Low boiling point petroleum naphthas: Human health tier II assessment

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Chemicals in this assessment

Chemical Name in the Inventory	CAS Number
Distillates, petroleum, C3-5, 2-methyl-2-butene rich	68477-34-9
Distillates, petroleum, polymerized, steam cracked petroleum distillates, C5-12 fraction	68477-50-9
Distillates, petroleum, steam cracked, C5-12 fraction	68477-53-2
Distillates, petroleum, steam cracked, C5-10 fraction, mixed with light steam cracked petroleum naphtha C5 fraction	68477-55-4
Extracts, petroleum, cold acid, C4-6	68477-61-2
Extracts, petroleum, reformer recycle	68477-63-4
Distillates, petroleum, naphtha raffinate pyrolyzate derived, gasoline blending	68425-29-6
Raffinates, petroleum, reformer, Lurgi unit seperated	68425-35-4
Naphtha, petroleum, heavy straight run	64741-41-9
Naphtha, petroleum, full range straight run	64741-42-0
Naphtha, petroleum, light straight run	64741-46-4
Naphtha, petroleum, heavy catalytic cracked	64741-54-4
Naphtha, petroleum, light catalytic cracked	64741-55-5
Naphtha, petroleum, light catalytic reformed	64741-63-5
Naphtha, petroleum, full range alkylate	64741-64-6
Naphtha, petroleum, heavy alkylate	64741-65-7

Chemical Name in the Inventory	CAS Number
Naphtha, petroleum, light alkylate	64741-66-8
Naphtha, petroleum, heavy catalytic reformed	64741-68-0
Naphtha, petroleum, light hydrocracked	64741-69-1
Naphtha, petroleum, isomerization	64741-70-4
Naphtha, petroleum, polymerization	64741-72-6
Naphtha, petroleum, light thermal cracked	64741-74-8
Naphtha, petroleum, heavy hydrocracked	64741-78-2
Naphtha, petroleum, heavy thermal cracked	64741-83-9
Naphtha, petroleum, solvent refined light	64741-84-0
Naphtha, petroleum, sweetened	64741-87-3
Extracts, petroleum, heavy naphtha solvent	64741-98-6
Extracts, petroleum, light naphtha solvent	64741-99-7
Naphtha, petroleum, acid treated	64742-15-0
Naphtha, petroleum, chemically neutralized heavy	64742-22-9
Naphtha, petroleum, chemically neutralized light	64742-23-0
Naphtha, petroleum, hydrotreated light	64742-49-0
Naphtha, petroleum, hydrodesulfurized light	64742-73-0
Naphtha, petroleum, light steam cracked	64742-83-2
Solvent naphtha, petroleum, light aliphatic	64742-89-8
Solvent naphtha, petroleum, light aromatic	64742-95-6
Distillates, petroleum, depentanizer overheads	68477-89-4
Residues, petroleum, butane splitter bottoms	68478-12-6
Residues, petroleum, C6-8 catalytic reformer	68478-15-9
Residual oils, petroleum, deisobutanizer tower	68478-16-0
Distillates, petroleum, heavy aromatic	67891-79-6
Distillates, petroleum, light aromatic	67891-80-9
Aromatic hydrocarbons, C6-10, acid treated, neutralized	68131-49-7
Residues, petroleum, light naphtha solvent extracts	68333-29-9

Chemical Name in the Inventory	CAS Number
Distillates, petroleum, straight run light	68410-05-9
Raffinates, petroleum, catalytic reformer ethylene glycol water countercurrent extracts	68410-71-9
Distillates, petroleum, hydrotreated middle, intermediate boiling	68410-96-8
Distillates, petroleum, light distillate hydrotreating process, low boiling	68410-97-9
Distillates, petroleum, hydrotreated heavy naphtha, deisohexanizer overheads	68410-98-0
Aromatic hydrocarbons, C6-8, naphtha raffinate pyrolyzate derived	68475-70-7
Distillates, petroleum, catalytic reformed depentanizer	68475-79-6
Distillates, petroleum, light steam cracked naphtha	68475-80-9
Hydrocarbons, C4-6, C5 rich	68476-43-7
Hydrocarbons, C5-10-aromatic concentrate, ethylene manufactured by product	68476-45-9
Hydrocarbons, C3-11, catalytic cracker distillates	68476-46-0
Hydrocarbons, C2-6, C6-8 catalytic reformer	68476-47-1
Hydrocarbons, C.gtoreq.5, C5-6 rich	68476-50-6
Hydrocarbons, C5 rich	68476-55-1
Hydrocarbons, cyclic C5 and C6	68476-56-2
Solvent naphtha, petroleum, light aromatic, hydrotreated	68512-78-7
Naphtha, petroleum, full range coker	68513-02-0
Distillates, petroleum, catalytic reformed straight run naphtha overheads	68513-63-3
Hydrocarbons, C4-10-unsaturated	68514-38-5
Petroleum products, hydrofiner powerformer reformates	68514-79-4
Naphtha, petroleum, steam cracked middle aromatic	68516-20-1
Alkenes, C6-	68526-52-3
Naphtha, petroleum, clay treated full range straight run	68527-21-9
Naphtha, petroleum, clay treated light straight run	68527-22-0
Naphtha, petroleum, light steam cracked aromatic	68527-23-1

Chemical Name in the Inventory	CAS Number
Naphtha, petroleum, light steam cracked, debenzenized	68527-26-4
Naphtha, petroleum, full range alkylate, butane containing	68527-27-5
Hydrocarbons, C8-11	68553-14-0
Distillates, petroleum, benzene unit hydrotreater dipentanizer overheads	68602-79-9
Distillates, petroleum, thermal cracked naphtha and gas oil	68603-00-9
Distillates, petroleum, thermal cracked naphtha and gas oil, C5 dimer containing	68603-01-0
Distillates, petroleum, thermal cracked naphtha and gas oil, extractive	68603-03-2
Naphtha, petroleum, aromatic containing	68603-08-7
Naphtha, petroleum, catalytic cracked light distilled	68783-09-5
Naphtha, petroleum, light polymerization	68783-11-9
Naphtha, petroleum, unsweetened	68783-12-0
Naphtha, petroleum, light, sweetened	68783-66-4
Hydrocarbons, C6-12, benzene recovery	68919-15-3
Naphtha, petroleum, full range reformed	68919-37-9
Hydrocarbons, C7-9	68920-06-9
Distillates, petroleum, light straight run gasoline fractionation stabilizer overheads	68921-08-4
Distillates, petroleum, naphtha unifiner stripper	68921-09-5
Distillates, petroleum, light thermal cracked, debutanized aromatic	68955-29-3
Naphtha, petroleum, catalytic reformed	68955-35-1
Fuel oil, residual, wastewater skimmings	68956-48-9
Petroleum products, C5-12, reclaimed, wastewater treatment	68956-70-7
Aromatic hydrocarbons, C9-11	70693-06-0
Alkanes, C4-6	70955-08-7

Preface

This assessment was carried out by staff of the National Industrial Chemicals Notification and Assessment Scheme (NICNAS) using the Inventory Multi-tiered Assessment and Prioritisation (IMAP) framework.

The IMAP framework addresses the human health and environmental impacts of previously unassessed industrial chemicals listed on the Australian Inventory of Chemical Substances (the Inventory).

The framework was developed with significant input from stakeholders and provides a more rapid, flexible and transparent approach for the assessment of chemicals listed on the Inventory.

Stage One of the implementation of this framework, which lasted four years from 1 July 2012, examined 3000 chemicals meeting characteristics identified by stakeholders as needing priority assessment. This included chemicals for which NICNAS already held exposure information, chemicals identified as a concern or for which regulatory action had been taken overseas, and chemicals detected in international studies analysing chemicals present in babies' umbilical cord blood.

Stage Two of IMAP began in July 2016. We are continuing to assess chemicals on the Inventory, including chemicals identified as a concern for which action has been taken overseas and chemicals that can be rapidly identified and assessed by using Stage One information. We are also continuing to publish information for chemicals on the Inventory that pose a low risk to human health or the environment or both. This work provides efficiencies and enables us to identify higher risk chemicals requiring assessment.

The IMAP framework is a science and risk-based model designed to align the assessment effort with the human health and environmental impacts of chemicals. It has three tiers of assessment, with the assessment effort increasing with each tier. The Tier I assessment is a high throughput approach using tabulated electronic data. The Tier II assessment is an evaluation of risk on a substance-by-substance or chemical category-by-category basis. Tier III assessments are conducted to address specific concerns that could not be resolved during the Tier II assessment.

These assessments are carried out by staff employed by the Australian Government Department of Health and the Australian Government Department of the Environment and Energy. The human health and environment risk assessments are conducted and published separately, using information available at the time, and may be undertaken at different tiers.

This chemical or group of chemicals are being assessed at Tier II because the Tier I assessment indicated that it needed further investigation.

For more detail on this program please visit:**www.nicnas.gov.au**

Disclaimer

ACRONYMS & ABBREVIATIONS

Grouping Rationale

The chemicals in this group are mostly those assigned in the low boiling point naphthas (gasoline) category by the CONservation of Clean Air and Water in Europe (CONCAWE). Several other chemicals with similar uses, carbon number ranges, and boiling point ranges have been included.

The low boiling point petroleum naphtha category consists of petroleum refinery streams used as blending constituents in final gasoline products, intermediate distillation products, or residues from distillation or extraction processes. The petroleum refinery stream used in the blending of gasoline is referred to as naphthas. The chemicals exist in closed systems and are typically consumed or undergo further processing or blending before leaving the site under a different CAS number (refer to **Import, manufacture and use** section). The final gasoline products are usually a combination of low boiling point petroleum naphthas and other hydrocarbons produced from petroleum refineries.

The chemicals in this category are unknown or variable compositions, complex reaction products and biological materials (UVCBs) containing aliphatic and aromatic hydrocarbons (e.g. alkanes, cycloalkanes, aromatics, alkenes etc.) primarily in the C4–C12 range (Government of Canada, 2011 & 2013; US EPA, 2011; NCI). The chemicals in this category are volatile liquids at standard temperatures and pressures with boiling point ranges covering -20 to 230 °C (CONCAWE, 2001; US EPA, 2011).

The chemical classes common to all naphthas are paraffinic, olefinic, naphthenic, and aromatic hydrocarbons. Chemicals in this category include, for example, C4–C6 aliphatics, C7–C12 isoalkanes, or a full spectrum of C4–C12 aliphatics and aromatics. The chemical compositions of these hydrocarbons depend on both the original source of the chemical and on the refinery process (e.g. distillation, alkylation, cracking, hydrotreatment, solvent extraction, desulfurisation etc.) used during manufacture.

Low boiling point petroleum naphthas may contain benzene (CAS No. 71-43-2) at an approximate concentration of 1 %, with benzene concentrations measured at up to 20 % in naphtha reformates (Government of Canada, 2011 & 2013). Benzene has a number of hazardous properties (NICNAS, 2001).

Import, Manufacture and Use

Australian

The following Australian industrial uses were reported under previous mandatory and/or voluntary calls for information.

The chemicals identified by the CAS Nos. 64742-49-0 and 64742-89-8 have reported commercial use as solvents and are listed on the 2006 High Volume Industrial Chemicals List (HVICL) with a total reported volume of 1000–9999 tonnes.

The chemical identified by the CAS No. 64742-95-6 has reported commercial use as a solvent, fuel additive, lubricant, and additive and is listed on the 2006 HVICL with a total reported volume of 10000–99999 tonnes.

International

The following international uses have been identified through:

- the European Union (EU) Registration, Evaluation and Authorisation of Chemicals (REACH) dossiers;
- the Organisation for Economic Co-operation and Development Screening information data set International Assessment Report (OECD SIAR);
- Galleria Chemica;
- the Substances and Preparations in the Nordic countries (SPIN) database;
- the European Commission Cosmetic Ingredients and Substances (CosIng) database;
- the United States (US) Personal Care Product Council International Nomenclature of Cosmetic Ingredients (INCI) Dictionary;
- the OECD High Production Volume chemical program (OECD HPV);
- the US Environmental Protection Agency's Aggregated Computer Toxicology Resource (ACToR);
- the US National Library of Medicine's Hazardous Substances Data Bank (HSDB); and
- various international assessments (US EPA, 2011; Government of Canada, 2011 & 2013).

