x - x	x x		
2-Methyl-2-propanol	T A	x - x	x x		
2-Methylpropenal	T B	- x -	x x		
Methyl propionate	- -	x x -	x x	D(50kg)	
Methyl propyl carbinol	T B	x x -	x x		
Methyl isopropyl ketone	T B	x - x	x x		
Methyl sulphide	T A	x x -	x x	D(45galls)	
Methyltrichlorosilane	T B	- - -	x x		Reacts with water to give toxic, corrosive and inflammable vapours. May ignite spontaneously on contact with air. For fire use CO ₂ , dry powder, dry sand or earth. For a small spillage use dry sand or earth. For a larger spillage of shallow depth (less than 1in) use copious water (not jets). For a deeper spillage use fine waterspray.
α-Methylvaleraldehyde	T B	- x -	x x	D	
β-Methylvaleraldehyde	T A	- - -	x x		
2-Methylvaleraldehyde α-Methylvaleraldehyde	T B	- x -	x x	D	
Methyl isovalerate	- -	x x -	x x	50kg	
Methyldichlorosilane--Methyl isovalerate					section 1/page 25

Name of substance (1)	Toxicity (2) Personal protection (3)	Fire extinguishing media (4)		Packing (5)	Other information (6)
		Water spray Foam	Alcohol- resistant foam Dry powder CO ₂ or vaporis- ing liquids		
Methyl vinyl ketone	T B	x x -	x x	D	
Nickel carbonyl Nickel tetracarbonyl	T B	- - -	x x	5lb cylinders	Reacts with moisture and may ignite spontaneously on contact with air.
Nickel tetracarbonyl	T B	- - -	x x	5lb cylinders	Beware explosion risk of released vapour or on heating of cylinders. For spillage use copious water to flush away.
Nitroglycerine solutions in alcohol (not exceeding 5% of nitroglycerine)	T B	- - -	x x		Protection required against skin absorption, and against clothing contamination, which would become highly in- flammable when the alcohol evaporated.
Paraldehyde	T A	x - x	x x		
Pentanethiol	T B	x x -	x x		
Pentan-2-ol <i>sec</i> Amyl alcohol Methyl propyl carbinol 2-Pentanol	T B	x x -	x x		
2-Pentanol	T B	x x -	x x		
Pentan-3-one Diethyl ketone Ethyl propionyl Metacetone Propione	- -	x - x	x x		
<i>iso</i> Pentyl acetate <i>iso</i> Amyl acetate	- -	- - x	x x		

Pentylamine 1-Aminopentane n-Amylamine	T B	- - -	x x	25kg
isoPentylamine isoAmylamine	T B	- - -	x x	2.5litres
Pentyl nitrite n-Amyl nitrite	T B	- - -	x x	90oz
isoPentyl nitrite isoAmyl nitrite	T B	- - -	x x	
1-Phenylpropane-1,2-dione	T B	- - -	x x	2.5litres
Piperidine	T B	x - -	x x	D
Propane-1-thiol Propyl mercaptan	T A	- x -	x -	D
Propane-2-thiol isoPropyl mercaptan	T A	- x -	x -	D
Propan-1-ol 1-Propanol Propyl alcohol	- -	x - x	x x	W
1-Propanol	- -	x - x	x x	W
Propan-2-ol Dimethyl carbinol 2-Propanol isoPropanol isoPropyl alcohol secPropyl alcohol	- -	x - x	x x	WD
2-Propanol	- -	x - x	x x	WD
isoPropanol	- -	x - x	x x	WD
Propanone	- -	x - x	x x	WD
Propargyl bromide	T B	- x -	- x	D

Beware explosion risk if subjected to heat; keep container cool with water spray. Danger of explosion in contact with copper, alloys with a high copper content, silver or mercury.

Name of substance (1)	Toxicity (2) Personal protection (3)	Fire extinguishing media (4)		Packing (5)	Other information (6)
		Water spray Foam	Alcohol- resistant foam Dry powder CO ₂ or vaporis- ing liquids		
Propenal	T B	x - x	x x		Beware explosion risk of released vapour. Wide inflammability range.
Propenenitrile	T B	x - x	x x	WD	
Propene oxide	T B	x - x	x x	WD	Beware explosion risk of released vapour. Wide inflammability range.
Prop-2-en-1-ol	T B	x - x	x x	D	
2-Propen-1-ol	T B	x - x	x x	D	
isoPropenyl acetate	--	- x -	x -	D	
2-Propenylamine	T B	x x -	x x	D	Beware explosion risk of released vapour. Wide inflammability range.
2-Propenyl methanoate	T B	- x -	x x	D(50kg)	
Propionaldehyde Propyl aldehyde	T A	x - x	x x	D	
Propione	--	x - x	x x		
Propionitrile Ethyl cyanide	T B	--	x x		For spillage use dry sand or earth. For disposal seek manufacturer's assistance.
2-isoPropoxy propane	T A	-- x	x x	WD	Beware of explosion risk of released vapour. Wide inflammability range.
Propyl acetate	--	-- x	x x		
isoPropyl acetate	--	-- x	x x		
Propyl alcohol	--	x - x	x x	W	

