UK Health Security Agency

White spirit

Incident management

This document provides information needed for response to a chemical incident, such as physicochemical properties, health effects and decontamination advice.

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Contents

Main points

General

White spirit is a colourless clear flammable liquid at room temperature, with a kerosene-like odour. Reacts with strong oxidants, causing a fire and explosion hazard. Attacks some forms of plastics, rubber and coatings.

Health

Systemic toxicity most commonly occurs after inhalational exposure, although it may occur following ingestion and rarely after skin contact.

Inhalation exposure may result in lung toxicity, including bronchospasm, pulmonary oedema, ARDs and lipoid pneumonia.

Ingestion of white spirit may result in corrosive effects of direct toxicity on the mucosa. Gastrointestinal upset may occur. Aspiration into the lungs can cause pneumonitis with initial choking, gasping, coughing and haemoptysis.

Exposure to the eyes may result in pain, lacrimation, conjunctivitis, oedema, and photophobia.

Brief exposure to the skin may cause irritation, drying and cracking. Prolonged contact may cause transient pain with erythema, blistering, necrosis, partial thickness burns and possibly full thickness burns.

Systemic features include drowsiness leading to coma, ataxia, convulsions, cardiac arrhythmias, and respiratory distress.

Casualty decontamination at the scene

Following disrobe, improvised dry decontamination should be considered for an incident involving white spirit, unless casualties are demonstrating signs or symptoms of exposure to caustic or corrosive substances.

Environment

Inform the Environment Agency where appropriate and avoid release into the environment.

Spillages, contaminated fire and decontamination run-off should be prevented from entering drains and surface and groundwaters.

Hazard identification

Table 1a. Standard (UK) dangerous goods emergency action codes for turpentine substitute, packing group II

UN		1300	Turpentine substitute, packing group II	
EAC		3YE	Use normal foam: protein-based foam that is not alcohol resistant. Wear normal fire kit in combination with breathing apparatus [note 1]. Substance can be violently or explosively reactive. Spillages, contaminated fire and decontamination run-off should be prevented from entering drains and surface and groundwaters. There may be a public safety hazard outside the immediate area of the incident [note 2].	
APP		-	-	
Hazards	**Class**	3	Flammable liquids and desensitised liquid explosives	
	Sub-risks	-	-	
HIN		33	Highly flammable liquid (flashpoint below 23°C)	

Abbreviations

UN = United Nations number.
EAC = emergency action code.
APP = additional personal protection.
HIN = hazard identification number.

Notes to Table 1a

Note 1: Normal firefighting clothing is appropriate: self-contained open circuit positive pressure compressed air breathing apparatus conforming to BS EN 137 worn in combination with fire kit conforming to BS EN 469, fire fighters' gloves conforming to BS EN 659 and firefighters' footwear conforming to BS EN 15090 (Footwear for firefighters) type F3- Hazmat and structural firefighting [CH – marking for chemical resistance] or alternatively firefighters' boots conforming to Home Office Specification A29 (rubber boots) or A30 (leather boots). Leather footwear including those conforming to A30 may not provide adequate chemical resistance therefore caution should be exercised in the use of these boots.

Note 2: People should be warned to stay indoors with all doors and windows closed, preferably in rooms upstairs and facing away from the incident. Ignition sources should be eliminated and ventilation stopped. Effects may spread beyond the immediate vicinity. All non-essential personnel should be instructed to move at least 250 m away from the incident.

References

National Chemical Emergency Centre (NCEC), part of Ricardo-AEA. 'Dangerous Goods Emergency Action Code List'. 2025 (viewed on 24 February 2025)

Table 1b. Standard (UK) dangerous goods emergency action codes for turpentine substitute, packing group III

UN		1300	Turpentine substitute, packing group III	
EAC		3Y	Use normal foam: protein-based foam that is not alcohol resistant. Wear normal fire kit in combination with breathing apparatus [note 1]. Substance can be violently or explosively reactive. Spillages, contaminated fire and decontamination run-off should be prevented from entering drains and surface and groundwaters.	
APP		-	-	
Hazards	**Class**	3	Flammable liquids and desensitised liquid explosives	
	Sub-risks	-	-	
HIN		30	Flammable liquid (flash-point between 23°C and 60°C, inclusive) or flammable liquid or solid in the molten state with a flash point above 60°C, heated to a temperature equal to or above its flash point, or self-heating liquid	

Abbreviations

UN = United Nations number.
EAC = emergency action code.
APP = additional personal protection.
HIN = hazard identification number.