The chemicals have reported uses as fuels. The chemicals are either site-limited or can be transferred to other petroleum processing facilities such as a fractionation plant.

Some of the chemicals listed in the SPIN database have reported domestic uses such as cleaning/washing agents, adhesives, binding agents, paints, lacquers and varnishes. However, it should be noted that SPIN does not distinguish between direct use of the chemical or use of the materials that are indirectly produced from the chemical.

Restrictions

Australian

The chemicals in the low boiling point petroleum naphtha category are listed in the *Poisons standard—the Standard for the uniform scheduling of medicines and poisons* (SUSMP) in Schedule 5 (SUSMP, 2014).

Schedule 5:

'HYDROCARBONS, LIQUID, including kerosene, diesel (distillate), mineral turpentine, white petroleum spirit, toluene, xylene and light mineral and paraffin oils (but excluding their derivatives), except:

(a) toluene and xylene when included in Schedule 6;

(b) benzene and liquid aromatic hydrocarbons when included in Schedule 7;

(c) food grade and pharmaceutical grade white mineral oils;

(d) in solid or semi-solid preparations;

(e) in preparations containing 25 per cent or less of designated solvents;

(f) in preparations packed in pressurised spray packs;

(g) in adhesives packed in containers each containing 50 grams or less of adhesive;

(h) in writing correction fluids and thinners for writing correction fluids packed in containers having a capacity of 20 mL or less; or

(i) in other preparations when packed in containers with a capacity of 2 mL or less.'

Schedule 5 chemicals are described as 'Substances with a low potential for causing harm, the extent of which can be reduced through the use of appropriate packaging with simple warnings and safety directions on the label.' Schedule 5 chemicals are labelled with 'Caution' (SUSMP, 2014).

International

The majority of the chemicals are listed on the EU Cosmetics Regulation 1223/2009 Annex II—List of substances prohibited in cosmetic products (Galleria Chemica). In addition, the majority of the chemicals are restricted under Annex XVII to the REACH Regulations (Galleria Chemica). The chemicals cannot be used in substances and preparations placed on the market for sale to the general public in individual concentrations ≥0.1 % (European Parliament & Council, 1999; European Parliament & Council, 2006; European Parliament & Council, 2008).

Existing Worker Health and Safety Controls

Hazard Classification

The majority of the chemicals are classified as hazardous, with the following risk phrases for human health in the Hazardous Substances Information System (HSIS) (Safe Work Australia):

- R45 Carc. Cat. 1 (carcinogenicity)
- R46 Muta. Cat. 2 (mutagenicity)
- Xn; R65 (aspiration hazard).

These classifications are subject to notes H and P.

'**Note H:** The classification and label shown for this substance applies to the dangerous property(ies) indicated by the Risk Phrase(s) in combination with the category(ies) of danger shown. The manufacturers, distributors and importers of this substance shall be obliged to carry out an investigation to make themselves aware of the relevant and accessible data which exists for all other properties to classify and label the substance.'

'**Note P:** The classification as a carcinogen or 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). When the substance is classified as a carcinogen or mutagen, Note E shall also apply. When the substance is not classified as a carcinogen or mutagen, at least the Safety Phrases (2-)23-24-62 shall apply. This note applies only to certain complex oil-derived substances in Annex I.'

'**Note E:** For substances ascribed Note E, the Risk Phrases R20, R21, R22, R23, R24, R25, R26, R27, R28 R39, R68 (harmful), R48 and R65 and all combinations of these Risk Phrases should be preceded by the word ‘also’.'

The following chemicals, listed by their CAS numbers, are not classified for human health hazards:

64741-72-6

64741-99-7

68333-29-9

68476-43-7

68476-45-9

68476-56-2

68477-63-4

68514-38-5

68526-52-3

68553-14-0

68602-79-9

68783-11-9

68919-15-3

68920-06-9

68956-48-9

68956-70-7

70693-06-0

70955-08-7

Exposure Standards

Australian

No specific exposure standards are available for the chemicals. The component chemical in the low boiling point petroleum naphthas, benzene (CAS No. 71-43-2), has an exposure standard of 3.2 mg/m^3 (1 ppm) time weighted average (TWA).

International

No specific exposure standards are available for the chemicals. The component chemical, benzene (CAS No. 71-43-2), has a number of exposure standards available internationally (Galleria Chemica).

Health Hazard Information

The chemicals in this group include a large number of individual components, which include linear and branched alkanes and alkenes, and aromatic compounds. The aromatic compounds, in general, are of higher toxicity than the aliphatic components. Of these, benzene (CAS No. 71-43-2) (NICNAS, 2001) has the highest toxicity and also serves as a marker for the aromatic content of these UVCBs.

Acute Toxicity

Oral

The chemicals have low acute oral toxicity based on results from animal tests with median lethal doses (LD50s) in Sprague Dawley (SD) rats for the chemicals identified by the CAS Nos. 64741-55-5, 64741-66-8, 64741-87-3, and 68955-35-1 reported to be >2000 mg/kg bw (Government of Canada, 2011; US EPA, 2011).

Dermal

The chemicals have low acute dermal toxicity based on results from animal tests with LD50s in New Zealand White rabbits for the chemicals identified by the CAS Nos. 64741-55-5, 64741-87-3, and 68955-35-1 reported to be >2000 mg/kg bw (Government of Canada, 2011; US EPA, 2011). No mortalities occurred at any doses for any of the chemicals in this group.

Inhalation

The chemicals have low acute toxicity based on results from animal tests following inhalation exposure. The median lethal concentrations (LC50s) in SD rats for the chemicals identified by the CAS Nos. 64741-55-5, 64741-66-8, and 64741-87-3 are >5.3, >6.31, and >5.2 mg/L, respectively.

Corrosion / Irritation

Corrosivity

No data are available.

Respiratory Irritation

No data are available.

Skin Irritation

The chemicals in this group are shown to have low to moderate skin irritation effects from animal studies. The chemicals identified by the CAS Nos. 64741-55-5, 64741-66-8, 64741-68-0, 64742-95-6, and 68955-35-1 are moderately irritating to rat or rabbit skin, while the chemical identified by the CAS No. 64741-87-3 was found to be slightly irritating to rabbit skin (US EPA, 2011).

The component chemical, benzene (CAS No. 71-43-2), is classified as hazardous with the risk phrase 'Irritant: Irritating to skin' (R38) (Safe Work Australia). In humans, vapour levels >60 ppm have been associated with skin irritation, including second degree burns (NICNAS, 2001). Reported concentrations of benzene in the low boiling point petroleum naphthas, up to 20 % but typically 1 % (Government of Canada, 2011 & 2013), are not above the cut-off concentrations for classification for skin irritation (Safe Work Australia, 2004; GHS, 2009). Therefore, classification for skin irritation could be warranted for some of the chemicals in this group (refer to **Recommendation** section).

Eye Irritation

In eye irritation studies in rabbits, the chemicals were found to have low to moderate eye irritation effects. The chemicals identified by the CAS Nos. 64741-55-5, 64741-66-8, and 64741-87-3 were not irritating to rabbit eyes, whereas the chemical with CAS No. 68955-35-1 was moderately irritating to rabbit eyes (US EPA, 2011).

The component chemical, benzene, is classified as hazardous with the risk phrase 'Irritant: Irritating to eyes' (R36) (Safe Work Australia). Benzene vapours have been reported to cause eye irritation in humans and rats at concentrations ≥33 and ≥10 ppm, respectively (NICNAS, 2001). Reported concentrations of benzene in the low boiling point petroleum naphthas, up to 20 % but typically 1 % (Government of Canada, 2011 & 2013), are not above the cut-off concentrations for

classification for eye irritation (Safe Work Australia, 2004; GHS, 2009). Therefore, classification for eye irritation could be warranted for some of the chemicals in this group (refer to **Recommendation** section).

Sensitisation

Respiratory Sensitisation

No data are available.

Skin Sensitisation

Some chemicals in this group were not found to induce dermal sensitisation when tested in guinea pigs in various skin sensitisation studies. The chemicals identified by the CAS Nos. 64741-55-5, 64741-66-8, and 68955-35-1 were found to be non-sensitising to guinea pig skin in the reported studies (US EPA, 2011).

Repeated Dose Toxicity

Oral

Limited data are available for the chemicals in this category.

In a 13-week oral gavage study in SD rats exposed to the chemical identified by the CAS No. 64742-95-6, a no observed adverse effect level (NOAEL) of 125 mg/kg bw/day was reported. Effects observed at the lowest observed adverse effect level (LOAEL) of 500 mg/kg bw/day included increased alanine aminotransferase and total protein in males, increased relative liver and kidney weights in females, and liver cell hypertrophy in both males and females (Government of Canada, 2011; US EPA, 2011).

The component chemical, benzene (CAS No. 71-43-2), is classified as hazardous with the risk phrase 'Toxic: Danger of serious damage to health by prolonged exposure by inhalation, in contact with skin and if swallowed' (R48/23/24/25) (Safe Work Australia) (refer to **Repeat dose inhalation toxicity**).

Dermal

Occluded applications of the chemicals identified by the CAS Nos. 64741-55-5, 64741-68-0, and 64741-87-3 showed no treatment-related systemic effects from 28–90-day repeated dose toxicity studies in SD rats at doses up to 652, 300, and 797 mg/kg bw/day, respectively (US EPA, 2011).

In a 28-day study, SD rats were applied the chemical with CAS No. 68513-02-0, a NOAEL of 38 mg/kg bw/day was reported based on increased globulin values and decreased albumin/globulin ratios in females, and lymph node hyperplasia in both sexes at the LOAEL of 188 mg/kg bw/day (US EPA, 2011).

Studies in rabbits (strain not specified) for the chemicals identified by the CAS Nos. 64741-54-4 and 68955-35-1 had reported LOAELs of 200 mg/kg bw/day (decreased growth rate) and 1000 mg/kg bw/day (increased mortality), respectively, from 28-day repeated dermal dose toxicity studies (Government of Canada, 2011).

The component chemical, benzene (CAS No. 71-43-2), is classified as hazardous with the risk phrase 'Toxic: Danger of serious damage to health by prolonged exposure by inhalation, in contact with skin and if swallowed' (R48/23/24/25) (Safe Work Australia) (refer to **Repeat dose inhalation toxicity**).

Inhalation

In general, minimal systemic effects have been observed in rodents following 28–90-day whole body inhalation exposures to the chemicals identified by the CAS Nos. 64741-41-9, 64741-55-5, 64741-63-5, and 64742-95-6 (Government of Canada, 2011; US EPA, 2011). The range of no observed adverse effect concentrations (NOAECs) reported in these studies was 2.3–13.4 mg/L (US EPA, 2011). The systemic effects included renal effects (increased kidney weight and renal lesions such as tubule dilation), liver effects (increased liver weight), and haematological changes.

The component chemical, benzene (CAS No. 71-43-2), is classified as hazardous with the risk phrase 'Toxic: Danger of serious damage to health by prolonged exposure by inhalation, in contact with skin and if swallowed' (R48/23/24/25) (Safe Work Australia). This classification is based on bone marrow depression observed with repeated occupational exposure to benzene vapours at ≥7.6 ppm (0.024 mg/L) (NICNAS, 2001). Reported concentrations of benzene (US EPA, 2011; Government of Canada, 2011 & 2013) in the low boiling point petroleum naphthas are, in some cases, above the cut-off concentrations for classification (Safe Work Australia, 2004; GHS, 2009). Therefore, classification for repeated dose toxicity could be warranted for some of the chemicals in this group (refer to **Recommendation** section).

Genotoxicity

The chemicals are classified as hazardous—Category 2 mutagenic substance—with the risk phrase ‘May cause heritable genetic damage’ (T; R46) in the HSIS (Safe Work Australia). This classification need not apply if it can be shown that the chemical contains less than 0.1 % w/w benzene. The available data support the overall classification.

