Public Health England

Protecting and improving the nation's health

Diesel

Incident Management

Key Points

General

- liquid at room temperature
- characteristic fuel-like odour

Health effects

- inhalation may lead to coma, ataxia, convulsions, cardiac arrhythmias and respiratory distress
- ingestion causes nausea, vomiting and abdominal pain and can lead to systemic effects
- aspiration of diesel causes pneumonitis initial symptoms include choking, gasping, coughing and haemoptysis
- dermal exposure can cause irritation, drying and cracking
- ocular exposure may cause an immediate stinging and burning sensation with lacrimation

Casualty decontamination at the scene

- following disrobe, improvised dry decontamination should be considered for an incident involving diesel unless casualties are demonstrating signs or symptoms of exposure to caustic or corrosive substances

Environment

- hazardous to the environment; inform the Environment Agency where appropriate
- spillages and decontamination run-off should be prevented from entering watercourses

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Hazard Identification

Standard (UK) dangerous goods emergency action codes

UN		1202	Gas oil or diesel fuel or heating oil, light	
EAC		3Y	Use normal foam. Wear normal fire kit in combination with breathing apparatus*. Spillages and decontamination run-off should be prevented from entering drains and watercourses. Substance can be violently or explosively reactive	
APP		–	–	
Hazards	**Class**	3	Flammable liquid	
	Sub-risks	–	–	
HIN		30	Flammable liquid (flashpoint between 23°C and 61°C inclusive) or flammable liquid or solid in the molten state with a flashpoint above 61°C, heated to a temperature equal to or above its flashpoint, or self-heating liquid	

UN – United Nations number, EAC – emergency action code, APP – additional personal protection, HIN – hazard identification number

* Normal firefighting clothing is appropriate, i.e. breathing apparatus conforming to BS EN 137 worn in combination with fire kit conforming to BS EN 469, firefighters' gloves conforming to BS EN 659 and firefighters' boots conforming to Home Office specification A29 or A30

Reference

Dangerous Goods Emergency Action Code List. National Chemical Emergency Centre (NCEC), Part of Ricardo-AEA. The Stationery Office, 2019.

Classification, labelling and packaging (CLP)*

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

* Implemented in the EU on 20 January 2009

Reference

European Commission. Harmonised classification – Annexe VI to Regulation (EC) No. 1272/2008 on Classification, Labelling and Packaging of Substances and Mixtures. http://echa.europa.eu/information-on-chemicals/cl-inventory-database (accessed 03/2019).

Physicochemical Properties

CAS number	CAS number is derived from refining process
Molecular weight	–
Empirical formula	Mixture of C_4 to 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	–
Reaction or degradation products	Gives off irritating or toxic fumes during a fire
Odour	Characteristic fuel-like odour

References

Agency for Toxic Substances and Disease Registry (ATSDR). Toxicological profile for fuel oils, 1995.

International Programme on Chemical Safety. International chemical safety card entry for diesel fuel No. 2. ICSC 1561, 2004. World Health Organization: Geneva.

Reported Effect Levels from Authoritative Sources

Data not available

Published Emergency Response Guidelines

Emergency response planning guideline (ERPG) values

Diesel fuel and other middle distillate fuel

	Listed value (mg/m^3)
ERPG-1*	300
ERPG-2†	1000
ERPG-3‡	Not established

* Maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing other than mild transient adverse health effects or perceiving a clearly defined, objectionable odour

† Maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing or developing irreversible or other serious health effects or symptoms which could impair an individual's ability to take protective action

‡ Maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing or developing life-threatening health effects

[1] Odour should be detectable near ERPG-1

Reference

American Industrial Hygiene Association (AIHA). 2016 Emergency Response Planning Guideline Values. https://www.aiha.org/get-involved/AIHAGuidelineFoundation/EmergencyResponsePlanningGuidelines/Documents/2016%20ERPG%20Table.pdf (accessed 03/2019).

Acute exposure guideline levels (AEGLs)

	Concentration (ppm)				
	10 min	**30 min**	**60 min**	**4 hours**	**8 hours**
AEGL-1*	No data available				
AEGL-2†					
AEGL-3‡					

* Level of the chemical in air at or above which the general population could experience notable discomfort

† 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

‡ 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

Occupational standards

	LTEL (8-hour reference period)		STEL (15-min reference period)	
	ppm	mg/m^3	ppm	mg/m^3
WEL	No data			
WEL – workplace exposure limit, LTEL – long-term exposure limit, STEL – short-term exposure limit				

Public health guidelines

Drinking water standard	No guideline value specified
Air quality guideline	No guideline value specified

Health Effects

Major route of exposure

- 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)