Notes to Table 1b

Note 1: Normal firefighting clothing is appropriate: self-contained open circuit positive pressure compressed air breathing apparatus conforming to BS EN 137 worn in combination with fire kit conforming to BS EN 469, fire fighters' gloves conforming to BS EN 659 and firefighters'

footwear conforming to BS EN 15090 (Footwear for firefighters) type F3- Hazmat and structural firefighting [CH – marking for chemical resistance] or alternatively firefighters' boots conforming to Home Office Specification A29 (rubber boots) or A30 (leather boots). Leather footwear including those conforming to A30 may not provide adequate chemical resistance therefore caution should be exercised in the use of these boots.

References

National Chemical Emergency Centre (NCEC), part of Ricardo-AEA. 'Dangerous Goods Emergency Action Code List'. 2025 (viewed on 24 February 2025)

Table 2. The GB classification, labelling and packaging (CLP) regulation for Stoddard solvent

Hazard class and category	Asp. Tox. 1	Aspiration hazard, category 1	
	Muta. 1B	Germ cell mutagenicity, category 1B	
	Carc. 1B	Carcinogenicity, category 1B	
	STOT RE 1	Specific target organ toxicity after repeated exposure, category 1	
Hazard statement	H304	May be fatal if swallowed and enters airways	
	H340	May cause genetic defects	
	H350	May cause cancer	
	H372	Causes damage to organs through prolonged or repeated exposure (central nervous system)	
Signal words	DANGER		

References

The Health and Safety Executive (HSE). ‘GB CLP Regulation’ (viewed on 24 February 2025)

Physicochemical properties

Table 3. Physicochemical properties

CAS number	8052-41-3
Molecular weight	144 (mean)
Formula	White spirit is a mixture of straight and branched chain paraffins, naphthene and alkyl aromatic hydrocarbons
Common synonyms	Stoddard solvent, mineral spirit, naptha, turpentine substitute
State at room temperature	Colourless clear liquid
Volatility	Vapour pressure = 0.1 - 1.4 kPa at 20°C
Specific gravity	0.77 - 0.80 (water = 1) 4.5 - 5 (air = 1)
Flammability	Flammable. Above 21°C explosive vapour/air mixtures may be formed.
Lower explosive limit	0.6%
Upper explosive limit	8.0%
Water solubility	Insoluble
Reactivity	Reacts with strong oxidants, causing a fire and explosion hazard. Attacks some forms of plastics, rubber and coatings.
Odour	Kerosene-like odour

References

World Health Organization. International Programme on Chemical Safety ‘International Chemical Safety Card entry for Stoddard solvent’ ICSC 0361, 2004 (viewed on 25 February 2025)

Reported effect levels from authoritative sources

Table 4. Exposure by inhalation of vapours

ppm	mg/m^3	Signs and symptoms	Reference
100	600	Headache	a
≤400	≤2400	Tiredness and giddiness	a

Table 5. Exposure by ingestion

mL	Signs and symptoms	Reference
10-30	Potentially fatal following aspiration into the lungs	a

Table 6. Exposure to the eyes

ppm	mg/m^3	Signs and symptoms	Reference
>100	>600	Irritation	a

These values give an indication of levels of exposure that can cause adverse effects. They are not health protective standards or guideline values.

References

a. International Programme on Chemical Safety. 'White Spirit. Environmental Health Criteria 187' 1996 (viewed on 25 February 2025)

Published emergency response guidelines

Table 7. Acute exposure guideline levels (AEGLs)

	Concentration				
	10 minutes	**30 minutes**	**60 minutes**	**4 hours**	**8 hours**
AEGL-1 [note 1]	Data not available				
AEGL-2 [note 2]					
AEGL-3 [note 3]					

Notes to Table 7

Note 1: Level of the chemical in air at or above which the general population could experience notable discomfort.

Note 2: Level of the chemical in air at or above which there may be irreversible or other serious long-lasting effects or impaired ability to escape.

Note 3: Level of the chemical in air at or above which the general population could experience life-threatening health effects or death.

Exposure standards, guidelines or regulations

Table 8. Occupational standards

	LTEL (8-hour reference period)		STEL (15-min reference period)	
	ppm	**mg/m³**	**ppm**	**mg/m³**
WEL	No values specified			

Abbreviations

WEL = workplace exposure limit.
LTEL = long-term exposure limit.
STEL = short-term exposure limit.

