SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1 Product identifier

Product Name	Naphtha (petroleum), isomerization
Product Description	V4027-ISOMERATE-Naphtha (petroleum), isomerization
Trade Name	ISOMERATE
Product code	ISOMERAT, V4027
CAS No.	64741-70-4
EC No.	265-073-5
REACH Registration No.	-

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified Use(s)

No.	Exposure Scenario	Page:
1	Distribution of Naphtha (petroleum), isomerization (0 – 1 % benzene content)	**12**
2	Formulation and (re)packing of Naphtha (petroleum), isomerization (0 – 1 % benzene content)	**15**
3	Use of Naphtha (petroleum), isomerization (0 – 1 % benzene content) as a fuel - Industrial	**18**
4	Use of Naphtha (petroleum), isomerization (0 – 1 % benzene content) as a fuel - Professional	**21**
5	Use of Naphtha (petroleum), isomerization (0 – 1 % benzene content) as a fuel - Consumer	**24**

Uses Advised Against: Anything other than the above.

1.3 Details of the supplier of the safety data sheet

Company Identification:

Vitol SA
Place des Bergues 3
P.O. Box 2056
1211 Geneva 1
Switzerland

Telephone	+31 10 498 7200
Fax	+31 10 452 9545
E-Mail (competent person)	xreach@vitol.com

1.4 Emergency telephone number

Emergency Phone No.	+44 (0) 1235 239 670, 24/7
Languages spoken	All official European languages.

SECTION 2: HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

2.1.1 Regulation (EC) No. 1272/2008 (CLP)

Flam. Liq. 1; H224
Asp. Tox. 1; H304
Skin Irrit. 2; H315
Muta. 1B; H340
Carc. 1B; H350
Repr. 2; H361fd
STOT SE 3; H336 (Central nervous system, Inhalation)
Aquatic Chronic 2; H411

2.2 Label elements

According to Regulation (EC) No. 1272/2008 (CLP)
Product Description: V4027-ISOMERATE-Naphtha (petroleum), isomerization

Hazard Pictogram(s)	
Signal Word(s)	Danger
Hazard Statement(s)	H224: Extremely flammable liquid and vapour. H304: May be fatal if swallowed and enters airways. H315: Causes skin irritation. H340: May cause genetic defects. H350: May cause cancer. H361fd: Suspected of damaging fertility. Suspected of damaging the unborn child. H336: May cause drowsiness or dizziness. (Central nervous system, Inhalation) H411: Toxic to aquatic life with long lasting effects.
Precautionary Statement(s)	P201: Obtain special instructions before use. P210: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. P273: Avoid release to the environment. P280: Wear protective gloves/protective clothing/eye protection/face protection. P301+P310: IF SWALLOWED: Immediately call a POISON CENTER/doctor. P331: Do NOT induce vomiting. P403+P233: Store in a well-ventilated place. Keep container tightly closed.

2.3 Other hazards

May form explosive mixture with air. The vapour is heavier than air; beware of pits and confined spaces. May cause irritation to eyes and air passages.
Product may release Hydrogen Sulphide: A specific assessment of inhalation risks from the presence of hydrogen sulphide in tank headspaces, confined spaces, product residue, tank waste and waste water, and unintentional releases should be made to help determine controls appropriate to local circumstances.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

SUBSTANCE	CAS No.	EC No.	%W/W
Naphtha (petroleum), isomerization	64741-55-5	265-056-2	100

SECTION 4: FIRST AID MEASURES

4.1 Description of first aid measures

Self-protection of the first aider	Eliminate sources of ignition. If it is suspected that fumes are still present, the responder should wear an appropriate mask or self-contained breathing apparatus. Drench contaminated clothing with water before removing to avoid risk of sparks from static electricity. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Avoid all contact. Do not ingest. If swallowed then seek immediate medical assistance.
H2S Warning:	Hydrogen sulphide (H2S) can accumulate in the headspace of storage tanks and reach potentially hazardous concentrations. If there is any suspicion of inhalation: A self contained breathing apparatus should be worn. Remove to fresh air immediately.
Inhalation	IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing. Maintain an open airway. Loosen tight

		clothing such as a collar, tie, belt or waistband. Get medical advice/attention if you feel unwell.
	Skin Contact	IF ON SKIN (or hair): Remove contaminated clothing immediately and wash affected skin with plenty of water or soap and water. If irritation (redness, rash, blistering) develops, get medical attention.
	Eye Contact	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists, get medical advice/attention.
	Ingestion	IF SWALLOWED: Do not induce vomiting because of risk of aspiration into the lungs. If vomiting occurs spontaneously, keep head below hips to prevent aspiration into the lungs. If unconscious, place in recovery position and get medical attention immediately. Do not give anything by mouth to an unconscious person. Get medical attention immediately. Do not wait for symptoms to appear.
4.2	**Most important symptoms and effects, both acute and delayed**	Inhalation: May cause drowsiness or dizziness. Headache, nausea and vomiting. Skin Contact: Causes skin irritation. Eye Contact: Causes serious eye irritation. Ingestion: Aspiration into the lungs may cause chemical pneumonitis, which can be fatal. Ingestion may cause irritation of the gastrointestinal tract. Nausea, Vomiting and Diarrhoea.
4.3	**Indication of any immediate medical attention and special treatment needed**	Treat symptomatically.
	Notes to a physician:	IF INHALED: If unconscious, place in recovery position and get medical attention immediately. Administer oxygen if available and artificial respiration if necessary. IF SWALLOWED: Do not induce vomiting because of risk of aspiration into the lungs. If aspiration is suspected obtain immediate medical attention. If vomiting occurs spontaneously, keep head below hips to prevent aspiration into the lungs.

SECTION 5: FIREFIGHTING MEASURES

5.1	**Extinguishing media**	
	Suitable Extinguishing media	Extinguish with sand or dry chemical. Foam, Carbon dioxide, Water fog or dry powder
	Unsuitable extinguishing media	Do not use water jet. Direct water jet may spread the fire.
5.2	**Special hazards arising from the substance or mixture**	Extremely flammable liquid and vapour. Will float and can be reignited on surface water. Decomposes in a fire giving off toxic fumes: A mixture of solid and liquid particulates and gases including unidentified organic and inorganic compounds. May form explosive mixture with air. Prevent liquid entering sewers, basements and any watercourses. Vapours are heavier than air and may travel considerable distances to a source of ignition and flashback. If sulphur compounds are present in appreciable amounts, combustion products may include also H2S and SOx (sulfur oxides) or sulfuric acid
5.3	**Advice for fire-fighters**	Fight fire with normal precautions from a reasonable distance. Fire fighters should wear complete protective clothing including self-contained breathing apparatus. Keep containers cool by spraying with water if exposed to fire. Avoid release to the environment. Dike fire control water for later disposal.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1	**Personal precautions, protective equipment and emergency procedures**	Caution - spillages may be slippery. Ensure operatives are trained to minimise exposures. Ensure suitable personal protection during removal of spillages. Eliminate sources of ignition. Shut off leaks if without risk. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Avoid all contact with substance. Ensure adequate ventilation. Do not breathe vapour. Do not ingest. If swallowed then seek immediate medical assistance. All official European languages. Do not use sparking tools. Use non-sparking ventilation systems, approved explosion-proof equipment, and intrinsically safe electrical systems.
	H2S Warning:	Product may release Hydrogen Sulphide. Exposure controls - These controls may include: Segregation of areas, Access only to authorised persons, Permit to

