SDS(Safety Data Sheet)

Product	HSR(Heavy Straight Run Naphtha)		
MSDS Number	**List No.**	**Issuing date**	**Last revised date**
-	PD1044	2008-07-25	2024-01-16

1. IDENTIFICATION

1) Product name

HSR(Heavy Straight Run Naphtha)

2) Recommended use of the chemical and restriction on use

- Recommended use: Feed materials, Intermediates
  Petrochemical process fuel
- Restrictions on use: Do not use for any other purpose.

3) Details of the supplier of the safety data sheet

○ **Manufacturer**

- Company name: GS Caltex Corporation
- Address: GS Tower, 508, Nonhyeon-ro, Gangnam-gu, Seoul, Korea
- Emergency telephone number: 1544-5151

2. HAZARDS IDENTIFICATION

1) Classification of the product

FLAMMABLE LIQUIDS : Category 2
SKIN CORROSION/IRRITATION : Category 2
CARCINOGENICITY : Category 1A
GERM CELL MUTAGENICITY : Category 1B
TOXIC TO REPRODUCTION : Category 2
SPECIFIC TARGET ORGAN TOXICITY FOLLOWING REPEATED EXPOSURE : Category 2
ASPIRATION HAZARD : Category 1

2) Label elements

○ **Hazard pictograms**

○ **Signal word**

Danger

○ **Hazard statements**

- H225 Highly flammable liquid and vapour.
- H304 May be fatal if swallowed and enters airways.
- H315 Causes skin irritation.
- H340 May cause genetic defects.(inhalation)

- H350 May cause cancer.
- H361 Suspected of damaging fertility or the unborn child.(Suspected of damaging the unborn child) (inhalation)
- H373 May cause damage to organs through prolonged or repeated exposure. (inhalation)

○ **Precautionary statements**

1) Prevention

- P201 Obtain special instructions before use.
- P202 Do not handle until all safety precautions have been read and understood.
- P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
- P233 Keep container tightly closed.
- P240 Ground and bond container and receiving equipment.
- P241 Use explosion-proof [electrical/ventilating/lighting] equipment.
- P242 Use non-sparking tools.
- P243 Take precautionary measures against static discharge.
- P260 Do not breathe dust/fume/gas/mist/vapours/spray.
- P264 Wash ... thoroughly after handling.
- P280 Wear protective gloves/protective clothing/eye protection/face protection/hearing protection.

2) Response

- P301 + P310 IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
- P302 + P352 IF ON SKIN: Wash with plenty of water/cleansing agent.
- P303 + P361 + P353 IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
- P308 + P313 IF exposed or concerned: Get medical advice/attention.
- P314 Get medical advice/attention if you feel unwell.
- P321 Specific treatment (see section 5).
- P331 Do not induce vomiting.
- P332 + P313 If skin irritation occurs: Get medical advice/attention.
- P362 + P364 Take off contaminated clothing and wash it before reuse.
- P370 + P378 In case of fire: Use manufacturer/supplier or the competent authority to specify appropriate media for extinction.

3) Storage

- P403 + P235 Store in a well-ventilated place. Keep cool.
- P405 Store locked up.

4) Disposal

- P501 Dispose of contents/container to ....

3) Other hazards

○ **Product NFPA Level**

(※ 0-Lack, 1-Low, 2-Moderate, 3-High, 4-Very High)

Product name	Health	Flammable	Reaction
HSR(Heavy Straight Run Naphtha)	2	3	0

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical name	Trade names and Synonyms	CAS No.	EC No.	Contain Ratio(%)
Naphtha (petroleum), heavy straight-run		64741-41-9	265-041-0	100
* 다음의 물질이 포함되어 있음				
Toluene	1-Methylbenzene; Methacide ; Methylbenzol	108-88-3	203-625-9	0 ~ 6
Xylene	Methyltoluene;Xylol	1330-20-7	215-535-7	0 ~ 6
Benzene	1,3,5-Cyclohexatriene ; Benzine ; Benzole	71-43-2	200-753-7	0 ~ 1.5

4. FIRST AID MEASURES

1) Eye contact

- In case of contact with substance, immediately flush eyes with running water for at least 20 minutes.
- If eye irritation persists: Get medical advice/attention.

2) Skin contact

- In case of contact with substance, immediately flush skin with running water for at least 20 minutes.
- In case of burns, immediately cool affected skin for as long as possible with cold water. Do not remove clothing if adhering to skin.
- If skin irritation occurs: Get medical advice/attention.
- Take off immediately all contaminated clothing and wash it before reuse.

3) Inhalation

- Do not use mouth-to-mouth method if victim inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.
- Administer oxygen if breathing is difficult.
- IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing.
- IF exposed or concerned: Get medical advice/attention.
- Do not induce vomiting.