Immediate signs or symptoms of acute exposure

Route	Signs and symptoms
Inhalation	Drowsiness which may lead to coma, ataxia, convulsions, cardiac arrhythmias, and respiratory distress 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 Rarely, inhalation may cause abnormal LFTs, acute kidney injury, intravascular haemolysis and disseminated intravascular coagulation
Ingestion	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 – 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 – 72 hours). In severe cases shock and cardiorespiratory arrest can occur Rarer complications include pleural effusions or pneumatoceles, lipoid pneumonia, emphysema, pneumothorax and pneumomediastinum Nausea, vomiting and abdominal pain may also occur, as well as diarrhoea, haematemesis and melaena, corrosive damage and perforation occurring rarely following ingestion
Systemic	Symptoms include drowsiness leading to coma, ataxia, convulsions, cardiac arrhythmias and respiratory collapse. In rare cases, abnormal LFTs, acute kidney injury, myocarditis, intravascular haemolysis and disseminated intravascular coagulation may occur
Dermal	Brief exposures cause irritation, drying and cracking. Prolonged exposure can lead to transient pain with erythema, blistering, necrosis, partial thickness burns and possibly full thickness burns. Dermatitis may develop after repeated exposures
Ocular	Ocular exposure may cause pain, blepharospasm, lacrimation, conjunctivitis, oedema and photophobia

References

TOXBASE. Diesel fuel, 12/2016 http://www.toxbase.org (accessed 03/2019).

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 signs or symptoms of exposure to caustic or corrosive substances.

Emergency services and public health professionals can obtain further advice from Public Health England (Centre for Radiation, Chemical and Environmental Hazards) using the 24-hour chemical hotline number: 0344 892 0555.

General advice on disrobe and decontamination

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, disrobe at the scene should be conducted by the casualty themselves and should be systematic to avoid transferring any contamination from clothing to the skin. Consideration should be given to ensuring the welfare and dignity of casualties as far as possible.

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**.

Improvised dry decontamination

- any available dry absorbent material can be used such as kitchen towel, paper tissues (e.g. blue roll) and clean cloth
- exposed skin surfaces should be blotted and rubbed, starting with the face, head and neck and moving down and away from the body

- rubbing and blotting should not be too aggressive, or it could drive contamination further into the skin
- all waste material arising from decontamination should be left in situ, and ideally bagged, for disposal at a later stage

Improvised wet decontamination

- 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 any available source of water such as taps, showers, fixed installation hose-reels and sprinklers
- when using water, it is important to try and limit the duration of decontamination to between 45 and 90 seconds and, ideally, to use a washing aid such as cloth or sponge
- improvised decontamination should not involve overly aggressive methods to remove contamination as this could 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 etc) 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
- 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/clothes
- 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

Interim wet decontamination

Interim decontamination is the use of standard fire and rescue service (FRS) 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.

NHS England. Emergency Preparedness, Resilience and Response (EPRR). Guidance for the initial management of self presenters from incidents involving hazardous materials. February 2019.

Clinical Decontamination and First Aid

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

Detailed information on clinical management can be found on TOXBASE – www.toxbase.org.

Important note

- **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

Clinical decontamination following surface contamination

- **do not allow smoking nearby – there may be a risk of fire**
- carry out decontamination in a well-ventilated area, preferably with its own ventilation system
- the patient should remove soiled clothing and wash themselves if possible
- put soiled clothing in a sealed container to prevent escape of volatile substances
- 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 in adults (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 (e.g. oxybuprocaine, amethocaine or similar); **however, do not delay irrigation if local anaesthetic is not immediately available**
- immediately irrigate the affected eye thoroughly with 1,000 mL 0.9% saline (e.g. by an infusion bag with a giving set) for a minimum of 10-15 minutes irrespective of initial conjunctival pH. Amphoteric solutions are available and may be used. A Morgan Lens may be used if anaesthetic has been given. Aim for a final conjunctival pH of 7.5–8.0. The conjunctivae may be tested with indicator paper. Retest 20 minutes after irrigation and use further irrigation if necessary
- 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

Inhalation

- maintain a clear airway and adequate ventilation
- give oxygen if indicated
- monitor vital signs, cardiac rhythm and check capillary blood sugar
- perform a 12 lead ECG in all patients that require assessment
- other supportive measures as indicated by the patient's clinical condition

Ingestion

- maintain a clear airway and adequate ventilation
- give oxygen if indicated
- gastric lavage should **not** be undertaken due to the increased risk of aspiration
- monitor vital signs, cardiac rhythm and check capillary blood sugar
- perform a 12-lead ECG in all patients that require assessment
- other supportive measures as indicated by the patient's clinical condition

Clinical decontamination and first aid references

TOXBASE http://www.toxbase.org (accessed 03/2019)

TOXBASE Diesel oil, 12/2016

TOXBASE Petroleum distillates – features and management, 04/2017

TOXBASE Petroleum distillates – inhalation, 10/2016

TOXBASE Petroleum distillates – skin contact, 03/2010

TOXBASE Chemicals splashed or sprayed into the eyes, 06/2017

This document from the PHE Centre for Radiation, Chemical and Environmental Hazards reflects understanding and evaluation of the current scientific evidence as presented and referenced here.

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