		work systems, Confined space working procedures, Area H2S alarms, Personal H2S alarms, Personal escape sets, H2S awareness training. Please see section 8 for appropriate personal protection equipment
	Small spillages:	Wear flame-resistant antistatic protective clothing.
	Large spillages:	Evacuate the area and keep personnel upwind. Drench contaminated clothing with water before removing to avoid risk of sparks from static electricity. Avoid all contact. Wear chemical protection suit and breathing apparatus. See Also Section: 8.
6.2	**Environmental precautions**	Avoid release to the environment. Do not allow to enter drains, sewers or watercourses. Spillages or uncontrolled discharges into watercourses must be alerted to the Environment Agency or other appropriate regulatory body. If necessary: Dike area to contain the spill and prevent releases to sewers, drains, or other waterways.
6.3	**Methods and material for containment and cleaning up**	Provided it is safe to do so, isolate the source of the leak. Use non-sparking equipment when picking up flammable spill. The vapour is heavier than air; beware of pits and confined spaces. Ensure that the equipment is adequately grounded. Allow small spillages to evaporate provided there is adequate ventilation. Wear flame-resistant antistatic protective clothing. Wear chemical protection suit and breathing apparatus.
	Spillages onto land:	In case of soil contamination, remove contaminated soil and treat in accordance with local regulations. Adsorb spillages onto sand, earth or any suitable adsorbent material. Transfer to a lidded container for disposal or recovery. Dispose of this material and its container as hazardous waste. **Small spillages:** Allow small spillages to evaporate provided there is adequate ventilation. Wear flame-resistant antistatic protective clothing. **Large spillages:** Cover spillage with foam to reduce evaporation. Do not use water jet.
	Spillages on water or at sea:	Collect as much as possible in clean container for reuse or disposal. **Small spillages:** Contain product with floating barriers or other equipment. Collect spilled product by absorbing with specific floating absorbents. **Large spillages:** Open waters should be contained with floating barriers or other mechanical means and recovered, only if this is strictly necessary and if fire/explosion risks can be adequately prevented. Otherwise control the spreading of the spillage, and let the substance evaporate naturally.
6.4	**Reference to other sections**	See Section: 8,13

SECTION 7: HANDLING AND STORAGE

7.1	**Precautions for safe handling**	Obtain special instructions before use. Keep away from sources of ignition - No smoking. Use only outdoors or in a well-ventilated area. Prevent vapour build up by providing adequate ventilation during and after use. May form explosive mixtures with air. Take action to prevent static discharges. Use non-sparking tools. All parts of the plant and equipment should be electrically bonded together and connected to earth. Electrical continuity should be checked at regular intervals. Antistatic clothing and footwear should be used. The vapour is heavier than air; beware of pits and confined spaces. Avoid all contact with substance. Do not ingest. If swallowed then seek immediate medical assistance. Do not breathe vapour. See Section: 8. Keep good industrial hygiene. Wash hands thoroughly after handling. Contaminated clothing should be thoroughly cleaned.
	H2S Warning:	Product may release Hydrogen Sulphide: A specific assessment of inhalation risks from the presence of hydrogen sulphide in tank headspaces, confined spaces, product residue, tank waste and waste water, and unintentional releases should be made to help determine controls appropriate to local circumstances. These controls may include: Segregation of areas, Access only to authorised persons, Permit to work systems, Confined space working procedures, Area H2S alarms, Personal H2S alarms, Personal escape sets, H2S awareness training.
7.2	**Conditions for safe storage, including any incompatibilities**	Light hydrocarbon vapours can build up in the headspace of containers. These can cause flammability / explosion hazards. Bund storage facilities to prevent soil and water pollution in the event of spillage. Keep only in original packaging. Keep containers properly sealed when not in use. Protect from sunlight. Containers of this material may be hazardous when empty since they retain

		product residue. Empty container may contain product residue which may result in flammable or explosive vapours inside the container.
	Storage temperature	Stable at ambient temperatures.
	Storage measures	Suitable containers: Stainless steel, Mild steel Do not store in: Synthetic materials
	Incompatible materials	Keep away from oxidising agents.
7.3	**Specific end use(s)**	See Section: 1.2 and/or Exposure Scenario.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

8.1.1 Occupational Exposure Limits

No Occupational Exposure Limit assigned. Users are advised to consider national Occupational Exposure Limits or other equivalent values.

8.1.2 Biological limit value

Not established.

8.1.3 PNECs and DNELs

PNEC: Not established. Naphtha (petroleum), isomerization is a hydrocarbon UVCB. The hydrocarbon block method is used in PETRORISK to calculate the environmental toxicity (HC5) of each group of components in the substance. These are used to estimate the environmental risk for the substance. Therefore individual environmental compartments PNECs are not available for this product.

Naphtha (petroleum), isomerization Derived No Effect Level	Oral	Inhalation	Dermal
Worker - Long Term - Systemic effects	-	1300 mg/m³	-
Worker - Long Term - Local effects	-	840 mg/m³	-
Worker - Acute - Local effects	-	1100 mg/m³	-
Consumer - Long Term - Systemic effects	-	1200 mg/m³	-
Consumer - Long Term - Local effects	-	180 mg/m³	-
Consumer - Acute - Local effects	-	640 mg/m³	-

8.2 Exposure controls

8.2.1 Appropriate engineering controls

Provide adequate ventilation, including appropriate local extraction if dusts, fumes or vapours are likely to be evolved. Store in a cool/low-temperature, well-ventilated (dry) place away from heat and ignition sources. Guarantee that the eye flushing systems and safety showers are located close to the working place.

8.2.2 Individual protection measures, such as personal protective equipment (PPE)

Protective clothing should be selected specifically for the working place, depending on concentration and quantity of the hazardous substances handled. The resistance of the protective clothing to chemicals should be ascertained with the respective supplier.
Fuels are typically used, transferred and transported in closed systems. If exposure is likely (i.e. during sampling) the following advice may be appropriate. Keep good industrial hygiene. Always wash hands before smoking, eating and drinking. Do not eat, drink or smoke at the work place.
Refer to annexes for exposure scenarios detailing use specific exposure controls

Eye/ face protection

Use eye protection according to EN 166, designed to protect against liquid splashes.

Skin protection

Hand protection: Wear impervious gloves (EN374). Gloves should be changed regularly to avoid permeation problems. Breakthrough time of the glove material: refer to the information provided by the gloves' producer.
Recommended: Nitrile rubber.

Body protection: Wear anti-static clothing and shoes.
small scale: Wear suitable coveralls to prevent exposure to the skin.
large scale: Chemical protection suit.

Respiratory protection 	When the product is heated /In case of inadequate ventilation wear respiratory protection. The use of a high efficiency filter (EN143) is recommended. Filter type A1 Closed system(s): Not normally required.
Thermal hazards	Not applicable.

8.2.3 Environmental Exposure Controls — Avoid release to the environment.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Appearance	Colourless liquid
Odour	Hydrocarbon
Odour threshold	Not established.
pH	Not established.
Melting point/freezing point	< - 60 °C
Initial boiling point and boiling range	< 35 °C
Flash point	< 0 °C
Evaporation rate	Not established.
Flammability (solid, gas)	Not applicable - Liquid
Upper/lower flammability or explosive limits	Flammable Limits (Lower) (%v/v) 1 Flammable Limits (Upper) (%v/v) 10
Vapour pressure	4 - 240 kPa @ 37.8°C
Vapour density	> 2
Relative density	0.62 – 0.88 g/cm³ @ 15 °C
Solubility(ies)	Immiscible with water.
Partition coefficient: n-octanol/water	Not applicable. Substance is complex UVCB.
Auto-ignition temperature	> 220 °C
Decomposition Temperature	Not established.
Viscosity	1 mm²/s @ 20 °C
Explosive properties	Not explosive. (Vapour may create explosive atmosphere.)
Oxidising properties	Not oxidising.

9.2 Other information — None known.

SECTION 10: STABILITY AND REACTIVITY

10.1 Reactivity — Stable under normal conditions. Reacts with - Strong oxidising agents

10.2 Chemical stability — Stable under normal conditions. Hazardous polymerisation will not occur. Product may release Hydrogen Sulphide.