Several in vitro assays for some of the chemicals indicated the following mixed results (Government of Canada, 2011 & 2013; US EPA, 2011):

- negative in bacterial mutation assays (various *Salmonella typhimurium* strains) in the absence and presence of metabolic activation (CAS Nos. 64741-46-4, 64742-95-6, and 68410-97-9);
- positive results in chromosomal aberrations of human lymphocytes with and without metabolic activation (doses up to 20 µg/mL for CAS No. 64742-95-6);
- positive results in chromosomal aberrations from mouse lymphoma assays with metabolic activation (doses up to 400 µg/mL for CAS No. 68955-35-1; unspecified doses for CAS No. 64741-68-0) and without metabolic activation (doses up to 0.10 µL/mL for CAS No. 64741-74-8);
- negative results in chromosomal aberrations from mouse lymphoma assays with and without metabolic activation (CAS Nos. 64741-55-5, 64741-63-5, 64741-66-8, 64741-87-3;
- equivocal for sister chromatid exchange (SCE) in Chinese hamster ovary (CHO) cells without metabolic activation (CAS No. 64741-55-5);
- positive results for cell transformation in mouse embryo cells without metabolic activation at doses up to 1500 µg/mL (CAS No. 68410-97-9); and
- negative for unscheduled DNA synthesis (UDS) in primary rat hepatocytes (CAS No. 68410-97-9).

The chemicals were negative in several in vivo genotoxicity assays which included the following:

- induction of bone marrow chromosomal aberration of SD rats (inhalation exposure and intraperitoneal (i.p.) injection of CAS No. 64741-55-5; i.p. injection of CAS Nos. 64741-66-8, 64741-87-3, 68526-52-3, and 68955-35-1).

The component chemical, benzene, is classified as hazardous—Category 2 mutagenic substance—with the risk phrase ‘May cause heritable genetic damage’ (T; R46) in the HSIS (Safe Work Australia). Reported concentrations of benzene in the low boiling point petroleum naphthas, up to 20 % but typically 1 % (Government of Canada, 2011 & 2013), are in most cases above the cut-off concentrations for classification (Safe Work Australia, 2004; GHS, 2009). Therefore, classification for genotoxicity could be warranted for most of the chemicals in this group (refer to **Recommendation** section).

Carcinogenicity

The majority of the chemicals are classified as hazardous—Category 1 carcinogenic substance—with the risk phrase ‘May cause cancer’ (T; R45) in the HSIS (Safe Work Australia). This classification need not apply if it can be shown that the chemical contains less than 0.1 % w/w benzene. The available data support the overall classification.

The chemicals identified by CAS Nos. 64741-46-4 and 64741-55-5 were carcinogenic in C3H mice at unspecified doses. The studies included reports of an increased incidence of malignant dermal neoplasms, which include squamous cell carcinomas and fibrosarcomas (US EPA, 2011). No other details were provided.

The chemicals identified by the CAS Nos. 64741-66-8, 64741-68-0, and 64741-87-3 were negative in lifetime carcinogenicity studies in C3H mice (US EPA, 2011).

The component chemical, benzene, is classified as hazardous—Category 1 carcinogenic substance—with the risk phrase ‘May cause cancer’ (T; R45) in the HSIS (Safe Work Australia). Reported concentrations of benzene in the low boiling point petroleum naphthas, up to 20 % but typically 1 % (Government of Canada, 2011 & 2013) are, in most cases, above the cut-off concentrations for classification (Safe Work Australia, 2004; GHS, 2009). Therefore, classification for carcinogenicity could be warranted for most of the chemicals in this group (refer to **Recommendation** section).

Reproductive and Developmental Toxicity

The chemicals are not reproductive or developmental toxicants.

In several combined reproductive/developmental toxicity screening tests, SD rats exposed by inhalation to the chemicals identified by the CAS Nos. 64741-41-9, 64741-55-5, 64741-63-5, 64741-66-8, and 64741-74-8 showed no adverse effects on reproductive and developmental toxicity parameters at doses up to 13.4, 23.0, 23.7, and 25 mg/L (Government of Canada, 2011; US EPA, 2011).

In a dermal application of the chemical with CAS No. 68513-02-0 in SD rats, no reproductive and developmental effects were observed at a dose up to 1000 mg/kg bw/day (Government of Canada, 2011).

Other Health Effects

Neurotoxicity

The SD rats were exposed to the chemical with CAS No. 64741-63-5 at a concentration of 27.8 mg/L. Neurobehavioural measurements, including motor activity and functional operational battery tests were undertaken, where an increase in motor activity was observed (US EPA, 2011). The chemicals identified by the CAS Nos. 64741-55-5 and 64741-66-8 were not neurotoxic to SD rats exposed by inhalation (US EPA, 2011).

Risk Characterisation

Critical Health Effects

The critical health effects of the chemicals are dependent on the composition of benzene. Effects include systemic long-term effects (carcinogenicity and mutagenicity) and systemic acute effects (acute toxicity from inhalation exposure, skin and eye irritation). The chemical could also cause harmful effects following

repeated oral, dermal and inhalation exposure. Components other than benzene are associated with a range of hazardous properties. However, exposure to chemicals of this group is expected to be very limited, and so only the most severe effect will contribute to the likely risk.

Public Risk Characterisation

Given the uses identified for these chemicals, it is unlikely that the public will be exposed. Hence, the public risk from these chemicals is not considered to be unreasonable.

There is limited general population exposure to unintentional releases of the gasoline blending constituents in the vicinity of petroleum refineries. These releases are likely to contribute to ambient background levels of hazardous components such as benzene. However, industrial emissions of benzene are not considered a significant source of public exposure (NICNAS, 2001).

Companies introducing and processing the chemicals are likely to implement control measures to reduce fugitive emissions on site as a consequence of several occupational and environmental legislative requirements, such as licence conditions and occupational exposure standards. Based on data reported to the National Pollutant Inventory for Australian refineries, fugitive emissions of volatile organic compounds have generally reduced over the past few years (NPI).

Occupational Risk Characterisation

Given that the chemicals are typically consumed or undergo further processing in closed systems, limited occupational exposure is expected.

Given the critical systemic acute and chronic health effects, the chemicals could pose an unreasonable risk to workers unless adequate control measures to minimise oral, dermal, ocular and inhalation exposure are implemented. The chemicals should be appropriately classified and labelled to ensure that a person conducting a business or undertaking (PCBU) at a workplace (such as an employer) has adequate information to determine the appropriate controls.

Any air monitoring should include benzene.

The data available support an amendment to the hazard classification in the HSIS (refer to **Recommendation** section).

NICNAS Recommendation

Assessment of these chemicals are considered to be sufficient, provided that the recommended amendment to the classification is adopted, and labelling and all other requirements are met under workplace health and safety and poisons legislation as adopted by the relevant state or territory.

Companies introducing or processing the chemicals should continually seek to reduce fugitive emissions as far as reasonably practicable.

Regulatory Control

Work Health and Safety

The chemicals are recommended for classification and labelling under the current Approved Criteria and adopted GHS as below. This assessment does not consider classification of physical and environmental hazards.

For skin and eye irritation and chronic health effects, the classification will be dependent on the concentration of benzene as follows:

Irritation/Corrosivity

In the absence of specific test data for chemicals in this group with high benzene content, the classification should be determined based on the levels of benzene;

Repeated dose toxicity

In the absence of specific test data, the classification should be determined based on the levels of benzene;

Genotoxicity

In the absence of specific test data, the classification should be determined based on the levels of benzene; and

Carcinogenicity

In the absence of specific test data, the classification should be determined based on the levels of benzene.

The classification criteria for mixtures (Safe Work Australia, 2004; GHS, 2009) should be applied to benzene, based on its concentration in these UVCB substances. The classifications below represent the highest possible classifications for each endpoint under these rules. Should empirical data become available for any member of the group indicating that a lower (or higher) classification is appropriate for the specific chemical, this may be used to amend the default classification for that chemical.

Hazard	Approved Criteria (HSIS)[a]	GHS Classification (HCIS)[b]

Hazard	Approved Criteria (HSIS)[a]	GHS Classification (HCIS)[b]
Acute Toxicity	Harmful: may cause lung damage if swallowed (Xn; R65)*	May be fatal if swallowed and enters airways - Aspi. Cat. 1 (H304)
Irritation / Corrosivity	Irritating to eyes (Xi; R36) Irritating to skin (Xi; R38)	Causes serious eye irritation - Cat. 2A (H319) Causes skin irritation - Cat. 2 (H315)
Repeat Dose Toxicity	Toxic: danger of serious damage to health by prolonged exposure through inhalation, in contact with skin and if swallowed (T; R48/23/24/25)	Causes damage to organs through prolonged or repeated exposure - Cat. 1 (H372)
Genotoxicity	Muta. Cat 2 - May cause heritable genetic damage (T; R46)*	May cause genetic defects - Cat. 1B (H340)
Carcinogenicity	Carc. Cat 1 - May cause cancer (T; R45)*	May cause cancer - Cat. 1A (H350)

[a] Approved Criteria for Classifying Hazardous Substances [NOHSC:1008(2004)].

[b] Globally Harmonized System of Classification and Labelling of Chemicals (GHS) United Nations, 2009. Third Edition.

[*] Existing Hazard Classification. No change recommended to this classification

Advice for industry

Control measures

Control measures to minimise the risk from oral, dermal, ocular and inhalation exposure to the chemicals should be implemented in accordance with the hierarchy of controls. Approaches to minimise risk include substitution, isolation and engineering controls. Measures required to eliminate, or minimise risk arising from storing, handling and using a hazardous chemical depend on the physical form and the manner in which the chemicals are used. Examples of control measures which could minimise the risk include, but are not limited to:

- using closed systems or isolating operations;
- using local exhaust ventilation to prevent the chemicals from entering the breathing zone of any worker;
- health monitoring for any worker who is at risk of exposure to the chemicals, if valid techniques are available to monitor the effect on the worker's health;
- air monitoring to ensure control measures in place are working effectively and continue to do so;
- minimising manual processes and work tasks through automating processes;
- work procedures that minimise splashes and spills;
- regularly cleaning equipment and work areas; and
- using protective equipment that is designed, constructed, and operated to ensure that the worker does not come into contact with the chemicals.

Guidance on managing risks from hazardous chemicals are provided in the *Managing risks of hazardous chemicals in the workplace—Code of practice* available on the Safe Work Australia website.

Personal protective equipment should not solely be relied upon to control risk and should only be used when all other reasonably practicable control measures do not eliminate or sufficiently minimise risk. Guidance in selecting personal protective equipment can be obtained from Australian, Australian/New Zealand or other approved standards.

Obligations under workplace health and safety legislation

Information in this report should be taken into account to help meet obligations under workplace health and safety legislation as adopted by the relevant state or territory. This includes, but is not limited to:

- ensuring that hazardous chemicals are correctly classified and labelled;
- ensuring that (material) safety data sheets ((M)SDS) containing accurate information about the hazards (relating to both health hazards and physicochemical (physical) hazards) of the chemicals are prepared; and
- managing risks arising from storing, handling and using a hazardous chemical.

Your work health and safety regulator should be contacted for information on the work health and safety laws in your jurisdiction.

Information on how to prepare an (M)SDS and how to label containers of hazardous chemicals are provided in relevant codes of practice such as the *Preparation of safety data sheets for hazardous chemicals—Code of practice* and *Labelling of workplace hazardous chemicals—Code of practice*, respectively. These codes of

practice are available from the Safe Work Australia website.

A review of the physical hazards of these chemicals has not been undertaken as part of this assessment.

