



UK Health
Security
Agency

Phthalates (Diisononylphthalate (DINP) and Di(2-ethylhexyl)phthalate (DEHP))

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

Phthalates are colourless, liquids and some of the phthalates (Diisononyl phthalates) are viscous oily liquids. They are stable under normal conditions, but react violently with strong oxidisers, acids, alkalis and nitrates. They are practically insoluble in water, and are highly lipid soluble.

Phthalates are combustible. They decompose on heating to produce acrid smoke and irritating vapours.

Health

Phthalates are generally of low acute toxicity.

The effects of long-term exposure are unclear.

Humans are exposed to phthalates via ingestion, inhalation and skin contact throughout their lifetime. Higher exposures may occur from use of medical devices that contain methyl phthalate, and from occupational exposures. Ingestion of large amounts may result in CNS depression.

In liquid form, phthalates are irritating to the eyes, mucous membranes and skin, urticaria has been reported. They have low toxicity by ingestion once incorporated in other products.

Casualty decontamination at the scene

Following disrobe, improvised dry decontamination should be considered for an incident involving phthalates, 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.

Hazard identification

Table 1. Standard (UK) dangerous goods emergency action codes

UN		No EACs available for this chemical
EAC		
APP		
Hazards	Class	
	Sub-risks	
HIN		

Abbreviations

UN = United Nations number.

EAC = emergency action code.


APP = additional personal protection.

HIN = hazard identification number.

References

National Chemical Emergency Centre (NCEC), part of Ricardo-AEA. '[Dangerous Goods Emergency Action Code List](#)'. 2023 (viewed on 17 October 2024)

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

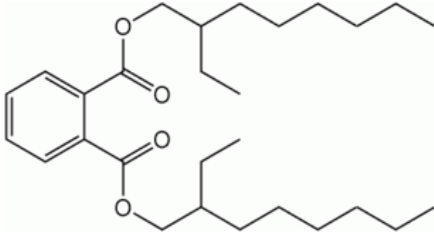
Hazard class and category	Repr. 1B	Toxic to reproduction, category 1B	
Hazard statement	H360FD	May damage fertility. May damage the unborn child	
Signal words	DANGER		

References

The Health and Safety Executive (HSE). '[GB CLP Regulation](#)' (viewed on 17 January 2025)

Physicochemical properties

Table 3a. Physicochemical properties of DINP

CAS number	28553-12-0
Molecular weight	419
Formula	C ₂₆ H ₄₂ O ₄
Common synonyms	Diisononylphthalate; 1,2-Benzenedicarboxylic acid diisononyl ester; Phthalic acid diisononyl ester
State at room temperature	Oily liquid
Volatility	Vapour pressure negligible at 20°C
Specific gravity	0.98 (water = 1)
Flammability	Combustible
Lower explosive limit	0.4
Upper explosive limit	2.9
Water solubility	Very poor solubility in water
Reactivity	-
Reaction or degradation products	When heated to decomposition emits acrid smoke and irritating vapours.
Odour	Odourless
Structure	

References

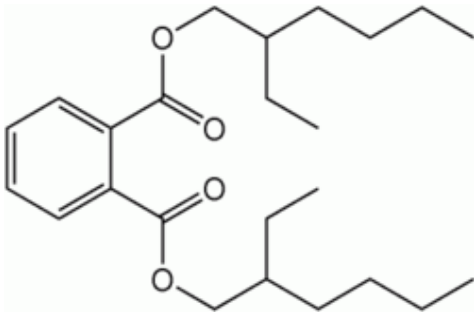
World Health Organization. International Programme on Chemical Safety.

'[International Chemical Safety Card entry for diisonyl phthalate](#)'. ICSC 0831, 2003

(viewed on 17 January 2025)

PubChem. Bethesda (MD): National Library of Medicine (US), National Center for Biotechnology Information. '[PubChem Compound Summary for CID 590836, Diisononyl phthalate](#)' (viewed on 17 January 2025)

Table 3b. Physicochemical properties of DEHP

CAS number	117-81-7
Molecular weight	391
Formula	C ₂₄ H ₃₈ O ₄
Common synonyms	Di(2-ethylhexyl)phthalate; bis(2-ethylhexyl)phthalate; Dioctyl phthalate; DOP
State at room temperature	Liquid
Volatility	Vapour pressure negligible at 20°C
Specific gravity	0.986 (water=1)
Flammability	Combustible
Lower explosive limit	-
Upper explosive limit	-
Water solubility	Practically insoluble in water at 25°C
Reactivity	Reacts with strong oxidants, acids, alkalis and nitrates
Reaction or degradation products	Decomposes on heating to produce irritating fumes
Odour	Slight odour
Structure	