10.3 Possibility of hazardous reactions — Extremely flammable liquid and vapour. May form explosive mixture with air. Vapours are heavier than air and may travel considerable distances to a source of ignition and flashback. Product may release Hydrogen Sulphide.

10.4 Conditions to avoid — Elevated temperature. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Keep away from direct sunlight.

10.5 Incompatible materials — Keep away from oxidising agents. Strong Acids and Alkalis.

10.6 Hazardous decomposition product(s) — A mixture of solid and liquid particulates and gases including unidentified organic and inorganic compounds. Decomposes in a fire giving off toxic fumes: COx, H2S, SOx,

SECTION 11: TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects — All test data taken from existing ECHA registrations for the substances mentioned.

Acute toxicity - Ingestion — Based upon the available data, the classification criteria are not met.
LD50 > 5000 mg/kg bw/day (rat) (OECD 401)

Acute toxicity - Inhalation — Based upon the available data, the classification criteria are not met.

		LC50 Vapour > 5600 mg/m³ Air (rat) (OECD 403)
	Acute toxicity - Skin Contact	Based upon the available data, the classification criteria are not met. LD50 > 2000 mg/kg bw/day (rabbit) (OECD 402)
	Skin corrosion/irritation	Skin Irrit. 2; Causes skin irritation. Irritating to skin. (rabbit) (OECD 404)
	Serious eye damage/irritation	Based upon the available data, the classification criteria are not met. Not irritating to eyes (rabbit) (OECD 405)
	Respiratory or skin sensitization	Based upon the available data, the classification criteria are not met. Sensitisation (guinea pig) - Negative (OECD 406)
	Germ cell mutagenicity	Muta. 1B; May cause genetic defects. Harmonised Classification. ECHA Registration Endpoint summary: According to EU CLP Classification (EC no. 1272/2008), there is a regulatory requirement to classify gasoline and naphtha streams as hazardous for this endpoint when they contain >0.1% benzene
	Carcinogenicity	Carc. 1B; May cause cancer. Harmonised Classification. ECHA Registration Endpoint summary: According to EU CLP Classification (EC no. 1272/2008), there is a regulatory requirement to classify gasoline and naphtha streams as hazardous for this endpoint when they contain >0.1% benzene
	Reproductive toxicity	Repr. 2; Suspected of damaging fertility or the unborn child. ECHA Registration Endpoint summary: According to EU CLP Classification (EC no. 1272/2008), there is a regulatory requirement to classify gasoline and naphtha streams as hazardous for this endpoint when they contain >0.1% Toluene and/or n-hexane
	STOT - single exposure	STOT SE 3; May cause drowsiness or dizziness. Weight of evidence approach
	STOT - repeated exposure	Based upon the available data, the classification criteria are not met.
	Oral:	No adverse effect observed (rat) (Halder CA, et al. (1985))
	Inhalation:	No adverse effect observed (rat) (OECD 453) Chronic - Systemic effects NOAEC 1402 mg/m³
	Dermal:	No adverse effect observed. (mouse) (OECD TG 410) Chronic - Systemic effects NOAEL 375 mg/kg bw/day
	Aspiration hazard	Asp. Tox. 1; May be fatal if swallowed and enters airways. Harmonised Classification. Viscosity: 1 mm²/s @ 20 °C
11.2	**Other information**	None.

SECTION 12: ECOLOGICAL INFORMATION

12.1	**Toxicity**	Aquatic Chronic 2; Toxic to aquatic life with long lasting effects.
	Short Term (acute):	LL50 (Fish) (96hr) 10 mg/l (OCED 203)
	Long Term (Chronic):	According to the EU CLP Regulation (EC No. 1272/2008) criteria, substances in the low boiling point naphtha category are classified as Chronic Category 2 (H411) for the environment based on acute invertebrate and alga toxicity.
12.2	**Persistence and degradability**	Readily biodegradable. (OECD 301F)
12.3	**Bioaccumulative potential**	Substance is complex UVCB. The BCF (fish) of this substance components is well below the criteria for bioaccumulation. Therefore, this substance is not considered as bioaccumulative substance. (ECHA registration dossier: PBT assessment 2)
12.4	**Mobility in soil**	The product is predicted to have low mobility in soil. Immiscible with water.
12.5	**Results of PBT and vPvB assessment**	Substance is complex UVCB. This substance does not contain PBT constituents included in the SVHC candidate list at concentrations above 0.1%.
12.6	**Other adverse effects**	None known.

SECTION 13: DISPOSAL CONSIDERATIONS

13.1	**Waste treatment methods**	Dispose of this material and its container as hazardous waste. Do not empty into drains, dispose of this material and its container at hazardous or special waste collection point. Disposal should be in accordance with local, state or national legislation. Containers of this material may be hazardous when empty since they retain product residue. Containers must not be punctured or destroyed by burning, even when empty. Allocation of a waste code number, according to the

European Waste Catalogue, should be carried out in agreement with the regional waste disposal company. Waste code: 13 07 01

SECTION 14: TRANSPORT INFORMATION

		ADR/RID	IMDG/ADN
14.1	UN number	UN 1268	UN 1268
14.2	Proper Shipping Name	PETROLEUM DISTILLATES N.O.S.	PETROLEUM DISTILLATES N.O.S.
14.3	Transport hazard class(es)	3	3+(N2, CMR,F)
14.4	Packing group	I	I
14.5	Environmental hazards	MILEUGEVAARLIJK / ENVIRONMENTALLY HAZARDOUS / UMWELTGEFÄHRDEND / DANGEREUX POUR L'ENVIRONNEMENT	
14.6	Special precautions for user	Vapour may create explosive atmosphere. The vapour is heavier than air; beware of pits and confined spaces.	
14.7	Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code	This product is being carried under the scope of MARPOL Annex 1. Special Precautions: Refer to Chapter 7 'Handling and Storage' for special precautions which a user needs to be aware of, or needs to comply with, in connection with transport.	
14.8	Additional Information	ADR HIN: 33 Tunnel Restriction Code: 3 (D/E) Limited Quantity: 500 ml	EmS: F-E, S-E Limited Quantity: 500ml

SECTION 15: REGULATORY INFORMATION

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

15.1.1 EU regulations

Seveso — Upper Tier: 25000 tonnes; Lower Tier: 2500 tonnes

Annex XVII (Restrictions) — In accordance with REACH Annex XVII entry 30 (c) this substance is exempt from Entry 28 and 29 of REACH Annex XVII as it is to be sold as a fuel in a closed system.

15.1.2 National regulations

Germany — Wassergefährdungsklasse (Germany). WGK number: 3

15.2 Chemical Safety Assessment — A REACH chemical safety assessment (CSA) has been carried out. Refer to annexes for exposure scenarios detailing use specific exposure controls.

SECTION 16: OTHER INFORMATION

Sections indicated with the following have been revised
Header and Section 1.3

Updated version and date. New SDS Regulation 2015/830 format, all sections have been updated to include new information. Please review SDS with care.

References:
Existing ECHA registration(s) for Naphtha (petroleum), isomerization (CAS No. 64741-70-4) and Chemical Safety Report.

This Safety Data Sheet was prepared in accordance with EC Regulation (EC) 1907/2006 (REACH), 1272/2008 (CLP) & 2015/830.

Literature References:

1. Halder CA, et al., 1985, Hydrocarbon nephropathy in male rats: identification of the nephrotoxic components of unleaded gasoline., Toxicol. Ind. Health 1:67-87

LEGEND

LTEL	Long Term Exposure Limit
STEL	Short Term Exposure Limit
DNEL	Derived No Effect Level
PNEC	Predicted No Effect Concentration
PBT	PBT: Persistent, Bioaccumulative and Toxic
vPvB	very Persistent and very Bioaccumulative
OECD	Organisation for Economic Cooperation and Development

ES	Exposure Scenario
NOAEC	no observed adverse effect concentration
NOAEL	No Observed Adverse Effect Level

Training advice: Consideration should be given to the work procedures involved and the potential extent of exposure as they may determine whether a higher level of protection is required.