4) Ingestion

- Do not use mouth-to-mouth method if victim ingested the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.
- IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
- IF SWALLOWED: rinse mouth. Do NOT induce vomiting.

5) Indication of any immediate medical attention and special treatment needed

- Exposures require specialized first aid with contact and medical follow-up.
- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

5. FIRE FIGHTING MEASURES

1) Suitable (and unsuitable) extinguishing media

- Use alcohol foam, carbon dioxide, or water spray when fighting fires involving this material.

- Use dry sand or earth to smother fire.
- For mixtures containing alcohol or polar solvent: Alcohol-resistant foam
- Direct water (Unsuitable extinguishing media)

2) Special hazards arising from the substance or mixture

- Can form explosive mixtures at temperatures at or above the flashpoint.
- Fire may produce irritating, corrosive and/or toxic gases.
- Highly flammable liquid and vapour.
- Heating may cause a fire or explosion.

3) Special protective equipment and precautions for firefighters

- Rescuers should put on appropriate protective gear.
- Fire involving Tanks: For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.
- In case of fire: Evacuate area. Fight fire remotely due to the risk of explosion.
- Eliminate all ignition sources if safe to do so.

6. ACCIDENTAL RELEASE MEASURES

1) Health considerations and protective equipment

- Clean up spills immediately, observing precautions in Protective Equipment section.
- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
- All equipment used when handling the product must be grounded.
- Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.
- Please note that materials and conditions to be avoided.

2) Environmental precautions

- Large spill: Prevent entry into waterways, sewers, basements or confined areas.

3) Methods and material for containment and cleaning up

- Dike and collect water used to fight fire.
- Absorb spill with inert material (e.g., dry sand or earth), then place in a chemical waste container.
- Absorb the liquid and scrub the area with detergent and water.
- Large Spill: Dike far ahead of liquid spill for later disposal.

7. HANDLING AND STORAGE

1) Precautions for safe handling

- Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, static electricity, or other sources of ignition.
- Follow all MSDS/label precautions even after container is emptied because they may retain product residues.
- Avoid prolonged or repeated contact with skin.
- Avoid breathing vapors from heated material.
- All equipment used when handling the product must be grounded.
- Please note that materials and conditions to be avoided.
- Handling refer to engineering control/personal protection section.
- Wash thoroughly after handling.
- Use only outdoors or in a well-ventilated area.

2) Conditions for safe storage (including any incompatibilities)

- Please note that materials and conditions to be avoided.
- Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
- Store in a well-ventilated place. Keep container tightly closed.

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

1) Control parameters

Chemical name	Exposure limits	ACGIH TLV	OSHA PEL	Biological limit values(BLV)
Naphtha (petroleum), heavy straight-run	Not available	Not available	Not available	Not available
Toluene	TWA : 50 ppm STEL : 150 ppm	Not available	PEL: 200 ppm, C 300 ppm mg/m3	0.02 mg/L Medium: blood Time: prior to last shift of workweek Parameter: Toluene; 0.03 mg/L Medium: urine Time: end of shift Parameter: Toluene; 0.3 mg/g creatinine Medium: urine Time: end of shift Parameter: o-Cresol with hydrolysis (background)
Xylene	TWA : 100 ppm STEL : 150 ppm	Not available	PEL: 100 ppm	1.5 g/g creatinine Medium: urine Time: end of shift Parameter: Methylhippuric acids

Benzene	TWA : 0.5 ppm STEL : 2.5 ppm	Not available	Not available	25 µg/g creatinine Medium: urine Time: end of shift Parameter: S-Phenylmercapturic acid (background); 500 µg/g creatinine Medium: urine Time: end of shift Parameter: t,t-Muconic acid (background)

2) Appropriate engineering controls

- Install local exhaust ventilation system.
- Check legal suitability of exposure level.

3) Personal protection equipment

○ **Respiratory protection**

- If exposure consentration of the material is lower than 100 ppm of the permitted exposure standards, Wear a respiratory protective device, equipped with an adequate filter by considering physicochemical properties of exposured particulate material ; such
- If exposure consentration of the paticle material is lower than 250 ppm of the permitted exposure standards, Wear a respiratory protective device, equipped with an adequate filter by considering physicochemical properties of exposured particulate material
- If exposure consentration of the particle material is lower than 500 ppm of the permitted exposure standards, Wear a respiratory protective device, equipped with an adequate filter by considering physicochemical properties of exposured particulate materia
- If exposure consentration of the particle material is lower than 10000 ppm of the permitted exposure standards, Wear a respiratory protective device, equipped with an adequate filter by considering physicochemical properties of exposured particulate mater
- If exposure consentration of the material is lower than 100000 ppm of the permitted exposure standards, Wear a respiratory protective device, equipped with an adequate filter by considering physicochemical properties of exposured particulate material ; su
- If exposure consentration of the material exceeds the permitted exposure standards, Wear European Standard EN 149 approved full or half face piece (with goggles) respireatory protective equipment.