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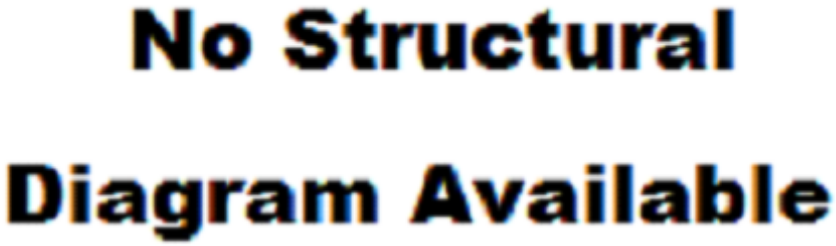
Last Update 21 April 2016

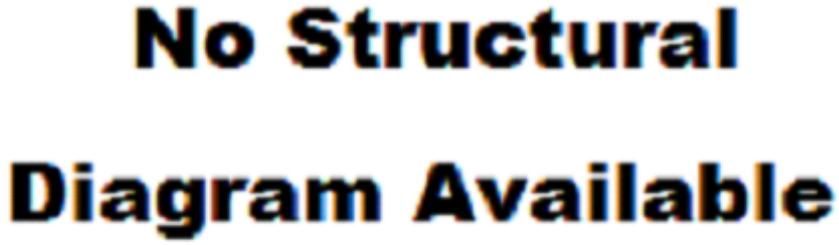
Chemical Identities

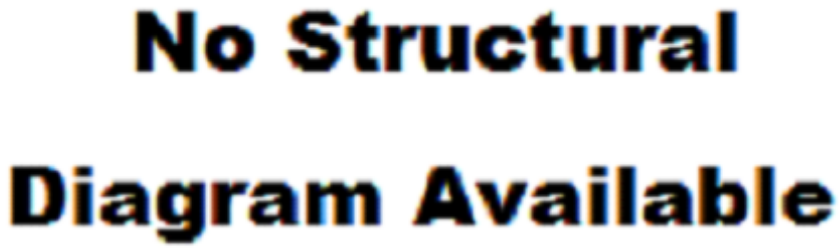
Chemical Name in the Inventory and Synonyms	**Distillates, petroleum, C3-5, 2-methyl-2-butene rich** Isoamylenes, extract

	Distillates, petroleum, C3-5, 2-methyl-2-butene-rich
CAS Number	68477-34-9
Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	N/A

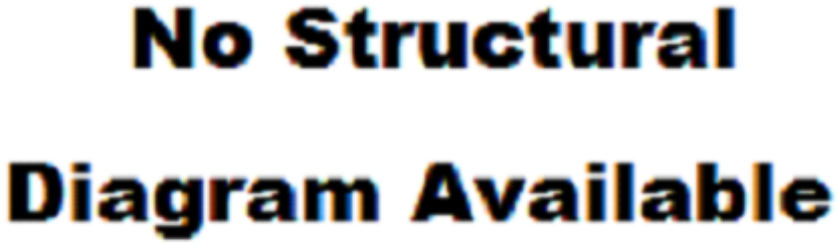
Chemical Name in the Inventory and Synonyms	**Distillates, petroleum, polymerized, steam cracked petroleum distillates, C5-12 fraction** (C5-12) Partial fraction, petroleum
CAS Number	68477-50-9
Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	N/A

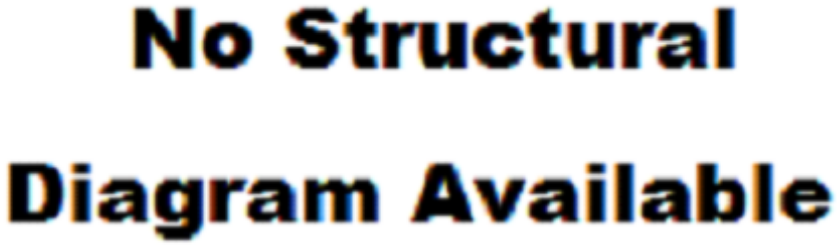
Chemical Name in the Inventory and Synonyms	**Distillates, petroleum, steam cracked, C5-12 fraction** Distillates (petroleum), steam-cracked C5-12 fraction

CAS Number	68477-53-2
Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	N/A

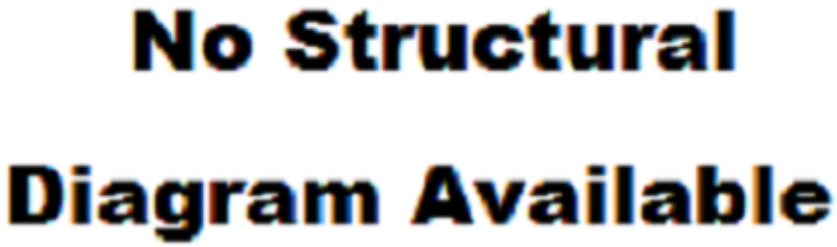
Chemical Name in the Inventory and Synonyms	**Distillates, petroleum, steam cracked, C5-10 fraction, mixed with light steam cracked petroleum naphtha C5 fraction** Distillates (petroleum), steam-cracked, C5-10 fraction, mixed with light steam-cracked petroleum naphtha C5 fraction
CAS Number	68477-55-4
Structural Formula	
Molecular Formula	.
Molecular Weight	N/A

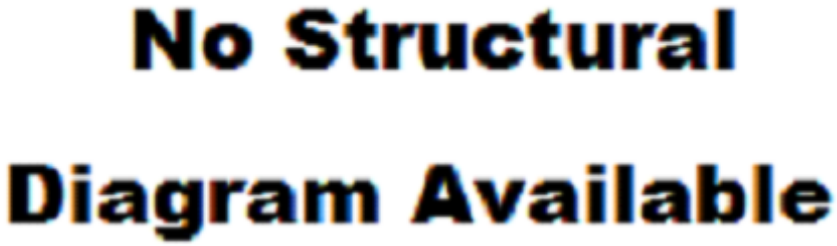
Chemical Name in the Inventory and Synonyms	**Extracts, petroleum, cold acid, C4-6** (C5) Mix extract

CAS Number	68477-61-2
Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	N/A

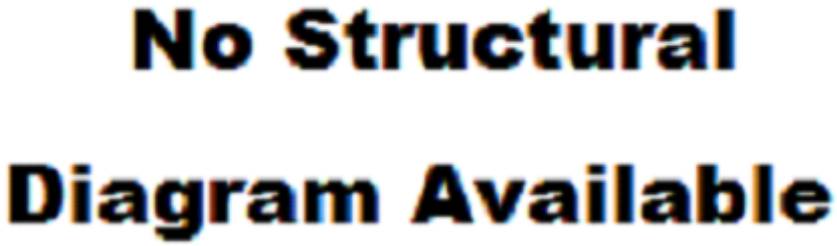
Chemical Name in the Inventory and Synonyms	**Extracts, petroleum, reformer recycle**
CAS Number	68477-63-4
Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	N/A

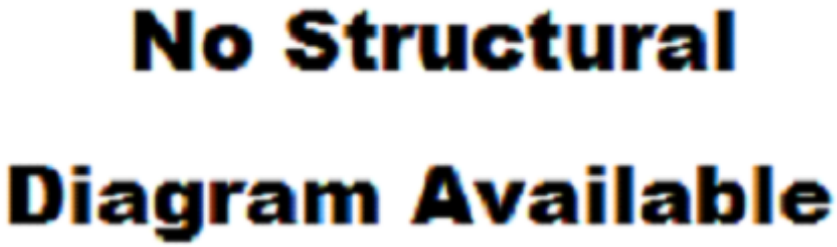
Chemical Name in the Inventory and Synonyms	**Distillates, petroleum, naphtha raffinate pyrolyzate derived, gasoline blending** Gasoline, blend stock Gasoline blending pyrolyzate derived naphtha raffinate distillates (petroleum)

CAS Number	68425-29-6
Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	N/A

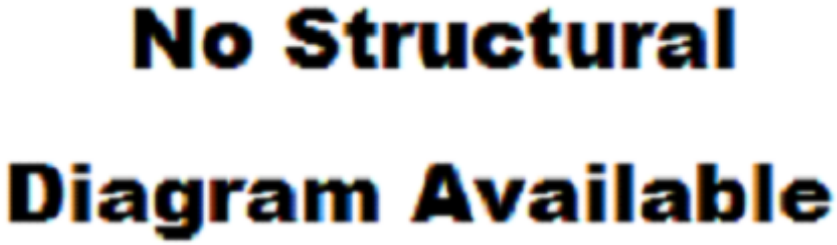
Chemical Name in the Inventory and Synonyms	**Raffinates, petroleum, reformer, Lurgi unit seperated** Raffinates (petroleum), reformer, Lurgi unit-sepd.
CAS Number	68425-35-4
Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	N/A

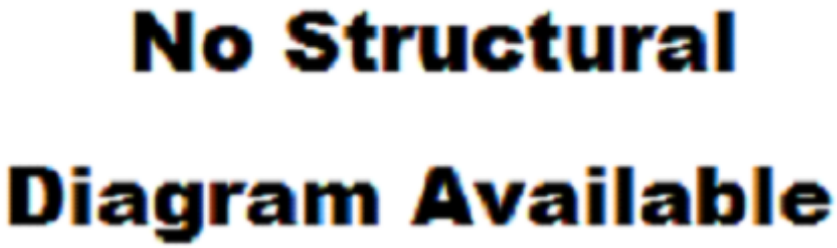
Chemical Name in the Inventory and Synonyms	**Naphtha, petroleum, heavy straight run** Atmospheric gas oil, petroleum slops naphtha
CAS Number	64741-41-9

Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	N/A

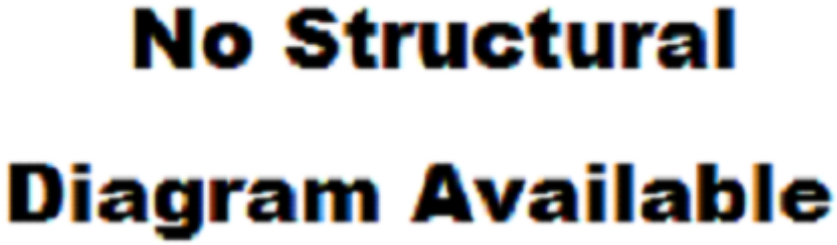
Chemical Name in the Inventory and Synonyms	**Naphtha, petroleum, full range straight run** Prefractionated crude naphtha
CAS Number	64741-42-0
Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	N/A

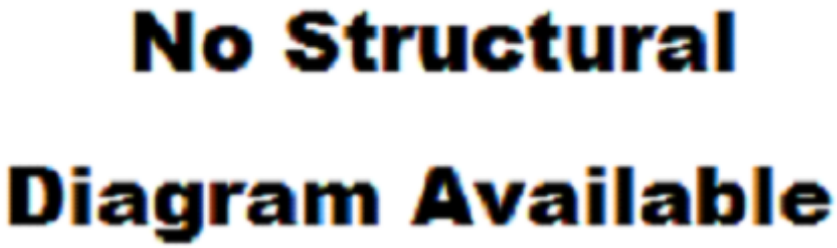
Chemical Name in the Inventory and Synonyms	**Naphtha, petroleum, light straight run** Light straight run gasoline
CAS Number	64741-46-4
Structural Formula	

	
Molecular Formula	Unspecified
Molecular Weight	N/A

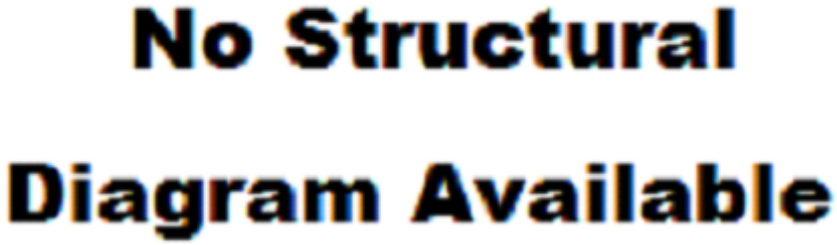
Chemical Name in the Inventory and Synonyms	**Naphtha, petroleum, heavy catalytic cracked**
CAS Number	64741-54-4
Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	N/A

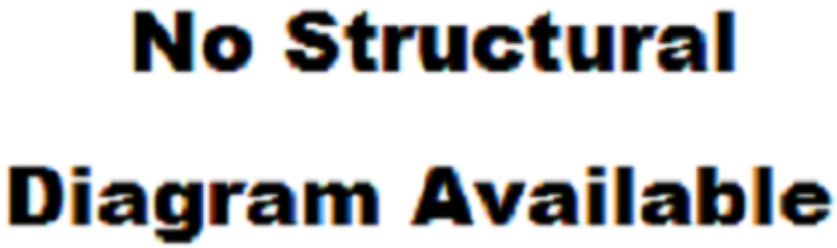
Chemical Name in the Inventory and Synonyms	**Naphtha, petroleum, light catalytic cracked** Light catalytic cracked naphtha, petroleum
CAS Number	64741-55-5
Structural Formula	

	
Molecular Formula	Unspecified
Molecular Weight	N/A

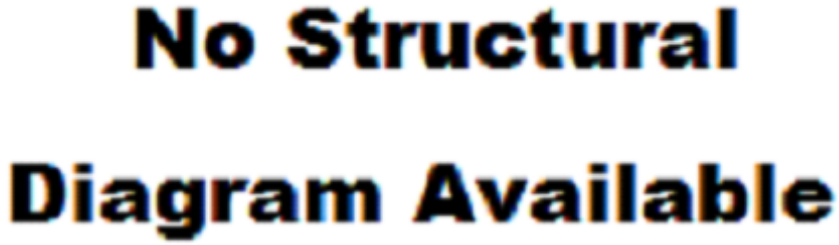
Chemical Name in the Inventory and Synonyms	**Naphtha, petroleum, light catalytic reformed** Platformate Naphthalene plant light gasoline
CAS Number	64741-63-5
Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	N/A