Disclaimers

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Annex to the extended Safety Data Sheet (eSDS)

See below -

Naphtha (petroleum), isomerization (0 -1% benzene content)

CAS Number 64741-70-4
EC Number 265-073-5

Summary of Parameters

Physical Parameters			
Vapour pressure (Pa)			4 – 240 @ 37.8 °C (Value used for exposure assessment = 340)
Partition Coefficient (log K_{OW})			2.00 - 20.43
Aqueous solubility (mg L^{-1})			1.6E+03 - 5.1E-18 (Value used for exposure assessment = 2.0E+02)
Molecular weight			Not applicable
Biodegradability			Not defined
Human health Parameter (DNELs)			
Worker	Short term	Inhalation (mg/m³)	1100
		Dermal (mg/kg bw/day)	Not applicable
	Long Term	Inhalation (mg/m³)	3.2 (= 1 ppm)*
		Dermal (mg/kg bw/day)	0.234*
Consumer		Inhalation (mg/m³)	0.0032 (=1 ppb)* (0.93 mg/kg bw/day)
		Dermal (mg/kg bw/day)	0.234*
		Oral (mg/kg^{-1} bw/day^{-1})	8.8
Environmental Parameter (PNECs)			
Naphtha (petroleum), isomerization is a hydrocarbon UVCB. The hydrocarbon block method is used in PETRORISK to calculate the environmental toxicity (HC5) of each group of components in the substance. These are used to estimate the environmental risk for the substance. Therefore individual environmental compartments PNECs are not available for this product.			

* Concentration: benzene (Worst case assumption. Contains benzene. @1%).

Table of Contents

Contributing Scenarios

Workers	
PROC1	Chemical production or refinery in closed process without likelihood of exposure or processes with equivalent containment conditions.
PROC2	Chemical production or refinery in closed continuous process with occasional controlled exposure or processes with equivalent containment conditions
PROC2 (Storage)	Use in closed, continuous process with occasional controlled exposure. Bulk product storage.
PROC3	Manufacture or formulation in the chemical industry in closed batch processes with occasional controlled exposure or processes with equivalent containment condition.
PROC3 (Sampling)	Use in closed, continuous process with occasional exposure. Sample collection
PROC8a (Maintenance)	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at non-dedicated facilities Clean down and maintenance of vessels and containers.
PROC8b (Bulk)	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities Bulk transfer in a closed system
PROC8b (Drum)	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities Drum or batch transfers.
PROC8b (Refueling)	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities Refueling vehicles, light aircraft or marine craft
PROC8b (aircraft)	Transfer of substance or preparation (charging/discharging) from/to vessels/large containers at dedicated facilities Refueling aircraft
PROC15	Use as laboratory reagent.
PROC16	Using material as fuel sources, limited exposure to unburned product to be expected.
PROC16 (Additive)	Using material as fuel sources, limited exposure to unburned product to be expected. Use as a fuel additive.
Environment	
ERC1	Manufacture of substance
ERC2	Formulation of preparations
ERC3	Formulation in materials
ERC4	Industrial use of processing aids in processes and products, not becoming part of articles
ERC5	Industrial use resulting in inclusion into or onto a matrix
ERC6a	Industrial use resulting in manufacture of another substance (use of intermediates)
ERC6b	Industrial use of reactive processing aids
ERC6c	Industrial use of monomers for manufacture of thermoplastics
ERC6d	Industrial use of process regulators for polymerisation processes in production of resins, rubbers, polymers
ERC7	Industrial use of substances in closed systems
ERC9a	Wide dispersive indoor use of substances in closed systems
ERC9b	Wide dispersive outdoor use of substances in closed systems
Consumer	
PC13	Fuels (Automotive refueling) (Scooter refueling) (Garden equipment refueling) (Garden equipment use)

Exposure Scenario 1 – Distribution of Naphtha (petroleum), isomerization (0 – 1 % benzene content)

1.0 Contributing Scenarios	
Sector of uses SU	SU3 Industrial uses: Uses of substances as such or in preparations at industrial sites
Process category [PROC]	PROC1 PROC2 PROC2 (Storage) PROC3 PROC3 (Sampling) PROC8a (Maintenance) PROC8b (Bulk) PROC15
Chemical product category [PC]	Not applicable
Article Categories [AC]	Not applicable
Environmental release categories [ERC]	ERC1 ERC2 ERC3 ERC4 ERC5 ERC6a ERC6b ERC6c ERC6d ERC7
Specific Environmental Release Categories SPERC	ESVOC SpERC 1.1b v.1

2.0 Operational conditions and risk management measures		
2.1 Control of worker exposure		
Product characteristics		
Physical form of product	Liquid with high volatility.	
Concentration of substance in product	Covers concentrations up to 100% (≤ 1 % benzene content)	
Human factors not influenced by risk management		
Potential exposure area	Not defined	
Frequency and duration of use		
Exposure duration per day	Covers daily exposures up to 8 hours (unless stated differently).	
Frequency of use (days per year)	300	
Other operational conditions affecting worker exposure		
Area of use	PROC3, PROC2 (Storage)	Outdoor
	All other PROC's	Not defined (default = Indoor)
Characteristics of the surroundings	Not defined	
General measures applicable to all activities Assumes a good basic standard of occupational hygiene is implemented. Assumes activities are at ambient temperature (unless stated differently).		
General measures (skin irritants) Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent/minimise exposures and to report any skin problems that may develop.		
General measures (carcinogens) Consider technical advances and process upgrades (including automation) for the elimination of releases. minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean/flush equipment, where possible, prior to maintenance Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when its use is identified for certain contributing scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.		
Technical conditions of use		
PROC1, PROC2, PROC3	Handle substance within a closed system.	
PROC8b (Bulk)	Ensure material transfers are under containment or extract ventilation. (Efficiency of at least 90 %)	
PROC15	Use fume cupboard. (Efficiency of at least 90 %)	
Organisational measures		
PROC3 (Sampling)	Sample via a closed loop or other system to avoid exposure. (Efficiency of at least 95 %)	
PROC8a (Maintenance)	Drain down and flush system prior to equipment break-in or maintenance. Retain drain downs in sealed storage pending disposal or for subsequent recycle. Clear spills immediately. (Inhalation - efficiency of at least 90 %)	
Risk management measures related to human health		

Respiratory protection	No special measures are required.	
Hand and/or Skin protection	PROC2	Wear suitable gloves tested to EN374. (Efficiency of at least 80 %)
	PROC8a (Maintenance)	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Efficiency of at least 90 %)
Eye Protection	No special measures are required.	