○ **Eye protection**

- An eye wash unit and safety shower station should be available nearby work place.
- Wear breathable safety goggles to protect from vapour state organic material causing eye irritation or other disorder.

○ **Hand protection**

- Wear appropriate protective gloves by considering physical and chemical

properties of chemicals.

○ **Body protection** - Wear appropriate protective clothing by considering physical and chemical properties of chemicals.

9. PHYSICAL AND CHEMICAL PROPERTIES

Item	Input Value
Apperance	Liquid
Color	No Data
Smell	독특한 냄새
Smell Threshold	No Data
pH (Numerical value)	No Data
Melting/Freezing Point	No Data
Boilling Point	90 ~ 150 ℃
Flash Point	20 ℃
Evaporating Rate	No Data
Flammability(Solid, Gas)	No Data
Explosibility Range	LEL : 1.0%, UEL : 5.3% %
Steam Pressure	2.01 psi @ 37.8℃
Solubility	No Data
Vapor Density	3.14
Specific Gravity	0.82 (15℃)
Distribution Coefficient	3.3~6
SelfIgnition Temperature	No Data
Pyrolysis Temperature	No Data
Viscosity	No Data
Molecular Weight	No Data

10. STABILITY AND REACTIVITY

1) Chemical Stability and hazardous reactivity - Can form explosive mixtures at temperatures at or above the flashpoint.
- HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames.
- Fire may produce irritating, corrosive and/or toxic gases.

2) Conditions to avoid - Ignition source(heat, spark, flame, friction, shock, contamination)

3) Incompatible materials - Combustibles

4) Hazardous decomposition - During a fire, irritating and highly toxic gases may be generated by thermal

products decomposition or combustion.

11. TOXICOLOGICAL INFORMATION

1) Information on the likely routes of exposures

○ **Inhalation**

- No inhalation effects through respiratory system.

○ **Skin contact**

- Causes skin irritation.
- Absorbable through the skin

○ **Eye contact**

- Causes serious eye irritation.
- Possible exposure through the eye

○ **Ingestion**

- May be fatal if swallowed and enters airways.
- Absorbable through the inhalation

2) Health hazard information

○ **Acute toxicity**

*** Oral - Not classified (ATEmix > 2000 mg/kg)**

- Naphtha (petroleum), heavy straight-run : rat; LD50 > 5000 mg/kg bw, no deaths (OECD TG 401, GLP) (read across : low viscosity liquid hydrocarbon) (ECHA)
- Toluene : rat(male); LD50 = 5580 mg/kg bw (EU Method B.1) (ECHA)
- Xylene : LD50(rat, male)=3,523 mg/kg bw (mixed isomers: 60.2% m-xylene, 13.6% p-xylene, 9.1% o-xylene, and 17.0% ethylbenzene) (EU Method B.1) (ECHA)
- Benzene : Rat(Male); LD50 > 2000 mg/kg (OECD TG 401)(ECHA)

*** Dermal - Not classified (ATEmix > 2000 mg/kg)**

- Naphtha (petroleum), heavy straight-run : rabbit; LD50 > 2000 mg/kgg bw, no deaths (OECD TG 402, GLP) (read across : low viscosity liquid hydrocarbon) (ECHA)
- Toluene : rabbit(male); LD50 > 5000 mg/kg bw (ECHA)
- Xylene : rabbit(male); LD50 = 12126 mg/kg (read across: m-xylene) (ECHA)
- Benzene : Rabbit(Male); LD50 > 9400 mg/kg (OECD TG 402)(ECHA)

*** Inhalation(Gas) - Not applicable**

- Naphtha (petroleum), heavy straight-run : Not applicable
- Toluene : Not applicable
- Xylene : Not applicable
- Benzene : Not applicable

*** Inhalation(Vapour) - Not classified (ATEmix > 20 mg/L)**

- Naphtha (petroleum), heavy straight-run : rat; inhalation: vapour; LC50 > 5.61 mg/L 4hr, no deaths (OECD TG 403, GLP) (read across : low viscosity liquid hydrocarbon) (ECHA)
- Toluene : rat; inhalation: vapours; LC50 = 28.1 mg/L air/4h (OECD TG 403) (ECHA)
- Xylene : 4h-LC50(rat)=4,550 ppm(unit conversion: 4h-LC50(rat)=19.71 mg/L (HSDB)
- Benzene : Rat(Male); inhalation: Vapours, LC50 = 43.767 mg/L 4h (OECD TG 403)(ECHA)

*** Inhalation(Dust, mist) - Not classified (ATEmix > 5 mg/L)**

- Naphtha (petroleum), heavy straight-run : Not available
- Toluene : Not available
- Xylene : Not available
- Benzene : Not available