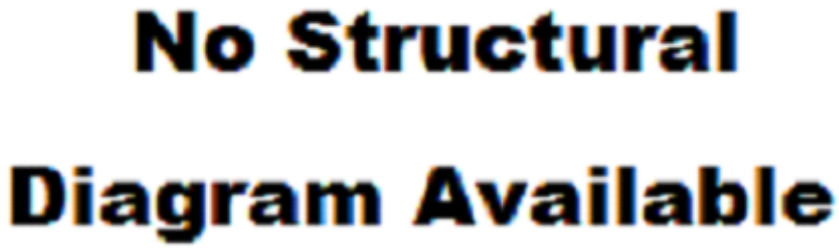
Chemical Name in the Inventory and Synonyms	**Naphtha, petroleum, full range alkylate** Full-range alkylate naphtha
CAS Number	64741-64-6
Structural Formula	

	
Molecular Formula	Unspecified
Molecular Weight	N/A

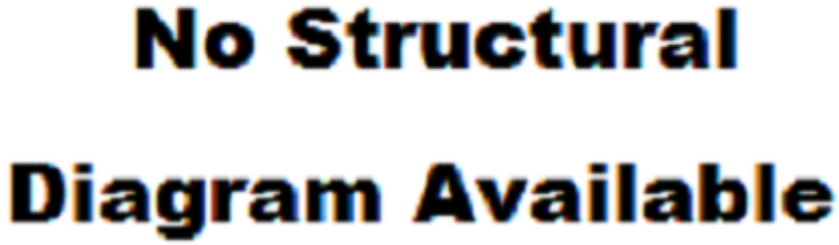
Chemical Name in the Inventory and Synonyms	**Naphtha, petroleum, heavy alkylate** Iso-paraffins Aliphatic HC's Low boiling point modified naphtha
CAS Number	64741-65-7
Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	N/A

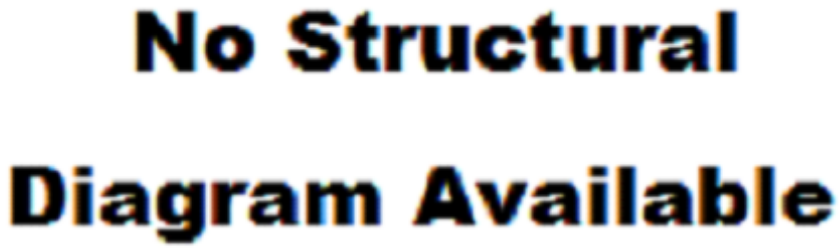
Chemical Name in the Inventory and Synonyms	**Naphtha, petroleum, light alkylate** Isopar E Fluid Isopar C Fluid
CAS Number	64741-66-8
Structural Formula	

	
Molecular Formula	Unspecified
Molecular Weight	N/A

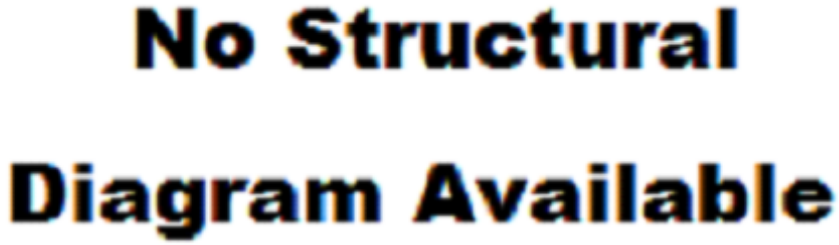
Chemical Name in the Inventory and Synonyms	**Naphtha, petroleum, heavy catalytic reformed** Naphthalene, plant heavy gasoline Heavy reformed naphtha
CAS Number	64741-68-0
Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	N/A

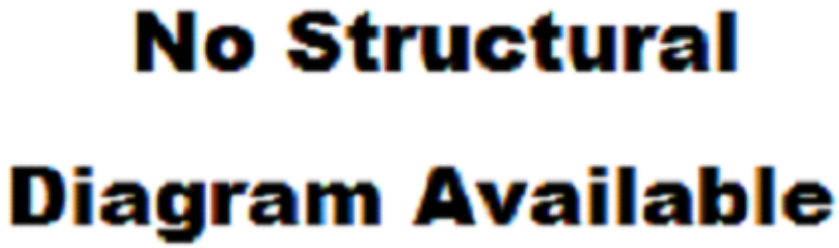
Chemical Name in the Inventory and Synonyms	**Naphtha, petroleum, light hydrocracked** Light hydrocracked naphtha, shale oil
CAS Number	64741-69-1
Structural Formula	

	
Molecular Formula	Unspecified
Molecular Weight	N/A

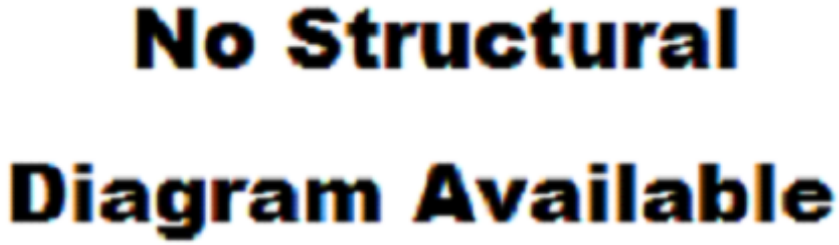
Chemical Name in the Inventory and Synonyms	**Naphtha, petroleum, isomerization** Isomerisation naphtha
CAS Number	64741-70-4
Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	N/A

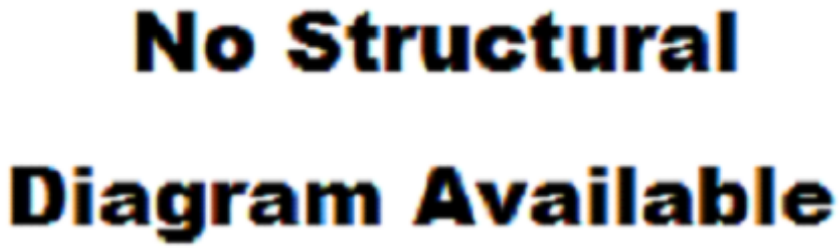
Chemical Name in the Inventory and Synonyms	**Naphtha, petroleum, polymerization** Petroleum, decene Petroleum, dodecene Petroleum, heptene Petroleum, nonene
CAS Number	64741-72-6
Structural Formula	

	
Molecular Formula	Unspecified
Molecular Weight	N/A

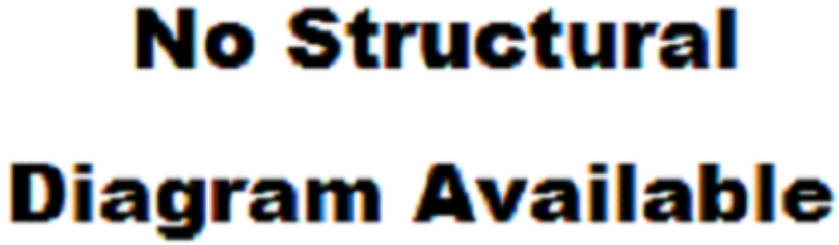
Chemical Name in the Inventory and Synonyms	**Naphtha, petroleum, light thermal cracked** Light coker naphtha, petroleum Light thermal cracked C4-5 naphtha and gas oil distillate
CAS Number	64741-74-8
Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	N/A

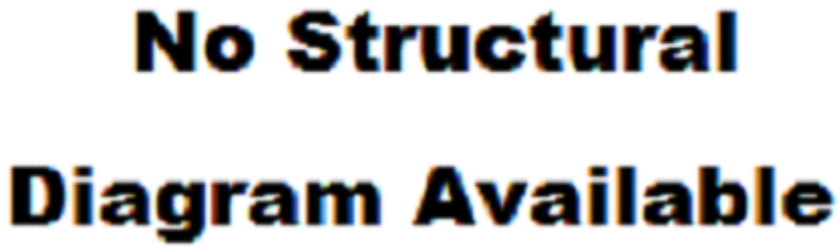
Chemical Name in the Inventory and Synonyms	**Naphtha, petroleum, heavy hydrocracked** Naphtha, petroleum, heavy hydrocracked
CAS Number	64741-78-2
Structural Formula	

	
Molecular Formula	Unspecified
Molecular Weight	N/A

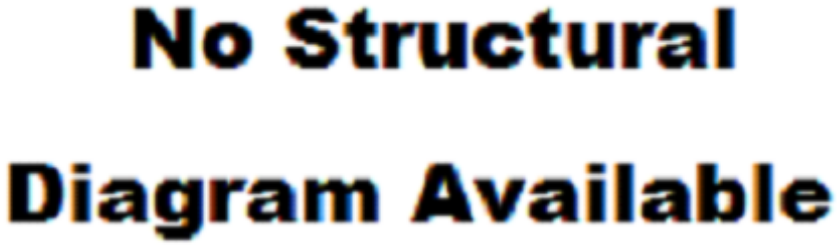
Chemical Name in the Inventory and Synonyms	**Naphtha, petroleum, heavy thermal cracked** Heavy thermally cracked naphtha
CAS Number	64741-83-9
Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	N/A

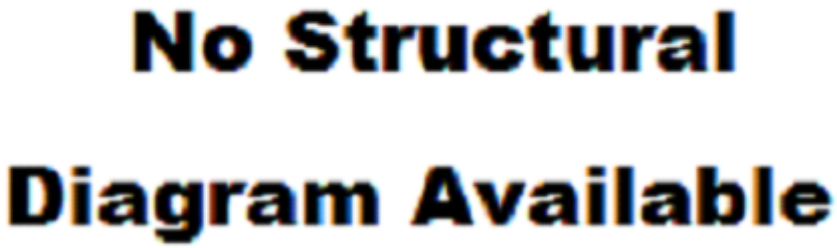
Chemical Name in the Inventory and Synonyms	**Naphtha, petroleum, solvent refined light** Solvent refined light naphtha heart cut, petroleum petroleum ehter 100/120
CAS Number	64741-84-0
Structural Formula	

	
Molecular Formula	Unspecified
Molecular Weight	N/A

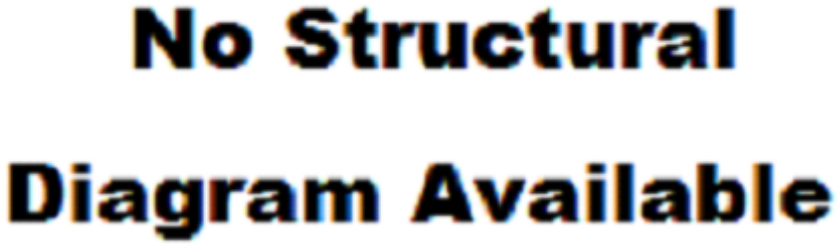
Chemical Name in the Inventory and Synonyms	**Naphtha, petroleum, sweetened** Sweetened hydrotreated light aromatic solvent naphtha
CAS Number	64741-87-3
Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	N/A

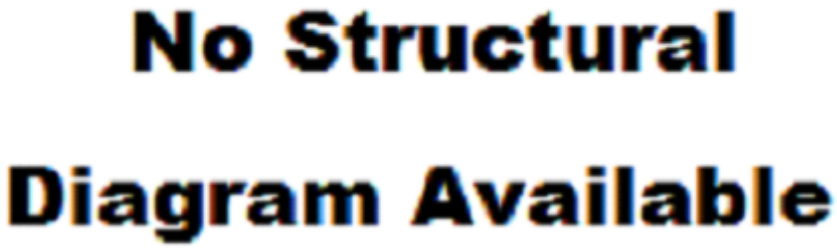
Chemical Name in the Inventory and Synonyms	**Extracts, petroleum, heavy naphtha solvent**
CAS Number	64741-98-6
Structural Formula	