Other operational conditions affecting worker exposure	
Wear suitable coveralls to prevent exposure to the skin. Clear transfer lines prior to de-coupling. Avoid dip sampling.	
2.2 Control of environmental exposure	
Amounts used	
Fraction of EU tonnage used in region:	0.1
Regional use tonnage (tons/year):	5.4E+05
Fraction of Regional tonnage used locally: tons/year	2.0E-03
Annual site tonnage (tons/year):	110,00
Average daily use (kg/day)	110,000
Environment factors not influenced by risk management	
Flow rate of receiving surface water (m^3/d):	Not defined (default = 18,000)
Local freshwater dilution factor:	10
Local marine water dilution factor:	100
Operational conditions	
Emission days (days/year):	100
Release fraction to air from process (initial release prior to RMM):	1.0E-03
Release fraction to wastewater from process (initial release prior to RMM):	1.0E-05
Release fraction to soil from process (initial release prior to RMM):	1.0E-05
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Treat air emission to provide a typical removal efficiency of (%):	90
If there is no discharge to domestic sewage treatment plant, Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of (%):	0
If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of >= (%)	0
Treat soil emission to provide a typical removal efficiency of (%):	0
Common practices vary across sites thus conservative process release estimates used. If discharging to domestic sewage treatment plant, no onsite wastewater treatment required.	
Organisational measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to municipal sewage treatment plant	
Size of municipal sewage system/treatment plant (m^3/d)	2000
Degradation effectiveness (%)	97.0
Conditions and measures related to external treatment of waste for disposal	
External treatment and disposal of waste should comply with applicable local and/or national regulations.	
Substance release quantities after risk management measures	
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d):	1.6E+06

3. Exposure estimation and reference to its source

3.1 Human exposure prediction

Exposure assessment (method/calculation model)	ECETOC TRA (benzene content)

Process category [PROC]	Inhalation		Dermal		Combined
	inhalation exposure (mg/m^3)	Risk characterisation ratio (RCR)	dermal exposure (mg/kg bw/day)	Risk characterisation ratio (RCR)	Risk characterisation ratio (RCR)
PROC1	0.00	0.00	0.03	0.15	0.15
PROC2	0.50	0.50	0.03	0.12	0.62
PROC2 (Storage)	0.35	0.35	0.14	0.57	0.94
PROC3	0.70	0.70	0.03	0.15	0.85
PROC3 (Sampling)	0.05	0.05	0.03	0.15	0.20
PROC8a (Maintenance)	0.25	0.25	0.14	0.57	0.84

PROC8b (Bulk)	0.15	0.15	0.07	0.30	0.45
PROC15	0.05	0.05	0.00	0.01	0.06

3.2 Environmental exposure prediction

Exposure assessment (method/calculation model)	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

Naphtha (petroleum), isomerization is a hydrocarbon UVCB. The hydrocarbon block method is used in PETRORISK to calculate the PEC of each group of components in the substance. These are used to estimate the environmental risk for the substance As the model assumes fractionation before entering the environment, the PEC is not of the substance as manufactured but is a some of the constituents expected to be present in the environmental compartment.

Environmental exposure	STP	freshwater	marine water	Soil	freshwater sediment	marine sediment
Predicted Environmental Exposure (PEC)	1.7E-03 mg/L	5.6E-04 mg/L	1.7E-05 mg/L	5.9E-06 mg/kg ww	1.0E-03 mg/kg ww	1.0E-04 mg/kg ww
Risk characterisation ratio (RCR)	2.4E-04	3.7E-03	1.1e-04	3.6E-06	1.3E-03	1.3E-04

Human exposure prediction:

Route of Exposure	Exposure ($\mu g/kg^{-1}$ day^{-1})	Risk characterisation ratio (RCR)
Oral	0.034	3.4E-04
Inhalation	0.13	1.4E-04

4.0 Evaluation guidance to downstream user		
For scaling see	Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. Available hazard data do not support the need for a DNEL to be established for other health effects. Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html). Exposure calculated for benzene and assumes that the substance contains 1 % benzene. Arithmetic scaling may be possible if the batch contains < 1 % benzene	
Exposure assessment instrument/tool/method	Worker	ECETOC TRA
	Environment	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

Exposure Scenario 2 – Formulation and (re)packing of Naphtha (petroleum), isomerization (0 – 1 % benzene content)

1.0 Contributing Scenarios	
Sector of uses SU	SU3 Industrial uses: Uses of substances as such or in preparations at industrial sites SU10 Formulation [mixing] of preparations and/or re-packaging (excluding alloys)
Process category [PROC]	PROC1 PROC2 PROC2 (Storage) PROC3 PROC3 (Sampling) PROC8a (Maintenance) PROC8b (Bulk) PROC8b (Drum/batch transfers) PROC15
Chemical product category [PC]	Not applicable
Article Categories [AC]	Not applicable
Environmental release categories [ERC]	ERC2
Specific Environmental Release Categories SPERC	ESVOC SpERC 2.2.v1

2.0 Operational conditions and risk management measures		
2.1 Control of worker exposure		
Product characteristics		
Physical form of product	Liquid with high volatility.	
Concentration of substance in product	Covers concentrations up to 100% (≤ 1 % benzene content)	
Human factors not influenced by risk management		
Potential exposure area	Not defined	
Frequency and duration of use		
Exposure duration per day	Covers daily exposures up to 8 hours (unless stated differently).	
Frequency of use (days per year)	300	
Other operational conditions affecting worker exposure		
Area of use	PROC3	Outdoor
	All other PROC's	Not defined (default = Indoor)
Characteristics of the surroundings	Not defined	
General measures applicable to all activities Assumes a good basic standard of occupational hygiene is implemented. Assumes activities are at ambient temperature (unless stated differently).		
General measures (skin irritants) Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent/minimise exposures and to report any skin problems that may develop.		
General measures (carcinogens) Consider technical advances and process upgrades (including automation) for the elimination of releases. minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean/flush equipment, where possible, prior to maintenance Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when its use is identified for certain contributing scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.		
Technical conditions of use		
PROC1, PROC2, PROC2 (Storage), PROC3	Handle substance within a closed system.	
PROC3 (Sampling)	Sample via a closed loop or other system to avoid exposure. (Efficiency of at least 95 %)	
PROC8b (Bulk), PROC8b (Drum/batch transfers)	Ensure material transfers are under containment or extract ventilation. (Efficiency of at least 97 %)	
PROC15	Use fume cupboard. (Efficiency of at least 90 %)	
Organisational measures		
PROC8a (Maintenance)	Drain down and flush system prior to equipment break-in or maintenance. Retain drain downs in sealed storage pending disposal or for subsequent recycle. Clear spills immediately. (Efficiency of at least 90 %)	
Risk management measures related to human health		
Respiratory protection	No special measures are required.	
Hand and/or Skin protection	PROC2, PROC2 (Storage)	Wear suitable gloves tested to EN374. (Efficiency of at least 80 %)
	PROC8a (Maintenance)	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Efficiency of

		at least 90 %)
Eye Protection	No special measures are required.	
Other operational conditions affecting worker exposure		
Wear suitable coveralls to prevent exposure to the skin. Clear transfer lines prior to de-coupling. Avoid dip sampling.		
2.2 Control of environmental exposure		
Amounts used		
Fraction of EU tonnage used in region:	0.1	
Regional use tonnage (tons/year):	1.2E+04	
Fraction of Regional tonnage used locally: (tons/year)	1	
Annual site tonnage (tons/year):	1.2E+04	
Average daily use (kg/day):	4.1E+04	
Environment factors not influenced by risk management		
Flow rate of receiving surface water (m^3/d):	Not defined (default = 18,000)	
Local freshwater dilution factor:	10	
Local marine water dilution factor:	100	
Operational conditions		
Emission days (days/year):	300	
Release fraction to air from process (initial release prior to RMM):	2.5E-02	
Release fraction to wastewater from process (initial release prior to RMM):	2.0E-03	
Release fraction to soil from process (initial release prior to RMM):	1.0E-04	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil		
Treat air emission to provide a typical removal efficiency of (%):	0	
If there is no discharge to domestic sewage treatment plant, Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of (%):	96.9	
If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of >= (%)	0	
Treat soil emission to provide a typical removal efficiency of (%):	0	
Common practices vary across sites thus conservative process release estimates used. If discharging to domestic sewage treatment plant, no onsite wastewater treatment required.		
Organisational measures to prevent/limit release from site		
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.		
Conditions and measures related to municipal sewage treatment plant		
Size of municipal sewage system/treatment plant (m^3/d)	2000	
Degradation effectiveness (%)	97.0	
Conditions and measures related to external treatment of waste for disposal		
External treatment and disposal of waste should comply with applicable local and/or national regulations.		
Substance release quantities after risk management measures		
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d):	4.2E+04	

3. Exposure estimation and reference to its source

3.1 Human exposure prediction

Exposure assessment (method/calculation model)	ECETOC TRA (benzene content)