○ **Skin corrosion/Irritation : Category 2 (SKIN IRRITATION Cat.2)**

- Naphtha (petroleum), heavy straight-run : rabbit; irritating (OECD TG 404, GLP) (read across : low viscosity liquid hydrocarbon) (ECHA)
- Toluene : rabbit; irritating (EU Method B.4, GLP) (ECHA)
- Xylene : The skin corrosion potential was determined by exposing the intact skin of six rabbits to p-xylene for four hours. The sites of application were not destroyed or changed irreversibly during or after the exposure. CHEVRON PARAXYLENE 99% was considered not to be corrosive to the intact skin of rabbits. primary dermal irritation index (PDII) : 3 (EU Method B.4) (ECHA)
- Benzene : Rabbit; Irritating (OECD TG 404)(ECHA)

○ **Serious eye damage/irritation : Not classified**

- Naphtha (petroleum), heavy straight-run : rabbit; not irritating (OECD TG 405, GLP) (read across : low viscosity liquid hydrocarbon) (ECHA)
- Toluene : rabbit; slightly irritating (OECD TG 405, GLP) (ECHA)
- Xylene : The available data indicate that mixed xylene and the individual isomers (m-, o- and p-xylene) should be considered to be irritating to skin, eyes and the respiratory tract. : induces serious eye irritation. (ECHA)
- Benzene : Rabbit; irritating (ECHA)

○ **Respiratory sensitization : Not classified**

- Naphtha (petroleum), heavy straight-run : Not available
- Toluene : Not available
- Xylene : Not available
- Benzene : Not available

○ **Skin sensitization : Not classified**

- Naphtha (petroleum), heavy straight-run : guinea pig; not sensitising (OECD TG 406, GLP) (read across : low viscosity liquid hydrocarbon) (ECHA)
- Toluene : guinea pig; not sensitising (EU Method B.6, GLP) (ECHA)
- Xylene : mouse; not sensitising (OECD TG 429, GLP) (ECHA)
- Benzene : Guinea pig; not sensitizing (OECD TG 406)(ECHA)

○ **Carcinogenicity : Category 1A**

- Naphtha (petroleum), heavy straight-run : EU CLP 1272/2008 : Carc. 1B (Note P : The classification as a carcinogen need not apply if it can be shown that the substance contains less than 0,1 % w/w benzene(EINECS No 200-753-7)
  IARC, OSHA, ACGIH, US EPA IRIS, NTP : not listed
- Toluene : IARC : 3 (Not Classifiable)
  ACGIH : A4 (Not Classifiable as a Human Carcinogen)
  Inhalation studies in rats and mice (Huff, 1990; Gibson and Hardisty 1983) and a supporting study in mice using skin application (Broddle et al, 1996), are

considered relevant for the risk assessment. Inhalation exposures for 6 or 6.5 h/day, 5 days/week for up to 2 years at concentrations up to 1200 ppm (4522 mg/m3) were used. The dermal application study involved application of 50 µL toluene twice a week for up to 2 years. No statistically significant increase in any tumour type was seen in any study. (ECHA)

- Xylene : The key chronic study was conducted by NTP (1986). The study comprises the oral gavage administration of mixed xylenes(60.2% m-xylene, 13.6% p-xylene, 9.1% o-xylene, and 17% ethylbenzene) to rats (0, 250, or 500 mg/kg/day) and mice (0, 500 or 1000 mg/kg/day) for 5 days/week for 103 weeks. There was no evidence of carcinogenicity. No studies are available regarding cancer in animals exposed via inhalation to mixed xylene or the individual xylene isomers. (EU Method B.32) (ECHA)
  IARC, OSHA, NTP, IRIS, ACGIH, EU CLP 1272/2008 : not listed
  ACGIH: A4

- Benzene : IARC : Group 1
  EU CLP 1272/2008 : Car. 1A
  ACGIH : A1
  NTP : K

○ **Germ cell mutagenicity : Category 1B**

- Naphtha (petroleum), heavy straight-run : EU CLP 1272/2008 : Muta. 1B : (Note P : The classification as a mutagen need not apply if it can be shown that the substance contains less than 0,1 % w/w benzene(EINECS No 200-753-7)

- Toluene : in vitro; Bacterial reverse mutation test : negative (EU Method B.13/14) (ECHA)
  In vitro Mouse Lymphoma cell Gene Mutation Test: negative (OECD TG 476) (ECHA)
  In vivo mouse(male); rodent dominant lethal assay : negative (OECD TG 478) (ECHA)