<i>sec</i> Propyl alcohol	--	x - x	x x	WD	
<i>iso</i> Propyl alcohol	--	x - x	x x	WD	
Propyl aldehyde	T B	x x -	x x		
Propylamine	T B	x - x	x x	D(45galls)	
<i>iso</i> Propylamine	T B	x - x	x x	D	
Propyl bromide	T B	x x -	x x	D	
<i>iso</i> Propyl bromide	T B	x x -	x x	D	
<i>iso</i> Propyl butyrate	--	x x -	x x	50kg	
<i>iso</i> Propyl isobutyrate	--	x x -	x x		
Propyl chloride	T A	x x -	x x	D	
<i>iso</i> Propyl chloride	T A	x x -	x x		
<i>iso</i> Propyl chloroformate	T B	x x -	x x	10galls	
Propyl cyanide	T B	--	x x		For spillage use dry sand or earth. For disposal seek manufacturer's assistance.
Propylene aldehyde	T B	x x -	x x		
Propylene chloride	T B	x x -	x x	WD	
Propylene dichloride	T B	x x -	x x	WD	
Propyleneimine	T B	x x -	x x	D(45galls)	
Propylene oxide 1,2-Epoxy propane Methyloxiran Propene oxide	T B	x - x	x x	WD	Beware of explosion risk of released vapour. Wide inflammability range.
<i>iso</i> Propyl ether	T A	-- x	x x	WD	
Propyl formate	--	x x -	x x	50kg	
<i>iso</i> Propyl formate	--	x x -	x x	50kg	
Propyl iodide	T B	--	x x	2.5litres	
<i>iso</i> Propyl iodide	T B	--	x x	2.5litres	
Propenal— <i>iso</i> Propyl iodide					

Name of substance (1)	Toxicity (2) Personal protection (3)	Fire extinguishing media (4)		Packaging (5)	Other information (6)
		Water spray Foam	Alcohol- resistant foam		
		Dry powder	CO ₂ or vapour ing liquids		
Propyl mercaptan	T A	- x -	x -	D	
isoPropyl mercaptan	T A	- x -	x -	D	
Propyl nitrate	T A	x x -	x x		
isoPropyl nitrate	T A	x x -	x x	D	
isoPropyl propionate	- -	x x -	x x	50kg	
Pyridine	T A	x x -	x x	WD	
Pyrrrolidine	T A	x x -	x x		
Tetrahydrobenzene	- -	x x -	x x	10galls	
Tetrahydrofuran	T A	x x -	x x		
1,2,3,6-Tetrahydropyridine	T B	- - -	x x		
Tetrahydrothiophen Tetramethylene sulphide	- -	- x -	x -	WD	
Tetramethyl ethylene diamine	- -	x x -	x x	D	
Tetramethylene sulphide	- -	- x -	x -	WD	
Tetrapropyl orthotitanate	- -	- - -	x x	2·5litres	Reacts with water, but water spray may be used.
Thioacetic acid	T B	x x -	x x		
Thiophen	- -	x x -	x x		
Thiophenol	T B	x x -	x x		
Triethoxyboron	T B	x - -	x x	10galls	
Triethylamine	T B	x - x	x x	WD	

Triethyl borate Ethylborate Triethoxyboron	T B	x - -	x x	10galls	
Trifluoromethylbenzene	T B	x x -	x x	D(45galls)	
Trimethoxyborine	T B	x - -	x x	D	
Trimethylaminesolutions in alcohol or water	T B	x x -	x x		
Trimethyl borate Trimethoxyborine	T B	x - -	x x	D	
Trimethyl carbinol	T A	x - x	x x		
Trimethylchlorosilane	T B	- - -	x x	D	Reacts with water to give toxic, corrosive and inflammable vapours. May ignite spontaneously on contact with air. For fire use CO ₂ , dry powder, dry sand or earth. For a small spillage use dry sand or earth. For a larger spillage of shallow depth (less than 1in) use copious water (not jets). For a deeper spillage use fine water spray.
<i>iso</i> Valeraldehyde <i>iso</i> Amyl aldehyde 3-Methyl butanal	T A	- - -	x x		
Vinyl acetate β -Methyl valeraldehyde	- -	- x -	x x	WD	
Vinyl cyanide	T B	x - x	x x	WD	
Vinyl ether	T A	- - x	x x	25ml	Beware of explosion risk of released vapour. Wide inflammability range.
Vinylidene chloride	T A	x x -	x x		

Name of substance
(1)

Toxicity (2)
Personal protection (3)

Fire extinguishing
media (4)

Packng
(5)

Other information
(6)

Vinyltrichlorosilane

T B

- - - x x

D

Reacts with water to give toxic, corrosive and inflammable vapours. May ignite spontaneously on contact with air. For fire use CO₂, dry powder, dry sand or earth. For a small spillage use dry sand or earth. For a larger spillage of shallow depth (less than 1 in) use copious water (not jets). For a deeper spillage use fine water spray.

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