Process category [PROC]	Inhalation		Dermal		Combined
	inhalation exposure (mg/m^3)	Risk characterisation ratio (RCR)	dermal exposure (mg/kg bw/day)	Risk characterisation ratio (RCR)	Risk characterisation ratio (RCR)
PROC1	0.00	0.00	0.03	0.15	0.15
PROC2	0.50	0.50	0.03	0.12	0.62
PROC2 (Storage)	0.50	0.50	0.03	0.12	0.62
PROC3	0.70	0.70	0.03	0.15	0.85
PROC3 (Sampling)	0.05	0.05	0.03	0.15	0.20
PROC8a (Maintenance)	0.25	0.25	0.14	0.59	0.84
PROC8b (Bulk)	0.05	0.05	0.07	0.30	0.35
PROC8b (Drum/batch transfers)	0.05	0.05	0.07	0.30	0.35
PROC15	0.05	0.05	0.00	0.01	0.06

3.2 Environmental exposure prediction

Exposure assessment (method/calculation model)	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

Naphtha (petroleum), isomerization is a hydrocarbon UVCB. The hydrocarbon block method is used in PETRORISK to calculate the PEC of each group of components in the substance. These are used to estimate the environmental risk for the substance As the model assumes fractionation before entering the environment, the PEC is not of the substance as manufactured but is a some of the constituents expected to be present in the environmental compartment.

Environmental exposure	STP	freshwater	marine water	Soil	freshwater sediment	marine sediment
Predicted Environmental Exposure (PEC)	1.2 mg/L	0.12 mg/L	0.012 mg/L	6.7E-04 mg/kg ww	0.78 mg/kg ww	0.077 mg/kg ww
Risk characterisation ratio (RCR)	0.18	0.82	0.082	2.1E-03	0.97	0.097

Human exposure prediction:

Route of Exposure	Exposure ($\mu g/kg^{-1}\ day^{-1}$)	Risk characterisation ratio (RCR)
Oral	7.1	0.071
Inhalation	7.0	0.075

4.0 Evaluation guidance to downstream user

For scaling see	Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. Available hazard data do not support the need for a DNEL to be established for other health effects. Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html). Exposure calculated for benzene and assumes that the substance contains 1 % benzene. Arithmetic scaling may be possible if the batch contains < 1 % benzene	
Exposure assessment instrument/tool/method	Worker	ECETOC TRA
	Environment	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

Exposure Scenario 3 – Use of Naphtha (petroleum), isomerization (0 – 1 % benzene content) as a fuel - Industrial

1.0 Contributing Scenarios	
Sector of uses SU	SU3 Industrial uses: Uses of substances as such or in preparations at industrial sites
Process category [PROC]	PROC1 PROC2 PROC2 (Storage) PROC3 PROC8a (Maintenance) PROC8b (Bulk) PROC8b (Drum/batch transfers) PROC8b (refuelling) PROC8b (refuelling aircraft) PROC16 PROC16 (Additive)
Chemical product category [PC]	Not applicable
Article Categories [AC]	Not applicable
Environmental release categories [ERC]	ERC7
Specific Environmental Release Categories SPERC	ESVOC SpERC 7.12a.v1

2.0 Operational conditions and risk management measures		
2.1 Control of worker exposure		
Product characteristics		
Physical form of product	Liquid with high volatility.	
Concentration of substance in product	Covers concentrations up to 100% (≤ 1 % benzene content)	
Human factors not influenced by risk management		
Potential exposure area	Not defined	
Frequency and duration of use		
Exposure duration per day	Covers daily exposures up to 8 hours (unless stated differently).	
Frequency of use (days per year)	300	
Other operational conditions affecting worker exposure		
Area of use	PROC3	Outdoor
	All other PROC's	Not defined (default = Indoor)
Characteristics of the surroundings	Not defined	
General measures applicable to all activities Assumes a good basic standard of occupational hygiene is implemented. Assumes activities are at ambient temperature (unless stated differently).		
General measures (skin irritants) Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent/minimise exposures and to report any skin problems that may develop.		
General measures (carcinogens) Consider technical advances and process upgrades (including automation) for the elimination of releases. minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean/flush equipment, where possible, prior to maintenance Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when its use is identified for certain contributing scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.		
Technical conditions of use		
PROC1, PROC2, PROC2 (Storage), PROC3, PROC16, PROC16 (Additive)	Handle substance within a closed system.	
PROC8b (Bulk), PROC8b (Drum/batch transfers), PROC8b (refuelling), PROC8b (refuelling aircraft)	Ensure material transfers are under containment or extract ventilation. (Efficiency of at least 90 %)	
Organisational measures		
PROC8a (Maintenance)	Drain down and flush system prior to equipment break-in or maintenance. Retain drain downs in sealed storage pending disposal or for subsequent recycle. Clear spills immediately. (Efficiency of at least 86 %)	
Risk management measures related to human health		
Respiratory protection	No special measures are required.	
Hand and/or Skin protection	PROC2	Wear suitable gloves tested to EN374. (Efficiency of at least 80 %)
	PROC8a (Maintenance)	Wear chemically resistant gloves (tested to EN374) in

		combination with 'basic' employee training. (Efficiency of at least 90 %)
Eye Protection	No special measures are required.	
Other operational conditions affecting worker exposure		
Wear suitable coveralls to prevent exposure to the skin. Clear transfer lines prior to de-coupling. Avoid dip sampling.		
2.2 Control of environmental exposure		
Amounts used		
Fraction of EU tonnage used in region:	0.1	
Regional use tonnage (tons/year):	1.6E+03	
Fraction of Regional tonnage used locally: (tons/year)	1	
Annual site tonnage (tons/year):	1.6E+03	
Average daily use (kg/day):	1.6E+04	
Environment factors not influenced by risk management		
Flow rate of receiving surface water (m^3/d):	Not defined (default = 18,000)	
Local freshwater dilution factor:	10	
Local marine water dilution factor:	100	
Operational conditions		
Emission days (days/year):	100	
Release fraction to air from process (initial release prior to RMM):	5.00E-02	
Release fraction to wastewater from process (initial release prior to RMM):	1.0E-05	
Release fraction to soil from process (initial release prior to RMM):	0	
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil		
Treat air emission to provide a typical removal efficiency of (%):	95.0	
If there is no discharge to domestic sewage treatment plant, Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of (%):	0	
If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of >= (%)	0	
Treat soil emission to provide a typical removal efficiency of (%):	0	
Common practices vary across sites thus conservative process release estimates used. If discharging to domestic sewage treatment plant, no onsite wastewater treatment required.		
Organisational measures to prevent/limit release from site		
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.		
Conditions and measures related to municipal sewage treatment plant		
Size of municipal sewage system/treatment plant (m^3/d)	2000	
Degradation effectiveness (%)	97.0	
Conditions and measures related to external treatment of waste for disposal		
External treatment and disposal of waste should comply with applicable local and/or national regulations.		
Substance release quantities after risk management measures		
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d):	2.2E+06	

3. Exposure estimation and reference to its source

3.1 Human exposure prediction

Exposure assessment (method/calculation model)	ECETOC TRA (benzene content)

Process category [PROC]	Inhalation		Dermal		Combined
	inhalation exposure (mg/m^3)	Risk characterisation ratio (RCR)	dermal exposure (mg/kg bw/day)	Risk characterisation ratio (RCR)	Risk characterisation ratio (RCR)
PROC1	0.00	0.00	0.03	0.15	0.15
PROC2	0.50	0.50	0.03	0.12	0.62
PROC2 (Storage)	0.35	0.35	0.14	0.59	0.94
PROC3	0.70	0.70	0.03	0.15	0.85
PROC8a (Maintenance)	0.35	0.35	0.14	0.59	0.94
PROC8b (Bulk)	0.09	0.09	0.07	0.30	0.39
PROC8b (Drum/batch transfers)	0.15	0.15	0.07	0.30	0.45
PROC8b (refuelling)	0.15	0.15	0.07	0.30	0.45

PROC8b (refuelling aircraft)	0.15	0.15	0.07	0.30	0.45
PROC16	0.25	0.25	0.03	0.15	0.40
PROC16 (Additive)	0.25	0.25	0.03	0.15	0.40

3.2 Environmental exposure prediction

Exposure assessment (method/calculation model)	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

Naphtha (petroleum), isomerization is a hydrocarbon UVCB. The hydrocarbon block method is used in PETRORISK to calculate the PEC of each group of components in the substance. These are used to estimate the environmental risk for the substance As the model assumes fractionation before entering the environment, the PEC is not of the substance as manufactured but is a some of the constituents expected to be present in the environmental compartment.