- Xylene : in vitro mammalian chromosome aberration test: negative (EU Method B.10) (ECHA), In vitro sister chromatid exchange assay in mammalian cells : negative (EU Method B.19) (ECHA)
  In vivo rodent dominant lethal assay: negative (OECD TG 478) (mixed xylenes) (ECHA)

- Benzene : In vitro bacterial reverse mutation assay: negative (OECD TG 471) (ECHA); in vitro Chinese Hamster lung fibroblast cell Chromosome Aberration Test (EPA OPPTS 870.5375): positive (ECHA)
  iIn vivo Mouse(Male) Erythrocyte Micronucleus test: positive (OECD TG 474) (ECHA); in vivo Mouse Bone Marrow Chromosome Aberration Test (OECD TG 475) and Germ cell Chromosome Aberration test (OECD TG 483): both poisitive (ECHA)

○ **Reproductive toxicity : Category 2**

- Naphtha (petroleum), heavy straight-run : rat; 0, 5000, 10000, 20000 mg/m3; two-generation reproductive toxicity; Based on the data reported, the reproductive NOAEL as defined by this study is >20000 mg/m3, the highest dose tested and approximately half of the lower explosive limit. (OECD TG 416, GLP) (read across : low viscosity liquid hydrocarbon) (ECHA)
  rat; 30, 125 and 500 mg/kg/day; developmental toxicity; Based on the study

results, the maternal NOAEL and the teratogenicity NOAEL were greater than 500mg/kg. (OECD TG 414) (read across : low viscosity liquid hydrocarbon) (ECHA)

- Toluene : rat; inhalation; reproductive toxicity study; 600, 2000 ppm; Toluene showed no effects on fertility in rats, however, decreased sperm count was reported at 2000 ppm. The NOAEC for this effect was 600 ppm. (ECHA)
  rat; inhalation; developmental toxicity; Animal studies indicate that toluene is not teratogenic however there is evidence of developmental toxicity (lower birth weight, delayed vaginal opening) at exposures = 1000 ppm in the presence of slight maternal toxicity; the NOAEC for developmental and maternal effects is 600 ppm (2261 mg/m3). Findings suggestive of an increased risk of late spontaneous abortions associated with exposure to toluene at levels around 88 ppm (330 mg/m3) were considered by the Commission Group of Specialised Experts in the fields of Carcinogenicity, Mutagenicity and Reprotoxicity to require confirmation, while the EU Scientific Committee on Occupational Exposure Limits SCOEL (2001) noted that abortions have not been reported upon accidental high exposure or toluene abuse by pregnant women. (ECHA)
- Xylene : 500 ppm mixed xylene (administered for 6 hours per day for 131 days prior to mating, during mating and continuing through gestation and lactation) is a NOAEC for systemic and reproductive toxicity. (ECHA)
  Overall it is concluded that xylene isomers are not developmental toxicants. (OECD TG 414) (ECHA)
- Benzene : rat(male/female); inhalation : vapor; one-generation reproductive toxicity; 0, 3.2, 32, 320, 960 mg/m3; NOAEC = 960 mg/m³ air; No treatment related effects were seen in pup survival or at gross post mortem on postnatal day 21 (OECD TG 415)(ECHA)

○ Specific target organ toxicity (single exposure) : 구분 2

- Naphtha (petroleum), heavy straight-run : Not available
- Toluene : Toluene is rapidly absorbed mainly through inhalation and acts on the central nervous system. Toluene causes fatigue, sleepiness, dizziness and mild respiratory irritation at 50-100 ppm, excitement associated with paresthesia and nausea at 200-400 ppm and central nervous system suppression leading to drunkenness, delirium and abnormal gait at 500-800 ppm (NITE)
- Xylene : inhalation; Clinical observations including body tremors suggestive of CNS involvement were seen at all concentrations during and after exposure, on the day of exposure. (ECHA)
- Benzene : Not available

○ Specific target organ toxicity (repeated exposure) : Category 2,구분 2

- Naphtha (petroleum), heavy straight-run : Not available
- Toluene : rat; oral; 90days; 312, 625, 1250, 2500, 5000 mg/kg/day; Absolute or relative weight increase; NOAEL = 625 mg/kg bw/day (EU method B.26, GLP) (ECHA)
  rat; inhalation; 103weeks; 0, 2261, 4522 mg/m3; Toluene caused local toxicity to rat nasal epithelium at concentrations of 600 ppm (2250 mg/m3) and above.

(OECD TG 453, GLP) (ECHA)

rat; inhalation; 90days; 100, 625, 1250, 2500 and 3000 ppm; Toluene exposure at concentrations = 1250 ppm, 6h/day, 5 days per week for 15 weeks induced adverse clinical signs, lower bodyweight and changes in haematology and organ weights. NOAEC = 925 ppm (EU method B.29, GLP) (ECHA)

Affects the central nervous system, liver, hearing, kidneys and lungs

- Xylene : For mixed xylenes Where ethylbenzene is >=10%, classification under CLP as STOT-RE Cat 2 H373 is proposed [see Specific Investigations: other studies (ototoxicity)].