Table 9. Public health standards and guidelines

Drinking water standard	No value specified
WHO guideline for drinking water quality	No value specified
UK indoor air quality guideline	No value specified
WHO indoor air quality guideline	No value specified
WHO air quality guideline	No value specified

Health effects

Systemic toxicity most commonly occurs after inhalational exposure, although systemic toxicity may occur following ingestion and rarely after skin contact. Pulmonary toxicity is most likely to occur following ingestion due to aspiration.

Table 10. Signs or symptoms of acute exposure

Route	Signs and symptoms
Inhalation	Inhalational exposure may result in lung toxicity, including asphyxia, bronchospasm, pulmonary oedema, ARDs and lipoid pneumonia. Severe symptoms usually occur secondary to intentional misuse or as the result of an industrial accident, where there is prolonged inhalation or exposure to high concentrations (especially within a confined space). Severe symptoms are unlikely to arise following brief accidental exposure. Systemic toxicity can occur after inhalation. Cardiac arrhythmias (in particular ventricular fibrillation) appear to be due to sensitisation of the myocardium to catecholamines. This may be further precipitated by exercise following exposure. Direct inhalation of aerosols also may cause death due to bradycardia and cardiac arrest from vagal stimulation by rapid chilling of the larynx.
Ingestion	Corrosive effects of direct toxicity may be seen on the mucosa. Petroleum distillates are poorly absorbed from the GI tract but systemic absorption can occur. Aspiration may also occur as a consequence of ingestion. Gastrointestinal upset may occur. Rarely, diarrhoea, upper GI bleeding, corrosive damage and perforation may occur.
Eyes	Pain, watering, conjunctivitis, oedema, and photophobia may occur.
Dermal	Brief exposures cause irritation, drying and cracking. Prolonged contact may cause transient pain with erythema, blistering, necrosis, partial thickness burns and possibly full thickness burns. Rarely, systemic toxicity may arise. Dermatitis may develop after repeated exposures.
Aspiration in the lungs	Aspiration into the lungs causes pneumonitis or acute lung injury. Initial features include choking, gasping, coughing and haemoptysis. Signs and symptoms may progress over 24 to 48 hours with wheeze,

Route	Signs and symptoms
	breathlessness, bronchospasm, hypoxia, fever and leukocytosis. Chest x-ray changes include patchy shadowing and pulmonary oedema (may be delayed for 24 to 72 hours). In severe cases shock and cardiorespiratory arrest can occur. Rarer complications include pleural effusions or pneumatoceles, lipoid pneumonia, emphysema, pneumothorax, and pneumomediastinum.
Systemic features	Drowsiness leading to coma, ataxia, convulsions, cardiac arrhythmias, and respiratory collapse. Rarely abnormal LFTs, acute kidney injury, myocarditis, intravascular haemolysis and disseminated intravascular coagulation.

Reference

National Poisons Information Service (NPIS). TOXBASE 'White Spirit' 2021 (viewed on 26 February 2025)

National Poisons Information Service (NPIS). TOXBASE 'Petroleum distillates – skin contact' 2021 (viewed on 26 February 2025)

National Poisons Information Service (NPIS). TOXBASE 'Chemicals Splashed or Sprayed into the Eyes – features and management' 2020 (viewed on 26 February 2025)

National Poisons Information Service (NPIS). TOXBASE 'Petroleum distillates - inhalation' 2021 (viewed on 26 February 2025)

Decontamination at the scene

Chemical specific advice

The approach used for decontamination at the scene will depend upon the incident, location of the casualties and the chemicals involved. Therefore, a risk assessment should be conducted to decide on the most appropriate method of decontamination.

Following disrobe, improvised dry decontamination should be considered for an incident involving white spirit unless casualties are demonstrating signs or symptoms of exposure to caustic or corrosive substances.

People who are processed through improvised decontamination should subsequently be moved to a safe location, triaged and subject to health and scientific advice. Based on the outcome of the assessment, they may require further decontamination.

Emergency services and public health professionals can obtain further advice from the UK Health Security Agency (UKHSA) Radiation, Chemicals, Climate and Environmental Hazards Directorate using the 24-hour chemical hotline number: 0344 892 0555.