Environmental exposure	STP	freshwater	marine water	Soil	freshwater sediment	marine sediment
Predicted Environmental Exposure (PEC)	2.5E-03 mg/L	6.40E-04 mg/L	2.5E-05 mg/L	8.4E-06 mg/kg ww	1.5E-03 mg/kg ww	1.5E-04 mg/kg ww
Risk characterisation ratio (RCR)	3.5E-04	4.3E-03	1.6E-04	2.6E-05	1.9E-03	1.9e-04

Human exposure prediction:

Route of Exposure	Exposure ($\mu g/kg^{-1}\ day^{-1}$)	Risk characterisation ratio (RCR)
Oral	0.036	3.6E-04
Inhalation	0.89	9.6E-04

4.0 Evaluation guidance to downstream user		
For scaling see	Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. Available hazard data do not support the need for a DNEL to be established for other health effects. Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html). Exposure calculated for benzene and assumes that the substance contains 1 % benzene. Arithmetic scaling may be possible if the batch contains < 1 % benzene	
Exposure assessment instrument/tool/method	Worker	ECETOC TRA
	Environment	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

Exposure Scenario 4 – Use of Naphtha (petroleum), isomerization (0 – 1 % benzene content) as a fuel - Professional

1.0 Contributing Scenarios	
Sector of uses SU	SU22 Professional uses: Public domain (administration, education, entertainment, services, craftsmen)
Process category [PROC]	PROC1 PROC2 PROC2 (Storage) PROC3 PROC8a (Maintenance) PROC8b (Bulk) PROC8b (Drum/batch transfers) PROC8b (refuelling) PROC16
Chemical product category [PC]	Not applicable
Article Categories [AC]	Not applicable
Environmental release categories [ERC]	ERC9a ERC9b
Specific Environmental Release Categories SPERC	ESVOC SpERC 9.12b.v1

2.0 Operational conditions and risk management measures		
2.1 Control of worker exposure		
Product characteristics		
Physical form of product	Liquid with high volatility.	
Concentration of substance in product	Covers concentrations up to 100% (≤ 1 % benzene content)	
Human factors not influenced by risk management		
Potential exposure area	Not defined	
Frequency and duration of use		
Exposure duration per day	Covers daily exposures up to 8 hours (unless stated differently).	
Frequency of use (days per year)	300	
Other operational conditions affecting worker exposure		
Area of use	PROC3	Outdoor
	All other PROC's	Not defined (default = Indoor)
Characteristics of the surroundings	Not defined	
General measures applicable to all activities Assumes a good basic standard of occupational hygiene is implemented. Assumes activities are at ambient temperature (unless stated differently).		
General measures (skin irritants) Avoid direct skin contact with product. Identify potential areas for indirect skin contact. Wear gloves (tested to EN374) if hand contact with substance likely. Clean up contamination/spills as soon as they occur. Wash off any skin contamination immediately. Provide basic employee training to prevent/minimise exposures and to report any skin problems that may develop.		
General measures (carcinogens) Consider technical advances and process upgrades (including automation) for the elimination of releases. minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation. Drain down systems and clear transfer lines prior to breaking containment. Clean/flush equipment, where possible, prior to maintenance Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when its use is identified for certain contributing scenario; clear up spills immediately and dispose of waste safely. Ensure safe systems of work or equivalent arrangements are in place to manage risks. Regularly inspect, test and maintain all control measures. Consider the need for risk based health surveillance.		
Technical conditions of use		
PROC1, PROC2, PROC2 (Storage), PROC3, PROC16	Handle substance within a closed system.	
PROC2 (Storage)	Provide a good standard of general ventilation. Natural ventilation is from doors, windows etc. Controlled ventilation means air is supplied or removed by a powered fan. (Efficiency of at least 30 %)	
PROC8b (Bulk), PROC8b (Drum/batch transfers), PROC8b (refuelling)	Ensure material transfers are under containment or extract ventilation. (Efficiency of at least 90 %)	
Organisational measures		
PROC8a (Maintenance)	Drain down and flush system prior to equipment break-in or maintenance. Retain drain downs in sealed storage pending disposal or for subsequent recycle. Clear spills immediately. (Efficiency of at least 83 %)	
Risk management measures related to human health		
Respiratory protection	No special measures are required.	

Hand and/or Skin protection	PROC2	Wear suitable gloves tested to EN374. (Efficiency of at least 80 %)
	PROC8a (Maintenance)	Wear chemically resistant gloves (tested to EN374) in combination with 'basic' employee training. (Efficiency of at least 98 %)
Eye Protection	No special measures are required.	
Other operational conditions affecting worker exposure		
Wear suitable coveralls to prevent exposure to the skin. Clear transfer lines prior to de-coupling. Avoid dip sampling.		

2.2 Control of environmental exposure	
Amounts used	
Fraction of EU tonnage used in region:	0.1
Regional use tonnage (tons/year):	4.5E+02
Fraction of Regional tonnage used locally: (tons/year)	5.0E-04
Annual site tonnage (tons/year):	0.23
Average daily use (kg/day):	0.62
Environment factors not influenced by risk management	
Flow rate of receiving surface water (m^3/d):	Not defined (default = 18,000)
Local freshwater dilution factor:	10
Local marine water dilution factor:	100
Operational conditions	
Emission days (days/year):	365
Release fraction to air from process (initial release prior to RMM):	1.0E-02
Release fraction to wastewater from process (initial release prior to RMM):	1.0E-05
Release fraction to soil from process (initial release prior to RMM):	1.0E-05
Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil	
Treat air emission to provide a typical removal efficiency of (%):	Not applicable
If there is no discharge to domestic sewage treatment plant, Treat onsite wastewater (prior to receiving water discharge) to provide the required removal efficiency of (%):	0
If discharging to domestic sewage treatment plant, provide the required onsite wastewater removal efficiency of >= (%)	0
Treat soil emission to provide a typical removal efficiency of (%):	0
Common practices vary across sites thus conservative process release estimates used. If discharging to domestic sewage treatment plant, no onsite wastewater treatment required.	
Organisational measures to prevent/limit release from site	
Do not apply industrial sludge to natural soils. Sludge should be incinerated, contained or reclaimed.	
Conditions and measures related to municipal sewage treatment plant	
Size of municipal sewage system/treatment plant (m^3/d)	2000
Degradation effectiveness (%)	97.0
Conditions and measures related to external treatment of waste for disposal	
External treatment and disposal of waste should comply with applicable local and/or national regulations.	
Substance release quantities after risk management measures	
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d):	1100

3. Exposure estimation and reference to its source

3.1 Human exposure prediction

Exposure assessment (method/calculation model)	ECETOC TRA (benzene content)

Process category [PROC]	Inhalation		Dermal		Combined
	inhalation exposure (mg/m^3)	Risk characterisation ratio (RCR)	dermal exposure (mg/kg bw/day)	Risk characterisation ratio (RCR)	Risk characterisation ratio (RCR)
PROC1	0.00	0.00	0.03	0.15	0.15
PROC2	0.50	0.50	0.03	0.12	0.62
PROC2 (Storage)	0.35	0.35	0.14	0.59	0.94
PROC3	0.70	0.70	0.03	0.15	0.85
PROC8a (Maintenance)	0.85	0.85	0.03	0.12	0.97
PROC8b (Bulk)	0.25	0.25	0.07	0.30	0.55
PROC8b (Drum/batch	0.25	0.25	0.07	0.30	0.55

transfers)					
PROC8b (refuelling)	0.25	0.25	0.07	0.30	0.55
PROC16	0.50	0.50	0.03	0.15	0.65

3.2 Environmental exposure prediction

Exposure assessment (method/calculation model)	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

Naphtha (petroleum), isomerization is a hydrocarbon UVCB. The hydrocarbon block method is used in PETRORISK to calculate the PEC of each group of components in the substance. These are used to estimate the environmental risk for the substance As the model assumes fractionation before entering the environment, the PEC is not of the substance as manufactured but is a some of the constituents expected to be present in the environmental compartment.