  The NOAEC of mixed xylenes for male rats exposed 6h/day for 5 days in each of 13 weeks was 3515 mg/m3.

  A NOAEC of 3515 mg/m3 was reported by Carpenter et al. (1975) for generalised systemic effects in male rats and male dogs. Other studies have shown that some xylene isomers adversely affect hearing in the rat, with a sub-chronic NOAEC of 1950 mg/m3 reported for p-xylene; the NOAEC for ototoxicity of m-xylene and o-xylene was greater than 7810 mg/m3 (Gagnaire et al., 2001). The ototoxicity of mixed xylenes appears to be dependent upon composition (Gagnaire et al., 2007), with a sub-chronic LOAEC of 1080 mg/m3 reported for one sample while another had a NOAEC of 2170 mg/m3. (ECHA)

- Benzene : After repeated dose exposure via oral or inhalation routes, benzene causes adverse effects on the haematopoietic system of animals and humans. ECHA)

○ **Aspiration hazard : Category 1**

- Naphtha (petroleum), heavy straight-run : <1 mm2/sec @ 37.8°C. (ECHA) & hydrocarbons
- Toluene : viscosity : 0.64 mm2/s (40°C) & hydrocarbons (ECHA)
- Xylene : 0.74 mm²/s (20°C) (ECHA) & hydrocarbons
- Benzene : 0.604 mPas (25.0 ℃, dynamic) & Hydrocarbons (ECHA)

  The direct aspiration of liquid benzene into the lungs causes immediate pulmonary oedema and haemorrhage at the site of contact with the pulmonary tissue (OECD SIDS)

12. ECOLOGICAL INFORMATION

1) Ecotoxicity

- Acute toxicity : Not classfied (ATEmix>1mg/L)
- Chronic toxicity : Not classfied

○ **Acute (short-term) aquatic hazard:**

Fish

- Naphtha (petroleum), heavy straight-run : 96h-LL50(Pimephales promelas) = 8.2 mg/L (EPA 66013-75-009, GLP) (ECHA)
- Toluene : 96h-LC50(Oncorhynchus kistutch) = 5.5 mg/L (ECHA)
- Xylene : 96h-LC50(Oncorhynchus mykiss) = 2.6 mg/L, static (OECD TG 203) (ECHA)
- Benzene : 96h-LC50(Oncorhynchus mykiss) = 5.3 mg/L (OECD TG 203)(ECHA)

Invertebrates

- Naphtha (petroleum), heavy straight-run : 48h-EL50(Daphnia magna) = 4.5 mg/L (OECD TG 202, GLP) (ECHA)

- Toluene : 48h-LC50(Ceriodaphnia dubia) = 3.78 mg/L (US EPA 600/4-91-003) (ECHA)
- Xylene : 48h-EC50(Daphnia magna)=8.5 mg/L (SIDS)
- Benzene : 48h-EC50(Daphnia magna) = 10 mg/L (OECD TG 202)(ECHA)

Aquatic algae

- Naphtha (petroleum), heavy straight-run : 72h-ErL50(Pseudokirchneriella subcapitata) = 3.1 mg/L (OECD TG 201, GLP) (ECHA)
- Toluene : 72h-EC50(Chlamydomonas angulosa) = 134 mg/L (ECHA)
- Xylene : 72h-ErC50(Pseudokirchneriella subcapitata)=4.7 mg/L, static (OECD TG 201) (ECHA)
- Benzene : 72h-ErC50(Pseudokirchneriella subcapitata) = 100 mg/L (OECD TG 201, GLP)(ECHA)

○ **Chronic (Long-term) aquatic hazard:**

Fish

- Naphtha (petroleum), heavy straight-run : Not available
- Toluene : 40d-NOEC(Oncorhynchus kisutch) = 1.39 mg/L (ECHA)
- Xylene : NOEC(Oncorhynchus mykiss)>=1.3 mg/L(mixed xylenes) (SIDS)
- Benzene : 32d-LOEC(Pimephales promelas) = 1.6 mg/L (ASTM 1984)(ECHA)

Invertebrates

- Naphtha (petroleum), heavy straight-run : 21d-NOELR(Daphnia magna) = 2.6 mg/L (OECD TG 211, GLP) (ECHA)
- Toluene : 7d-NOECreproduction(Ceriodaphnia dubia) = 0.74 mg/L (US EPA 600/4-91-003)(ECHA)
- Xylene : 21d-NOEC(Daphnia magna)=1.57 mg/L, static(OECD TG 211, GLP) (ECHA)
- Benzene : 7d-NOEC(Ceriodaphnia dubia) = 3 mg/L (US EPA 600/4-91-003)(ECHA)

