



UK Health
Security
Agency

Diesel

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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Main points

General

Diesel is a flammable liquid and has a characteristic fuel-like odour.

It may release irritating or toxic fumes during a fire.

Health

Major routes of exposure are inhalation and ingestion.

Inhalation of benzene may result in mucous membrane irritation, sore throat, cough, hoarseness of voice and dyspnoea; pulmonary oedema and haemorrhage may follow severe exposure.

Ingestion causes burning sensation of the mouth, oesophagus and stomach; nausea, vomiting and abdominal pain may follow.

Dermal contact can cause irritation, erythema and dermatitis.

Benzene vapour may cause eye irritation at high concentrations.

Casualty decontamination at the scene

Following disrobe, improvised dry decontamination should be considered for an incident involving benzene, 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 1. Standard (UK) dangerous goods emergency action codes for benzene

UN		1202	Gas oil or diesel fuel or heating oil, light	
EAC		3Y	Use normal foam, i.e., 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 1

Note 1: Normal firefighting clothing is appropriate i.e., 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.

Reference

National Chemical Emergency Centre (NCEC), part of Ricardo-AEA. '[Dangerous Goods Emergency Action Code List](#)'. 2023 (viewed on 27 September 2024)

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

Hazard class and category	Carc. 2	Carcinogenicity, category 2	
Hazard statement	H351	Suspected of causing cancer	
Signal words	WARNING		

References

The Health and Safety Executive (HSE). '[GB CLP Regulation](#)' (viewed on 27 September 2024)

Physicochemical properties

Table 3. Physicochemical properties

CAS number	CAS number is derived from refining process
Molecular weight	-
Formula	Mixture of C ₄ and C ₁₂ hydrocarbons
Common synonyms	-
State at room temperature	Liquid
Volatility	2.12-26.4 mmHg at 20°C
Specific gravity	0.87-0.95 at 20°C (water = 1)
Flammability	Flammable
Lower explosive limit	0.6%
Upper explosive limit	6.5%
Water solubility	0.5 mg/100 mL
Reactivity	Gives off irritating or toxic fumes during a fire
Odour	Characteristic fuel-like odour

References

World Health Organization. International Programme on Chemical Safety. [‘International chemical safety card entry for diesel fuel No. 2’](#). ICSC 1561, 2004 (viewed on 27 September 2024)

Agency for Toxic Substances and Disease Registry (ATSDR). [‘Toxicological profile for fuel oils’](#). 1995 (viewed on 27 September 2024).

Reported effect levels from authoritative sources

Diesel fuels are mixtures of C₄ and C₁₂ hydrocarbons, and may vary in composition between sites of extraction and refinery processes. This varies the toxicity of each mixture. Therefore, effect levels cannot be given.

Published emergency response guidelines

Table 4. Acute exposure guideline levels (AEGLs) for benzene

	Concentration				
	10 minutes	30 minutes	60 minutes	4 hours	8 hours
AEGL-1 [note 1]	No data available				
AEGL-2 [note 2]					
AEGL-3 [note 3]					

Exposure standards, guidelines or regulations

Table 5. Occupational standards

	LTEL (8-hour reference period)		STEL (15-min reference period)	
	ppm	mg/m ³	ppm	mg/m ³
WEL	No level published			

Abbreviations

WEL = workplace exposure limit.

Table 6. Public health standards and guidelines

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

Health effects

Systemic toxicity most commonly occurs after exposure by inhalation; it may occur following ingestion and is also possible after prolonged skin contact. Pulmonary toxicity is most likely to occur following ingestion due to aspiration.

Table 7. Signs or symptoms of acute exposure

Route	Signs and symptoms
Inhalation	<p>Inhalation exposure may result in lung toxicity; including asphyxia, bronchospasm, pulmonary oedema, ARDS and lipoid pneumonia.</p> <p>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.</p> <p>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.</p> <p>Rarely: abnormal LFTs, acute kidney injury, intravascular haemolysis and disseminated intravascular coagulation.</p>
Ingestion	<p>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. Gastrointestinal effects include GI upset, diarrhoea, upper GI haemorrhage, corrosive damage and perforation.</p> <p>Aspiration into the lungs may cause pneumonitis or lipoid pneumonia. Initial features include choking, gasping, coughing and haemoptysis. Signs and symptoms may progress over 24 to 48 hours with wheeze, 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.</p> <p>Rarer complications include pleural effusions or pneumatoceles, lipoid pneumonia, emphysema, pneumothorax and pneumomediastinum.</p>
Eyes	<p>Ocular exposure may cause pain, blepharospasm, lacrimation, conjunctivitis, oedema and photophobia</p>

Route	Signs and symptoms
Dermal	<p>Brief exposures can cause irritation, drying and cracking of the skin.</p> <p>Prolongued exposure can lead to transient pain with erythema, blistering, necrosis, partial thickness burns and possibly full thickness burns. Rarely systemic toxicity may arise.</p>
Systemic	<p>Symptoms include drowsiness leading to coma, ataxia, convulsions, cardiac arrhythmias and respiratory collapse.</p> <p>In rare cases, abnormal LFTs, acute kidney injury, myocarditis, intravascular haemolysis, renal damage and disseminated intravascular coagulation may occur.</p>

Reference

National Poisons Information Service (NPIS). TOXBASE. '[Diesel fuel](#)' 2021 (viewed on 27 September 2024)

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 diesel unless casualties are demonstrating obvious signs 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 and Environment 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 more structured interventions such as Interim or Specialist Operational Response are present.

Improvised dry decontamination

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.

Water should only be used for decontamination where casualty signs and symptoms are consistent with exposure to caustic or corrosive substances such as acids or alkalis.

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 July 2015 (viewed on 27 September 2024)

National Health Service England. '[Emergency Preparedness, Resilience and Response \(EPRR\): Guidance for the initial management of self-presenters from incidents involving hazardous materials.](#)' February 2019 (viewed on 27 September 2024)

Joint Emergency Service Interoperability Programme. '[Initial Operational Response IOR to Incidents Suspected to Involve Hazardous Substances or CBRN Materials](#)' June 2024 (viewed on 27 September 2024)

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. Click [here](#) for further information.

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.

Dermal exposure

Decontaminate (as above) the patient following surface contamination.

For extensive or prolonged exposure there may be systemic effects – see ingestion.

Burns totalling more than 15% of body surface area (more than 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 supportive 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 lodged 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.

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

Ingestion

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 and treating clinicians should have a low threshold for establishing a protected airway.

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

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

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

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

Inhalation

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 and treating clinicians should have a low threshold for establishing a protected airway.

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

Check and record pupil size.

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

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

Clinical decontamination and first aid references

National Poisons Information Service. [TOXBASE](#). (viewed on 27 September 2024).

National Poisons Information Service. TOXBASE. '[Diesel](#)' 2022 (viewed on 27 September 2024)

National Poisons Information Service. TOXBASE. '[Chemicals Splashed or Sprayed into the Eyes – features and management](#)' 2020 (viewed on 27 September 2024)

National Poisons Information Service. TOXBASE. '[Skin decontamination – irritants](#)' 2019 (viewed on 27 September 2024)

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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