Disrobe

The disrobe process is highly effective at reducing exposure to HAZMAT/CBRN material when performed within 15 minutes of exposure.

Therefore, disrobe must be considered the primary action following evacuation from a contaminated area.

Where possible, disrobing should be conducted at the scene and by the casualty themselves. Disrobing should be systematic to prevent transfer of contaminant from clothing to skin. Clothing should not be pulled over the head if possible.

Clothing stuck to the casualty by the contaminant should not be forcefully removed, as this risks causing further harm.

Consideration should be given to ensuring the welfare and dignity of casualties as far as possible. Immediately after decontamination the opportunity should be provided to dry and dress in clean robes or clothes.

Improvised decontamination

Improvised decontamination is an immediate method of decontamination prior to the use of specialised resources. This should be performed on all contaminated casualties unless medical advice is received to the contrary. Improvised dry decontamination should be considered for an incident involving chemicals unless the agent appears to be corrosive or caustic.

Unprotected first responders and members of the public should not approach casualties incapacitated by exposure to administer improvised decontamination, as they may be exposed to contaminants and become a casualty themselves.

Important note: Improvised decontamination should continue until a more structured intervention, such as an Interim Operational Response is conducted, or Specialist Operational Response are present.

Improvised dry decontamination

Improvised dry decontamination should be considered for an incident involving white spirit unless casualties are demonstrating obvious signs of chemical burns or skin irritation.

Any available dry absorbent material can be used such as kitchen towel, paper tissues (for example blue roll) and clean cloth.

Exposed skin surfaces should be blotted first and then rubbed, starting with the face, head, and neck, and moving down and away from the body.

Blotting and rubbing should not be too aggressive, as it could drive contamination further into the skin.

Casualties should also blow their nose to remove contaminants from the nasal cavities.

All waste material arising from decontamination should be left in situ, and ideally bagged, for disposal at a later stage.

Improvised wet decontamination

Wet decontamination should be used if contamination with a caustic chemical substance is suspected.

Wet decontamination may be performed using copious amounts of water from any available source such as taps, showers, water bottles, fixed installation hose-reels and sprinklers to

gently rinse the affected skin. Other natural sources of water may be considered unless this creates greater risks to the individuals affected. Wet wipes or baby wipes may be used as an effective alternative.

Improvised decontamination should not involve overly aggressive methods to remove contamination as this could further damage affected tissues and drive the contamination further into the skin.

Where appropriate, seek professional advice on how to dispose of contaminated water and prevent run-off going into the water system.

Additional notes

Following improvised decontamination, remain cautious and observe for signs and symptoms in the decontaminated person and in unprotected staff.

If water is used to decontaminate casualties this may be contaminated, and therefore hazardous, and a potential source of further contamination spread.

All materials (paper tissues and so on) used in this process may also be contaminated and, where possible, should not be used on new casualties.

The risk from hypothermia should be considered when disrobe and any form of wet decontamination is carried out.

People who are contaminated should not eat, drink or smoke before or during the decontamination process and should avoid touching their face.

When vulnerable people are affected by a hazardous substance, they may need additional support to remove themselves, their clothing or the substance.

Casualties should remain in the area and should not leave to seek care at a hospital, as this presents a contamination risk. Further care will be administered on site by the appropriate emergency services.

Interim wet decontamination

Interim decontamination is the use of standard Fire and Rescue Service equipment to provide a planned and structured decontamination process prior to the availability of purpose-designed decontamination equipment.

Decontamination at the scene references

Home Office. ‘Initial operational response to a CBRN incident’ Version 2.0 2015 (viewed on 26 February 2025)

National Health Service England. ‘Emergency Preparedness, Resilience and Response (EPRR): Guidance for the initial management of self-presenters from incidents involving hazardous materials’ 2019 (viewed on 26 February 2025)

Joint Emergency Service Interoperability Programme. ‘Initial Operational Response (IOR) to Incidents Suspected to Involve Hazardous Substances or CBRN Materials’ 2024 (viewed on 26 February 2025)

Clinical decontamination and first aid

Clinical decontamination is the process where trained healthcare professionals, using purpose-designed decontamination equipment, treat contaminated persons individually.

Detailed information on clinical management can be found on TOXBASE.

Important notes

Once body surface contaminants have been removed or if your patient was exposed by ingestion or inhalation, the risk that secondary care givers may become contaminated is very low. Secondary carers should wear standard hospital PPE as a precaution against secondary contamination from vomit and body fluids.