Aquatic algae

- Naphtha (petroleum), heavy straight-run : 72h-NOErLR(Pseudokirchneriella subcapitata) = 0.5 mg/L (OECD TG 201, GLP) (ECHA)
- Toluene : Not available
- Xylene : Not available
- Benzene : Not available

2) Persistence and degradability

○ **Persistence**

- Naphtha (petroleum), heavy straight-run : log Kow = 5.18 (experimental) (EPISUITE)
- Toluene : log Kow = 2.73 (20 °C) (ECHA)
- Xylene : log Kow=3.16 (20 °C) (ECHA)
- Benzene : log Kow = 2.13 (ECHA)

○ **Degradability**

- Naphtha (petroleum), heavy straight-run : Not available
- Toluene : Calculated phototransfomation half-life in air : 2.59 days (ECHA)
- Xylene : The estimated half life of the xylene isomers and ethylbenzene is about 1-2 days based on a recommended reaction rate with hydroxyl radicals and the concentration of hydroxyl radicals recommended in the ECHA guidance. (ECHA)
- Benzene : calculated phototransformation half-life in air : 13.4days (ECHA)

3) Bioaccumulative potential

○ **Bioaccumulation**

- Naphtha (petroleum), heavy straight-run : BCF = 1216 (estimated) (EPISUITE)
- Toluene : BCF = 90 (ECHA)

- Xylene : The highest calculated BCF is 25.9. (ECHA)
- Benzene : BCF = 13 (ECHA)

○ **Biodegradation**

- Naphtha (petroleum), heavy straight-run : 90.35% degradation after 28d; readily biodegradable (ISO/DIS 14593, GLP) (ECHA)
- Toluene : 80% degradation after 20days; readily biodegradable (ECHA)
- Xylene : 98 % degradation (28 d) (OECD TG 301F, GLP) (ECHA)
- Benzene : 96% degradation after 28days; readily biodegradable (ECHA)

4) Mobility in soil

- Naphtha (petroleum), heavy straight-run : Koc = 31280 (EPISUITE)
- Toluene : Koc = 205 (calculated) (ECHA)
- Xylene : Koc=246-540 (HSDB)
- Benzene : Koc = 134 (ECHA)

5) Hazard to the ozone layer

- Naphtha (petroleum), heavy straight-run : Not applicable
- Toluene : Not applicable
- Xylene : Not applicable
- Benzene : Not applicable

6) Other adverse effects

- Naphtha (petroleum), heavy straight-run : Not available
- Toluene : Not available
- Xylene : Not available
- Benzene : Not available

13. DISPOSAL CONSIDERATIONS

1) Disposal methods

- Waste must be disposed of in accordance with federal, state and local environmental control regulation.

2) Special precaution for disposal

- Consider the required attentions in accordance with waste treatment management regulation.

14. TRANSPORT INFORMATION

1) UN No.

- 1268

2) Proper shipping name

- PETROLEUM DISTILLATES, N.O.S. or PETROLEUM PRODUCTS, N.O.S

3) Transport hazard class(es)

- 3

4) Packing group

- I

5) Marine pollutant

- Not applicable

6) Special safety response for transportation or transportation measure

- Types of Emergency Measures in Case of Fire : F-E
- Types of Emergency Measures in Leakage : S-E

15. REGULATORY INFORMATION

EINECS(or ELINCS)

- Naphtha (petroleum), heavy straight-run : European EINECS phase-in substance
- Toluene : European EINECS phase-in substance
- Xylene : European EINECS phase-in substance
- Benzene : European EINECS phase-in substance

EU CLP (CLASSIFICATION) - PRODUCT : Not applicable

- Naphtha (petroleum), heavy straight-run : Not applicable
- Toluene : Not applicable
- Xylene : Not applicable
- Benzene : Not applicable

Substances restricted under REACH

- Naphtha (petroleum), heavy straight-run : Substances restricted under REACH
- Toluene : Substances restricted under REACH
- Xylene : Not applicable
- Benzene : Substances restricted under REACH

Substances subject to authorization under REACH

REACH SVHC List

Korea

○ **Occupational Safety and Health Act**

- Naphtha (petroleum), heavy straight-run : Not applicable
- Toluene : Substance subject to occupational exposure limits, Substance subject to permissible exposure limits, Hazardous substance subject to control, Harmful agents subject to work environment monitoring, Harmful agents subject to workers requiring health examination, Substance subject to submission of process safety reports
- Xylene : Substance subject to occupational exposure limits, Hazardous substance subject to control, Harmful agents subject to work environment monitoring, Harmful agents subject to workers requiring health examination, Substance subject to submission of process safety reports
- Benzene : Substance subject to occupational exposure limits, Substance subject to permissible exposure limits, Special management substance, Harmful agents subject to work environment monitoring, Harmful agents subject to workers requiring health examination, Substance subject to submission of process safety reports