	
Molecular Formula	Unspecified
Molecular Weight	N/A

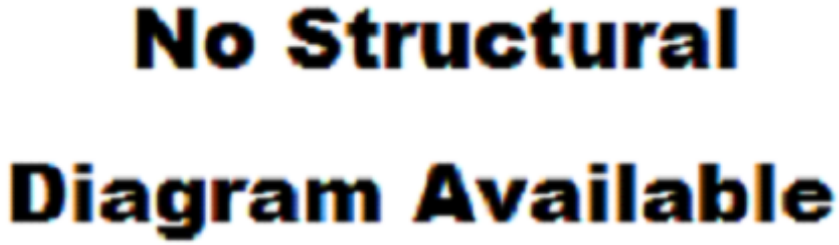
Chemical Name in the Inventory and Synonyms	**Extracts, petroleum, light naphtha solvent**
CAS Number	64741-99-7
Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	N/A

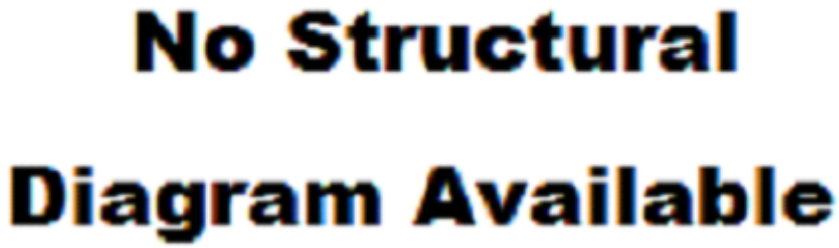
Chemical Name in the Inventory and Synonyms	**Naphtha, petroleum, acid treated**
CAS Number	64742-15-0
Structural Formula	

	
Molecular Formula	Unspecified
Molecular Weight	N/A

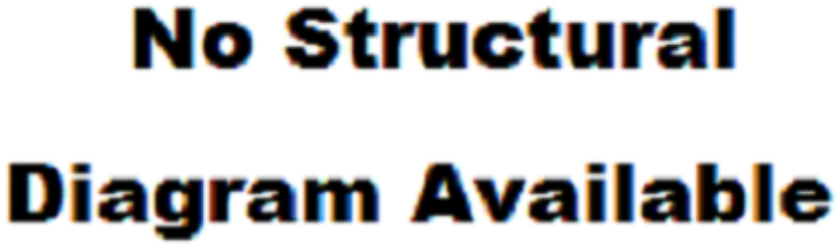
Chemical Name in the Inventory and Synonyms	**Naphtha, petroleum, chemically neutralized heavy**
CAS Number	64742-22-9
Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	N/A

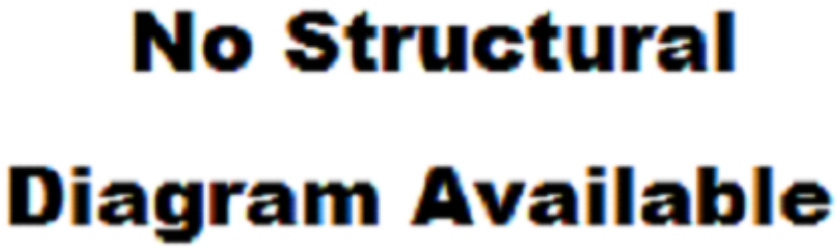
Chemical Name in the Inventory and Synonyms	**Naphtha, petroleum, chemically neutralized light**
CAS Number	64742-23-0
Structural Formula	

	
Molecular Formula	Unspecified
Molecular Weight	N/A

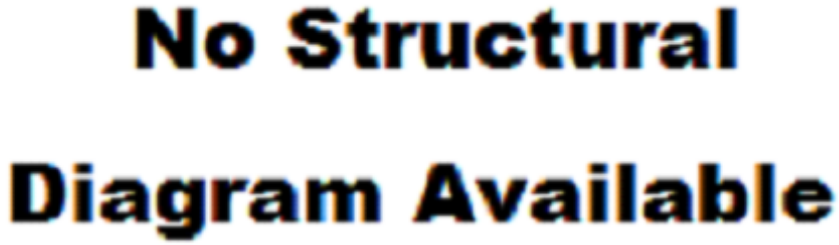
Chemical Name in the Inventory and Synonyms	**Naphtha, petroleum, hydrotreated light** Hydrotreated light, straight run, petroleum hydrosol essence 100/140
CAS Number	64742-49-0
Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	N/A

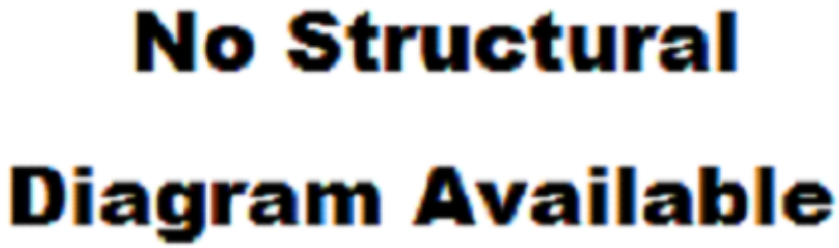
Chemical Name in the Inventory and Synonyms	**Naphtha, petroleum, hydrodesulfurized light** Hydrotreated light steam cracked naphtha heartcut, petroleum
CAS Number	64742-73-0
Structural Formula	

	
Molecular Formula	Unspecified
Molecular Weight	N/A

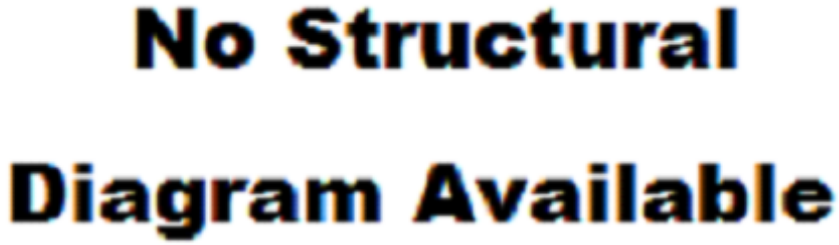
Chemical Name in the Inventory and Synonyms	**Naphtha, petroleum, light steam cracked** Crude butadiene, petroleum Light steam cracked aromatic naphtha C6 concentrate, petroleum Steam cracked narrow cut naphtha, petroleum
CAS Number	64742-83-2
Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	N/A

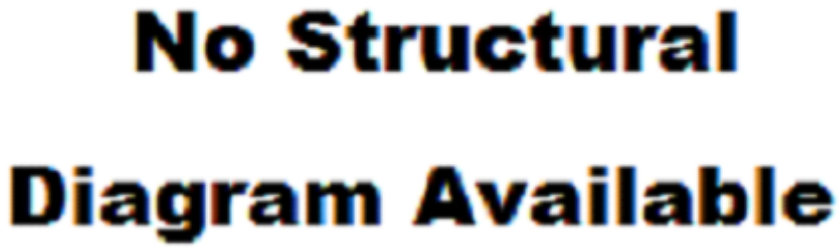
Chemical Name in the Inventory and Synonyms	**Solvent naphtha, petroleum, light aliphatic** Aliphatic naphtha Virgin naphtha
CAS Number	64742-89-8
Structural Formula	

	
Molecular Formula	Unspecified
Molecular Weight	N/A

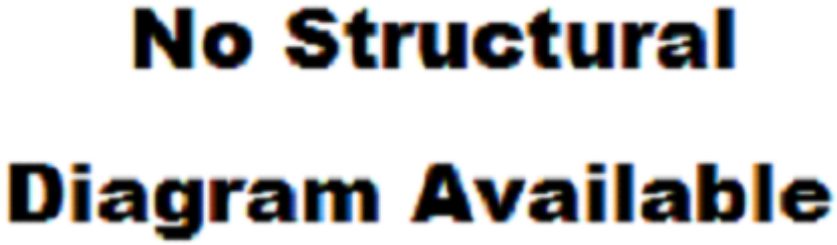
Chemical Name in the Inventory and Synonyms	**Solvent naphtha, petroleum, light aromatic** Petrinex T9 Solarex 90/160
CAS Number	64742-95-6
Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	N/A

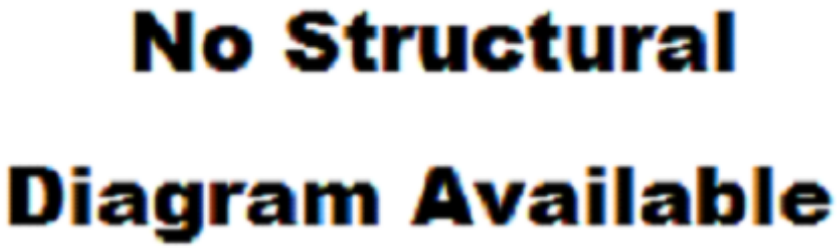
Chemical Name in the Inventory and Synonyms	**Distillates, petroleum, dependanizer overheads** Gases, petroleum, dependanizer overheads Pentane stream
CAS Number	68477-89-4
Structural Formula	

	
Molecular Formula	Unspecified
Molecular Weight	N/A

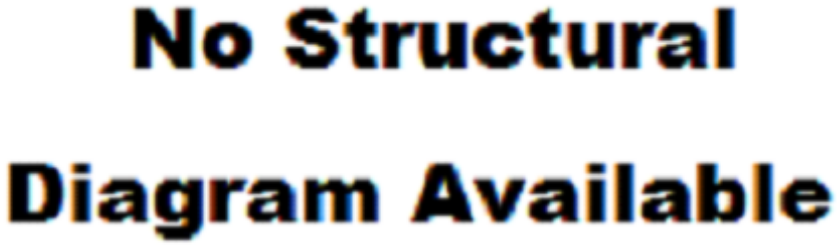
Chemical Name in the Inventory and Synonyms	**Residues, petroleum, butane splitter bottoms** Butane, splitter bottoms
CAS Number	68478-12-6
Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	N/A

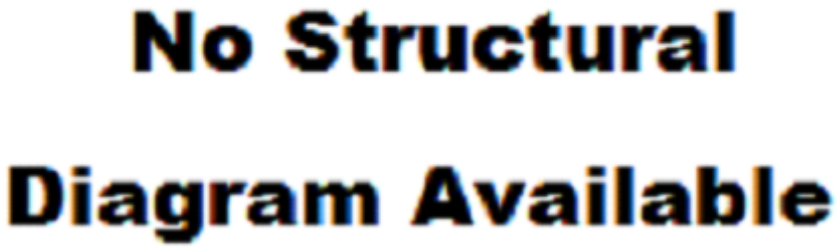
Chemical Name in the Inventory and Synonyms	**Residues, petroleum, C6-8 catalytic reformer** E-412 Liquid from the B-reformer
CAS Number	68478-15-9
Structural Formula	

	
Molecular Formula	Unspecified
Molecular Weight	N/A

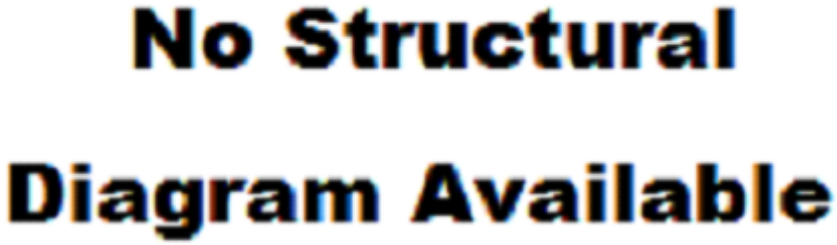
Chemical Name in the Inventory and Synonyms	**Residual oils, petroleum, deisobutanizer tower** Deisobutanizer tower bottoms
CAS Number	68478-16-0
Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	N/A

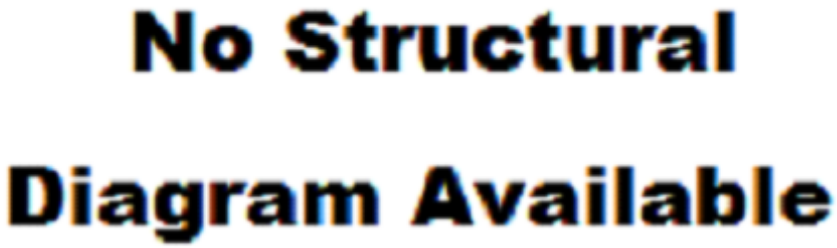
Chemical Name in the Inventory and Synonyms	**Distillates, petroleum, heavy aromatic** Heavy aromatic distillate, petroleum
CAS Number	67891-79-6
Structural Formula	