Environmental exposure	STP	freshwater	marine water	Soil	freshwater sediment	marine sediment
Predicted Environmental Exposure (PEC)	9.4E-08 mg/L	3.9E-04 mg/L	9.2E-07 mg/L	5.7E-06 mg/kg ww	7.6E-04 mg/kg ww	1.6E-06 mg/kg ww
Risk characterisation ratio (RCR)	1.3E-08	2.6E-03	6.1E-06	2.9E-06	9.5E-04	2.1E-06

Human exposure prediction:

Route of Exposure	Exposure ($\mu g/kg^{-1}$ day^{-1})	Risk characterisation ratio (RCR)
Oral	0.031	3.1E-04
Inhalation	0.1	1.1E-04

4.0 Evaluation guidance to downstream user		
For scaling see	Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. Available hazard data do not support the need for a DNEL to be established for other health effects. Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html). Exposure calculated for benzene and assumes that the substance contains 1 % benzene. Arithmetic scaling may be possible if the batch contains < 1 % benzene	
Exposure assessment instrument/tool/method	Worker	ECETOC TRA
	Environment	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

Exposure Scenario 5 – Use of Naphtha (petroleum), isomerization (0 – 1 % benzene content) as a fuel - Consumer

1.0 Contributing Scenarios	
Sector of uses SU	SU21 Consumer uses: Private households (= general public = consumers)
Process category [PROC]	Not applicable
Chemical product category [PC]	PC13 PC13 (Automotive refueling) PC13 (Scooter refueling) PC13 (Garden equipment refueling) PC13 (Garden equipment use)
Article Categories [AC]	Not applicable
Environmental release categories [ERC]	ERC9a ERC9b
Specific Environmental Release Categories SPERC	ESVOC SpERC 9.12c.v1

2.0 Operational conditions and risk management measures			
2.1 Control of worker exposure			
Product characteristics			
Physical form of product	Liquid with high volatility.		
Concentration of substance in product	Covers concentrations up to 100% (≤ 1 % benzene content)		
Human factors not influenced by risk management			
Potential exposure area (Skin Contact)	PC13	Automotive refueling; Scooter refueling	210 cm²
		Garden equipment use; Garden equipment refueling	420 cm²
Frequency and duration of use			
Exposure duration (hours/Event)	PC13	Automotive refueling; Scooter refueling	0.05
		Garden equipment use	0.03
		Garden equipment refueling	2.00
Frequency of use (days per year)	PC13	Automotive refueling; Scooter refueling	52 (Covers frequency up to: weekly use)
		Garden equipment use; Garden equipment refueling	26 (Covers frequency up to: once in two weeks.)
Amounts used (g/Event)	PC13	Automotive refueling	37500
		Scooter refueling	3750
		Garden equipment use; Garden equipment refueling	750
Other operational conditions affecting worker exposure			
Area of use	Not defined		
Characteristics of the surroundings	PC13	Automotive refueling; Scooter refueling; Garden equipment use	Outdoor
		Garden equipment refueling	34 m³
Risk Management Measures			
Respiratory protection	No specific measures identified.		
Hand and/or Skin protection	No specific measures identified.		
Eye Protection	No specific measures identified.		
2.2 Control of environmental exposure			
Amounts used			
Fraction of EU tonnage used in region:	0.1		
Regional use tonnage (tons/year):	100,00		
Fraction of Regional tonnage used locally: (tons/year)	5.0E-04		
Annual site tonnage (tons/year):	5.1		
Average daily use (kg/day):	14		
Environment factors not influenced by risk management			
Flow rate of receiving surface water (m³/d):	Not defined (default = 18,000)		
Local freshwater dilution factor:	10		
Local marine water dilution factor:	100		
Operational conditions			

Emission days (days/year):	365
Release fraction to air from process (initial release prior to RMM):	1.0E-02
Release fraction to wastewater from process (initial release prior to RMM):	1.0E-05
Release fraction to soil from process (initial release prior to RMM):	1.0E-05
Conditions and measures related to municipal sewage treatment plant	
Size of municipal sewage system/treatment plant (m^3/d)	2000
Degradation effectiveness (%)	97.0
Conditions and measures related to external treatment of waste for disposal	
External treatment and disposal of waste should comply with applicable local and/or national regulations.	
Substance release quantities after risk management measures	
Maximum allowable site tonnage (MSafe) based on release following total wastewater treatment removal (kg/d):	2400

3. Exposure estimation and reference to its source

3.1 Human exposure prediction

Exposure assessment (method/calculation model)	ECETOC TRA (benzene content)

Yearly Use (Chronic)

Chemical product category [PC]	Inhalation		Dermal		Combined
	inhalation exposure (mg/m^3)	Risk characterisation ratio (RCR)	dermal exposure (mg/kg bw/day)	Risk characterisation ratio (RCR)	Risk characterisation ratio (RCR)
PC13 (Automotive refueling)	0.002	0.69	0.00	0.01	0.70
PC13 (Scooter refueling)	0.001	0.46	0.00	0.01	0.47
PC13 (Garden equipment use)	0.003	0.87	0.00	0.00	0.87
PC13 (Garden equipment refueling)	0.001	0.18	0.00	0.02	0.20

3.2 Environmental exposure prediction

Exposure assessment (method/calculation model)	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.

Naphtha (petroleum), isomerization is a hydrocarbon UVCB. The hydrocarbon block method is used in PETRORISK to calculate the PEC of each group of components in the substance. These are used to estimate the environmental risk for the substance As the model assumes fractionation before entering the environment, the PEC is not of the substance as manufactured but is a some of the constituents expected to be present in the environmental compartment.

Environmental exposure	STP	freshwater	marine water	Soil	freshwater sediment	marine sediment
Predicted Environmental Exposure (PEC)	2.1E-06 mg/L	3.9E-04 mg/L	9.4E-07 mg/L	5.9E-06 mg/kg ww	7.6E-04 mg/kg ww	1.8E-06 mg/kg ww
Risk characterisation ratio (RCR)	3.0E-07	2.6E-03	6.3E-06	3.6E-06	9.5E-04	2.2E-06

Human exposure prediction:

Route of Exposure	Exposure ($\mu g/kg^{-1}\ day^{-1}$)	Risk characterisation ratio (RCR)
Oral	0.031	3.1E-04
Inhalation	0.44	1.1E-04

4.0 Evaluation guidance to downstream user

For scaling see	Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels. Available hazard data do not support the need for a DNEL to be established for other health effects. Further details on scaling and control technologies are provided in SpERC factsheet (http://cefic.org/en/reach-for-industries-libraries.html). Exposure calculated for benzene and assumes that the substance contains 1 % benzene. Arithmetic scaling

	may be possible if the batch contains < 1 % benzene	
Exposure assessment instrument/tool/method	Consumer	ECETOC TRA
	Environment	The Hydrocarbon Block Method has been used to calculate environmental exposure with the Petrorisk model.