○ **K-REACH**

- Naphtha (petroleum), heavy straight-run : Not applicable
- Toluene : Phase-in Substances subject to Registration
- Xylene : Phase-in Substances subject to Registration, Substance subject to intensive control (2019)
- Benzene : Phase-in Substances subject to Registration, Substance subject to intensive control (2019)

○ **Chemical Control Act in Korea**

- Naphtha (petroleum), heavy straight-run : Not applicable
- Toluene : Toxic substance, Substance requiring preparation for accidents, List of substance subjected to the PRTR

- Xylene : Toxic substance, List of substance subjected to the PRTR
- Benzene : Toxic substance, Substance requiring preparation for accidents, List of substance subjected to the PRTR

○ **Safety Control of Dangerous Substances Act**

- Naphtha (petroleum), heavy straight-run : Not applicable
- Toluene : Dangerous substance
- Xylene : Dangerous substance
- Benzene : Dangerous substance

U.S.A

○ **US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)**

- Naphtha (petroleum), heavy straight-run : Not applicable
- Toluene : Not applicable
- Xylene : Not applicable
- Benzene : Not applicable

○ **CERCLA Designation of hazardous substances (40 CFR 302.4)**

- Naphtha (petroleum), heavy straight-run : Not applicable
- Toluene : US management information(CERCLA regulation)
- Xylene : US management information(CERCLA regulation)
- Benzene : US management information(CERCLA regulation)

○ **CERCLA Section 302 regulation**

- Naphtha (petroleum), heavy straight-run : Not applicable
- Toluene : Not applicable
- Xylene : Not applicable
- Benzene : Not applicable

○ **CERCLA Section 304 regulation**

- Naphtha (petroleum), heavy straight-run : Not applicable
- Toluene : Not applicable
- Xylene : Not applicable
- Benzene : Not applicable

○ **CERCLA Section 313 regulation**

- Naphtha (petroleum), heavy straight-run : Not applicable
- Toluene : US management information(CERCLA Section 313 regulation)
- Xylene : US management information(CERCLA Section 313 regulation)
- Benzene : US management information(CERCLA Section 313 regulation)

Interntional Convention on Environment

○ **Rotterdam Convention list**

- Naphtha (petroleum), heavy straight-run : Not applicable
- Toluene : Not applicable
- Xylene : Not applicable
- Benzene : Not applicable

○ **Stockholm Convention list**

- Naphtha (petroleum), heavy straight-run : Not applicable
- Toluene : Not applicable
- Xylene : Not applicable
- Benzene : Not applicable

○ **Montreal Protocol list**

- Naphtha (petroleum), heavy straight-run : Not applicable
- Toluene : Not applicable
- Xylene : Not applicable
- Benzene : Not applicable

National Inventory

○ **Korea**

- Naphtha (petroleum), heavy straight-run : Not applicable
- Toluene : Not applicable
- Xylene : Not applicable
- Benzene : Not applicable

○ **U.S.A**

- Naphtha (petroleum), heavy straight-run : US TSCA phase-in substance
- Toluene : US TSCA phase-in substance
- Xylene : US TSCA phase-in substance
- Benzene : US TSCA phase-in substance

○ **China**

- Naphtha (petroleum), heavy straight-run : China phase-in substance
- Toluene : China phase-in substance
- Xylene : China phase-in substance
- Benzene : China phase-in substance

○ **Japan**

- Naphtha (petroleum), heavy straight-run : Not applicable
- Toluene : Japan ENCS phase-in substance
- Xylene : Japan ENCS phase-in substance
- Benzene : Japan ENCS phase-in substance

16. OTHER INFORMATION

1) Reference

- Sources of information used in preparing this SDS included one or more of the following: Internal technical data, data from OECD eChemPortal, ECHA, NITE, TOXNET, IPCS and KOSHA search results.

2) Issue Date

- 2008-07-25

3) Revision number and Last date revised

○ **Number of revised**

- 4

○ **Date of last revision**

- 2024-01-11

○ **Last Revision History**

- We have reviewed the ingredient content and revised the 3. COMPOSITION/INFORMATION ON INGREDIENTS sections, changed hazard classification.

4) Other

- The information contained in the Safety Data Sheet is at the date of its issuance to the best of our knowledge

correct according to the data available to us. The information is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and shall not be considered a warranty or quality specification of any type. The information provided relates only to the specific material identified at the top of this SDS and may not be valid when the SDS material is used in combination with any other materials or in any process, unless specified in the text. Material users should review the information and recommendations in the specific context of their intended manner of handling, use, processing and storage, including an assessment of the appropriateness of the SDS material in the user's end product, if applicable.