If the patient has not been decontaminated following surface contamination, secondary carers must wear appropriate NHS PPE for chemical exposure to avoid contaminating themselves.

The area should be well ventilated.

For comprehensive clinical advice consult TOXBASE directly.

Clinical decontamination following surface contamination

Avoid contaminating yourself.

Carry out decontamination in a well-ventilated area, preferably with its own ventilation system.

The patient should remove soiled clothing and wash him/herself if possible.

Contaminated clothing should be removed, double-bagged, sealed and stored safely to prevent escape of volatile substances.

Decontaminate open wounds first and avoid contamination of unexposed skin. Wash hair and all contaminated skin with liberal amounts of water (preferably warm) and soap.

Pay special attention to skin folds, fingernails and ears.

The earlier irrigation begins, the greater the benefit.

Dermal exposure

Decontaminate (as above) the patient following surface contamination.

If features of systemic toxicity are present manage as per ingestion.

Chemical burns totalling more than 15% of body surface area in adults (>10% in children) will require standard fluid resuscitation as for thermal burns.

Cover affected area with a clean non-adherent dressing.

Chemical burns should be reviewed by a burns specialist. Excision or skin grafting may be required.

Other measures as indicated by the patient's clinical condition.

Ocular exposure

Remove contact lenses if present.

Anaesthetise the eye with a topical local anaesthetic (for example, oxybuprocaine, amethocaine or similar). However, do not delay irrigation if local anaesthetic is not immediately available.

Immediately irrigate the affected eye thoroughly with 1,000mL 0.9% saline or equivalent crystalloid (for example, by an infusion bag with a giving set) for a minimum of 10 to 15 minutes irrespective of initial conjunctival pH. A Morgan Lens may be used if anaesthetic has been given.

Aim for a neutral conjunctival pH of 7 to 7.2. The conjunctivae may be tested with indicator paper. Retest at 15 to 30 minutes after irrigation and use further irrigation if necessary.

Any particles lodges in the conjunctival recesses should be removed.

Repeated instillation of local anaesthetics may reduce discomfort and help more thorough decontamination. However, prolonged use of concentrated local anaesthetics is damaging to the cornea.

Patients with corneal damage, those who have been exposed to strong acids or alkalis and those whose symptoms do not resolve rapidly should be discussed urgently with an ophthalmologist.

Carry out other supportive measures as indicated by the patient's clinical condition.

Ingestion and Inhalation

Assess the severity of the exposure by establishing the product used and its concentration, the timing and duration of exposure and the presence of clinical features that might indicate toxicity.

Maintain a clear airway and ensure adequate ventilation.

Administer oxygen to achieve adequate oxygenation.

In severely affected patients, especially those with tachypnoea, stridor or upper airway damage, critical care input is essential with urgent assessment of the airway. A supraglottic-epiglottic burn with erythema and oedema is usually a sign that further oedema will occur that may lead to airway obstruction.

Children are at increased risk of airway obstruction.

Gastric lavage should not be undertaken following ingestion due to the increased risk of aspiration.

Monitor conscious level, vital signs and cardiac rhythm; check the capillary blood glucose.

Perform a 12-lead ECG in all patients who require assessment.

Carry out other supportive measures as indicated by the patient's clinical condition.

Clinical decontamination and first aid references

National Poisons Information Service (NPIS). TOXBASE 'White Spirit' 2021 (viewed on 26 February 2025)

National Poisons Information Service (NPIS). TOXBASE 'Petroleum distillates – skin contact' 2021 (viewed on 26 February 2025)

National Poisons Information Service (NPIS). TOXBASE 'Chemicals Splashed or Sprayed into the Eyes – features and management' 2020 (viewed on 26 February 2025)

National Poisons Information Service (NPIS). TOXBASE 'Petroleum distillates - inhalation' 2021 (viewed on 26 February 2025)

About the UK Health Security Agency

UKHSA is responsible for protecting every member of every community from the impact of infectious diseases, chemical, biological, radiological and nuclear incidents and other health threats. We provide intellectual, scientific and operational leadership at national and local level, as well as on the global stage, to make the nation health secure.

UKHSA is an executive agency, sponsored by the Department of Health and Social Care.

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For queries relating to this document, please contact chemcompendium@ukhsa.gov.uk or enquiries@ukhsa.gov.uk

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