	
Molecular Formula	Unspecified
Molecular Weight	N/A

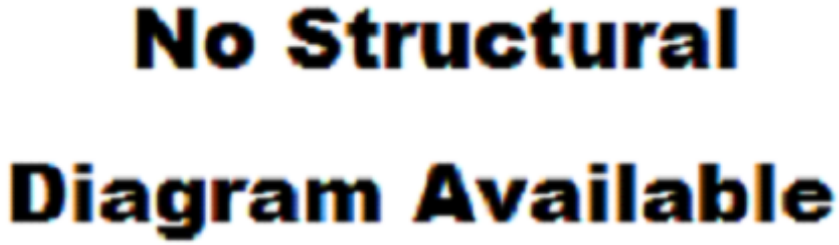
Chemical Name in the Inventory and Synonyms	**Distillates, petroleum, light aromatic** Light aromatic distillate, petroleum
CAS Number	67891-80-9
Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	N/A

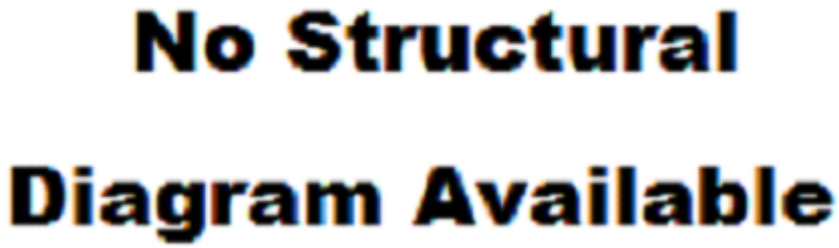
Chemical Name in the Inventory and Synonyms	**Aromatic hydrocarbons, C6-10, acid treated, neutralized**
CAS Number	68131-49-7
Structural Formula	

	
Molecular Formula	Unspecified
Molecular Weight	N/A

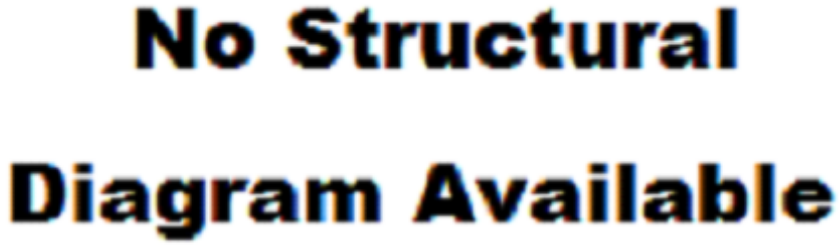
Chemical Name in the Inventory and Synonyms	**Residues, petroleum, light naphtha solvent extracts** Light naphtha solvent extract residuum
CAS Number	68333-29-9
Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	N/A

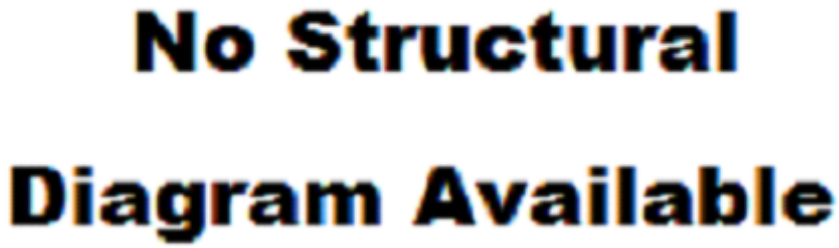
Chemical Name in the Inventory and Synonyms	**Distillates, petroleum, straight run light** Distillates, petroleum, light crude oil
CAS Number	68410-05-9
Structural Formula	

	
Molecular Formula	Unspecified
Molecular Weight	N/A

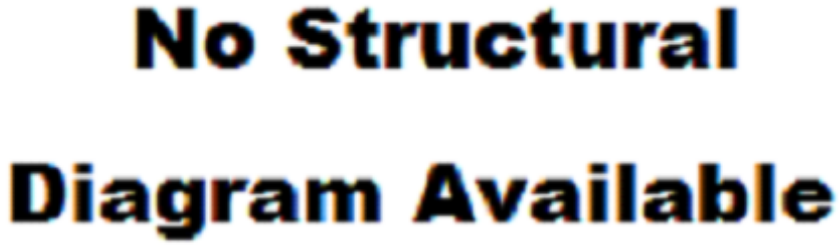
Chemical Name in the Inventory and Synonyms	**Raffinates, petroleum, catalytic reformer ethylene glycol water countercurrent extracts** Catalytic reformate, udex raffinate
CAS Number	68410-71-9
Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	N/A

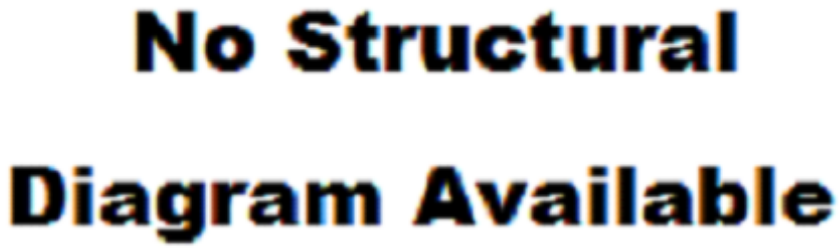
Chemical Name in the Inventory and Synonyms	**Distillates, petroleum, hydrotreated middle, intermediate boiling** Middle distillate hydrotreated gasoline
CAS Number	68410-96-8
Structural Formula	

	
Molecular Formula	Unspecified
Molecular Weight	N/A

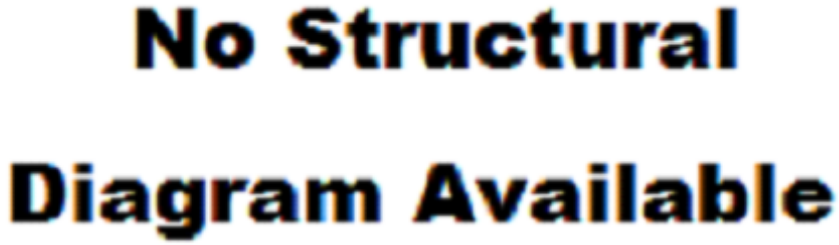
Chemical Name in the Inventory and Synonyms	**Distillates, petroleum, light distillate hydrotreating process, low boiling** Light distillate hydrotreater stabilizer overhead liquid
CAS Number	68410-97-9
Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	N/A

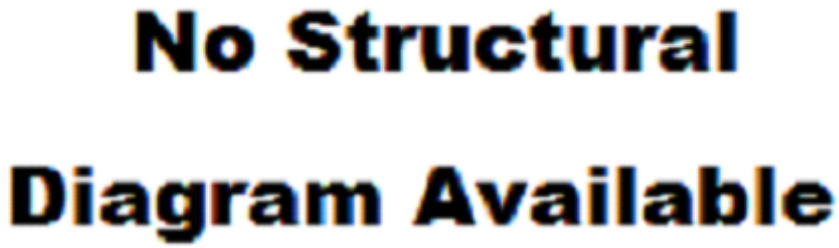
Chemical Name in the Inventory and Synonyms	**Distillates, petroleum, hydrotreated heavy naphtha, deisohexanizer overheads** Heavy naphtha, hydrotreater deisohexanizer overhead liquid
CAS Number	68410-98-0
Structural Formula	

	
Molecular Formula	Unspecified
Molecular Weight	N/A

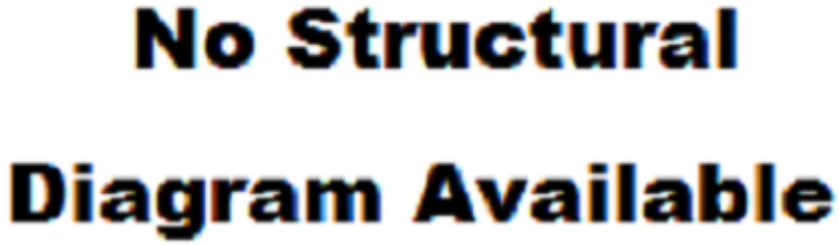
Chemical Name in the Inventory and Synonyms	**Aromatic hydrocarbons, C6-8, naphtha raffinate pyrolyzate derived** Aromatic concentrate (BTX)
CAS Number	68475-70-7
Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	N/A

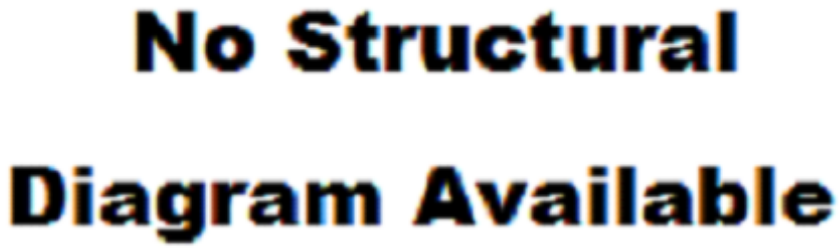
Chemical Name in the Inventory and Synonyms	**Distillates, petroleum, catalytic reformed depentanizer** Catalytic reforming depentanizer overhead liquid
CAS Number	68475-79-6
Structural Formula	

	
Molecular Formula	Unspecified
Molecular Weight	N/A

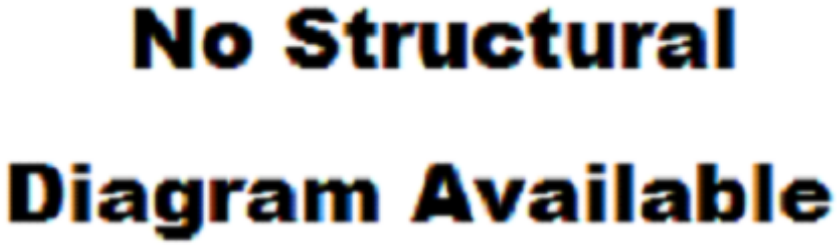
Chemical Name in the Inventory and Synonyms	**Distillates, petroleum, light steam cracked naphtha** Light steam cracked naphtha, C10-18 fraction
CAS Number	68475-80-9
Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	N/A

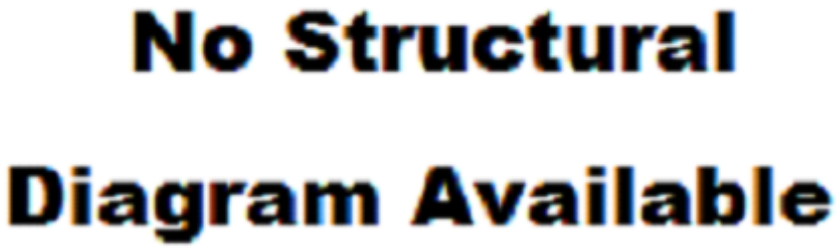
Chemical Name in the Inventory and Synonyms	**Hydrocarbons, C4-6, C5 rich** Pentane, pentene fraction
CAS Number	68476-43-7
Structural Formula	

	
Molecular Formula	Unspecified
Molecular Weight	

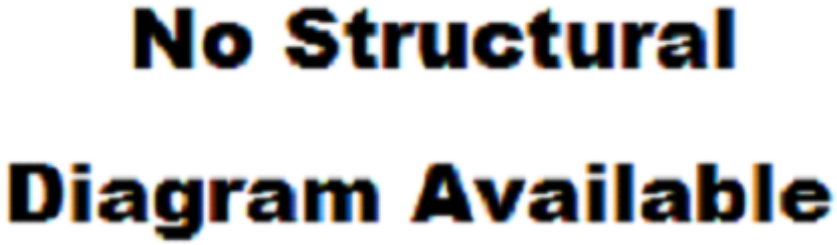
Chemical Name in the Inventory and Synonyms	**Hydrocarbons, C5-10-aromatic concentrate, ethylene manufactured by product**
CAS Number	68476-45-9
Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	N/A

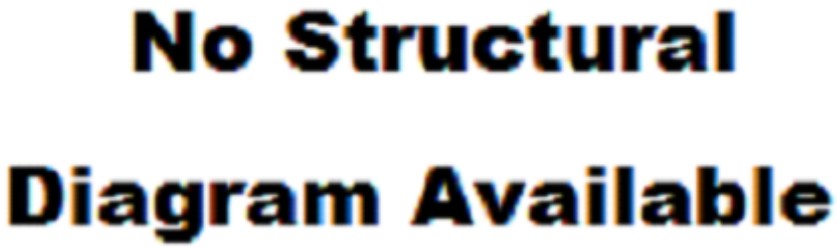
Chemical Name in the Inventory and Synonyms	**Hydrocarbons, C3-11, catalytic cracker distillates** TCC raw gasoline, petroleum
CAS Number	68476-46-0
Structural Formula	