References

World Health Organization. International Programme on Chemical Safety. [‘International Chemical Safety Card entry for di\(2-ethylhexyl\)phthalate’](#). ICSC 0271, 2001.(viewed on 17 January 2025)

PubChem. Bethesda (MD): National Library of Medicine (US), National Center for Biotechnology Information. [‘PubChem Compound Summary for CID 8343, Bis\(2-ethylhexyl\)phthalate’](#) (viewed on 17 January 2025)

Reported effect levels from authoritative sources

Table 4. Exposure by ingestion of DEHP

g	Signs and symptoms	Reference
10	Stomach irritation and diarrhoea	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. National Poisons Information Service (NPIS). TOXBASE. '[Phthalates](#)', 2024 (viewed on 17 January 2025)

Published emergency response guidelines

Table 5. Acute exposure guideline levels (AEGLs)

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

Notes to Table 5

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 6a. Occupational standards for DINP

	LTEL (8-hour reference period)		STEL (15-min reference period)	
	ppm	mg/m ³	ppm	mg/m ³
WEL	-	5	-	-

Abbreviations

WEL = workplace exposure limit.

LTEL = long-term exposure limit.

STEL = short-term exposure limit.

Reference

Health and Safety Executive (HSE). '[EH40/2005 Workplace Exposure Limits](#) . Fourth Edition' 2020.(viewed on 17 January 2025)

Table 6b. Occupational standards for DEHP

	LTEL (8-hour reference period)		STEL (15-min reference period)	
	ppm	mg/m ³	ppm	mg/m ³
WEL	-	5	-	10

Abbreviations

WEL = workplace exposure limit.

LTEL = long-term exposure limit.

STEL = short-term exposure limit.

Reference

Health and Safety Executive (HSE). '[EH40/2005 Workplace Exposure Limits](#) . Fourth Edition' 2020. (viewed on 117 January 2025)

Table 7. Public health standards and guidelines

WHO guideline for drinking water quality	DINP	No value specified
	DEHP	8 µg/L
Drinking water standard	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	

Reference

World Health Organisation. [Guidelines for Drinking-water Quality, 4th Edition Incorporating First and Second Addendum](#) 2022 (viewed on 17 January 2025)

Health effects

Phthalates are generally of low acute toxicity.

Table 8. Signs or symptoms of acute exposure

Route	Signs and symptoms
Inhalation	Unlikely to have any effects following acute exposure. The effects of long term exposure are unclear
Ingestion	Phthalates have low toxicity by ingestion once incorporated in other products. Ingestion of large amounts may result in CNS depression.
Eyes	Irritating to the eyes
Dermal	Irritating to skin and mucous membranes

Reference

National Poisons Information Service (NPIS). '[Phthalates](#)' 2024 (viewed on 17 January 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 phthalates, 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 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 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 phthalates 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.

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 2015 (viewed on 17 January 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 17 January 2025)

Joint Emergency Service Interoperability Programme. [‘Initial Operational Response IOR to Incidents Suspected to Involve Hazardous Substances or CBRN Materials’](#) 2024 (viewed on 17 January 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

Carry out decontamination after resuscitation.

This should be performed in a well-ventilated area, preferably with its own ventilation system.

Avoid contaminating yourself with this product and wash any exposed area.

Contaminated clothing should be removed, double-bagged, sealed and stored safely.

Decontaminate open wounds first and avoid contamination of unexposed skin.

Any particulate matter adherent to skin should be removed and the patient washed with soap and copious amounts of water under low pressure for at least 10 to 15 minutes.

Pay particular attention to mucous membranes, moist areas such as skin folds, fingernails and ears.

Dermal exposure

Decontaminate (as above) the patient following surface contamination.

Carry out 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 7.0 to 7.2. The conjunctivae may be tested with indicator paper. Retest at 15 to 30 minutes intervals 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.

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

Ingestion

Remove from exposure if appropriate.

The benefit of gastric decontamination using activated charcoal is uncertain – see [TOXBASE](#) for further advice.

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

Inhalation

Maintain a clear airway and ensure adequate ventilation.

Remove from exposure if appropriate.

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

Clinical decontamination and first aid references

National Poisons Information Service (NPIS). TOXBASE '[Phthalates](#)' 2024 (viewed on 17 January 2025)

National Poisons Information Service (NPIS). TOXBASE '[Chemicals splashed or sprayed into the eyes – Features and clinical management](#)' 2020 (viewed on 17 January 2025)

National Poisons Information Service (NPIS). TOXBASE '[Skin decontamination – irritants](#)' 2019 (viewed on 17 January 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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