	
Molecular Formula	Unspecified
Molecular Weight	N/A

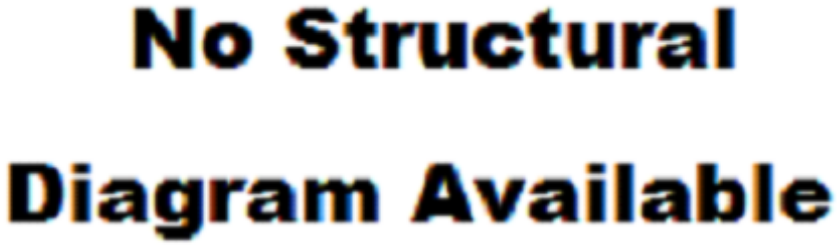
Chemical Name in the Inventory and Synonyms	**Hydrocarbons, C2-6, C6-8 catalytic reformer** F-405 liquid
CAS Number	68476-47-1
Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	N/A

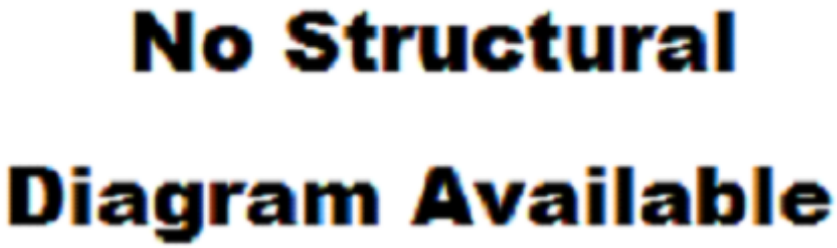
Chemical Name in the Inventory and Synonyms	**Hydrocarbons, C.gtoreq.5, C5-6 rich**
CAS Number	68476-50-6
Structural Formula	

	
Molecular Formula	Unspecified
Molecular Weight	N/A

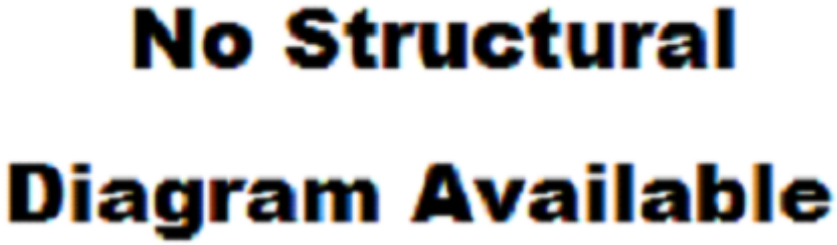
Chemical Name in the Inventory and Synonyms	**Hydrocarbons, C5 rich**
CAS Number	68476-55-1
Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	72.1

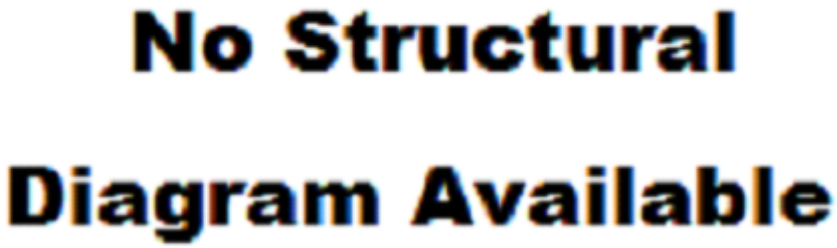
Chemical Name in the Inventory and Synonyms	**Hydrocarbons, cyclic C5 and C6**
CAS Number	68476-56-2
Structural Formula	

	
Molecular Formula	Unspecified
Molecular Weight	

Chemical Name in the Inventory and Synonyms	**Solvent naphtha, petroleum, light aromatic, hydrotreated** Hydrotreated, light aromatic, solvent naphtha
CAS Number	68512-78-7
Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	N/A

Chemical Name in the Inventory and Synonyms	**Naphtha, petroleum, full range coker** Full range coker naphtha, petroleum
CAS Number	68513-02-0
Structural Formula	

	
Molecular Formula	Unspecified
Molecular Weight	N/A

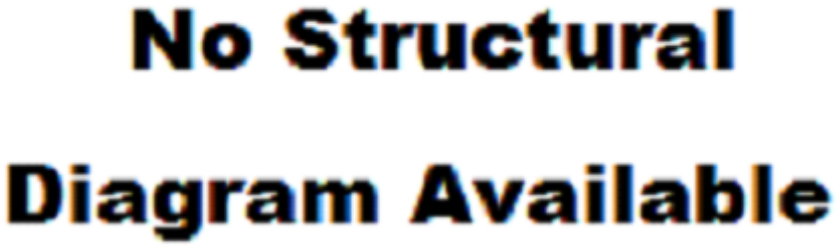
Chemical Name in the Inventory and Synonyms	**Distillates, petroleum, catalytic reformed straight run naphtha overheads**
CAS Number	68513-63-3
Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	N/A

Chemical Name in the Inventory and Synonyms	**Hydrocarbons, C4-10-unsaturated**
CAS Number	68514-38-5
Structural Formula	

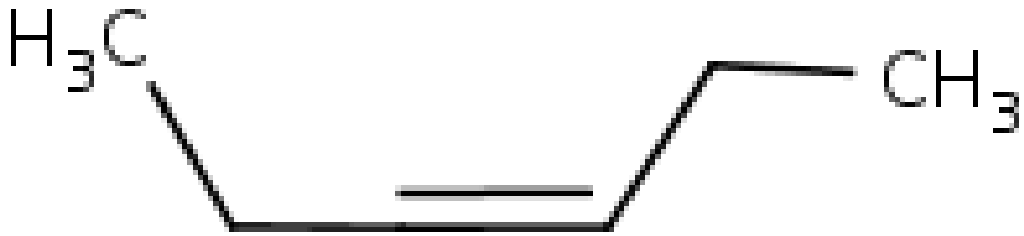
	
Molecular Formula	Unspecified
Molecular Weight	82.1

Chemical Name in the Inventory and Synonyms	**Petroleum products, hydrofiner powerformer reformates** Reformate
CAS Number	68514-79-4
Structural Formula	**No Structural Diagram Available**

Molecular Formula	Unspecified
Molecular Weight	N/A

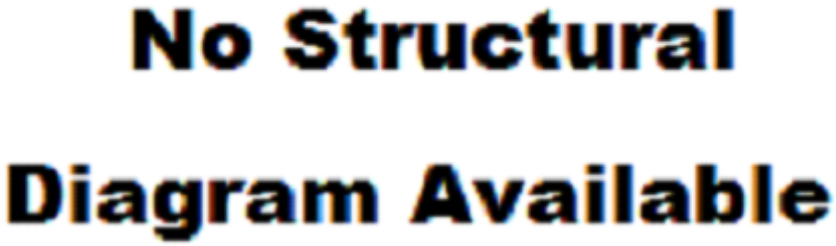
Chemical Name in the Inventory and Synonyms	**Naphtha, petroleum, steam cracked middle aromatic** Medium steam cracked aromatic naphtha, petroleum
CAS Number	68516-20-1
Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	N/A

Chemical Name in the Inventory and Synonyms	**Alkenes, C6-** Petroleum hexene, petroleum
CAS Number	68526-52-3
Structural Formula	

	
Molecular Formula	Unspecified
Molecular Weight	84.1

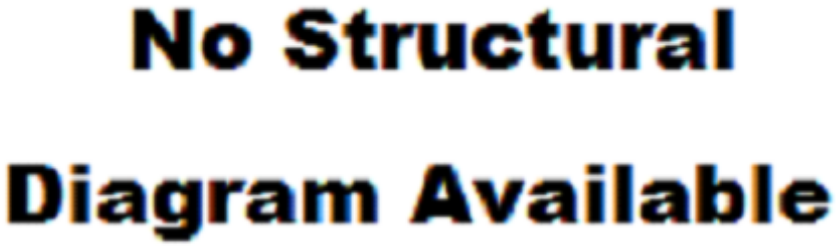
Chemical Name in the Inventory and Synonyms	**Naphtha, petroleum, clay treated full range straight run** Clay treated full range straight run naphtha, petroleum
CAS Number	68527-21-9
Structural Formula	**No Structural Diagram Available**

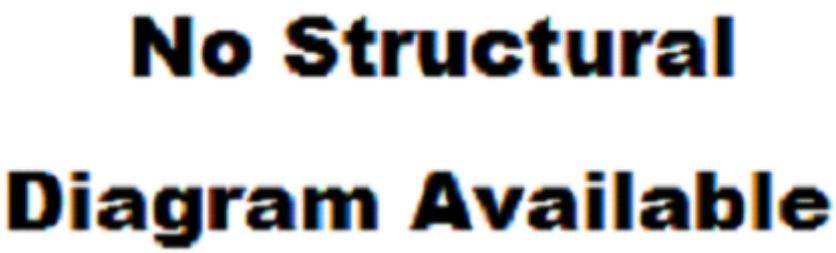
Molecular Formula	Unspecified
Molecular Weight	N/A

Chemical Name in the Inventory and Synonyms	**Naphtha, petroleum, clay treated light straight run** Clay treated light straight run naphtha
CAS Number	68527-22-0
Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	N/A

Chemical Name in the Inventory and Synonyms	**Naphtha, petroleum, light steam cracked aromatic** Light steam cracked aromatic naphtha, petroleum
CAS Number	68527-23-1
Structural Formula	
Molecular Formula	Unspecified

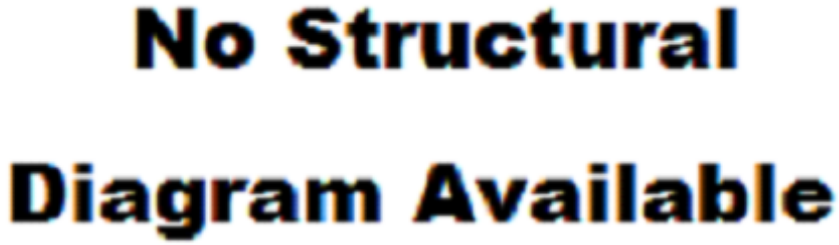
Molecular Weight	N/A

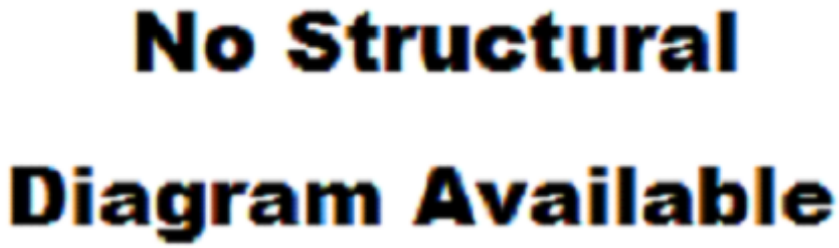
Chemical Name in the Inventory and Synonyms	**Naphtha, petroleum, light steam cracked, debenzenized** Debenzenized light steam cracked naphtha, petroleum
CAS Number	68527-26-4
Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	N/A

Chemical Name in the Inventory and Synonyms	**Naphtha, petroleum, full range alkylate, butane containing** Full range alkylate naphtha, with butanes, petroleum
CAS Number	68527-27-5
Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	N/A

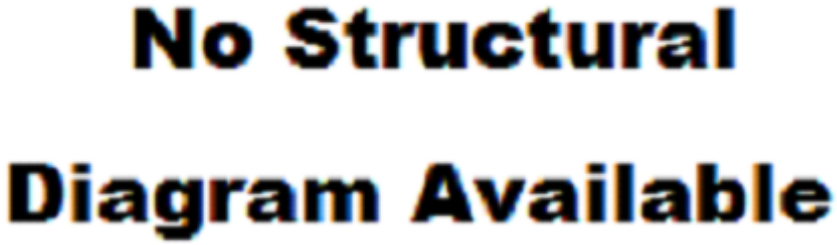
Chemical Name in the Inventory and Synonyms	**Hydrocarbons, C8-11** Isoamylene polymer, extract
CAS Number	68553-14-0
Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	130.2

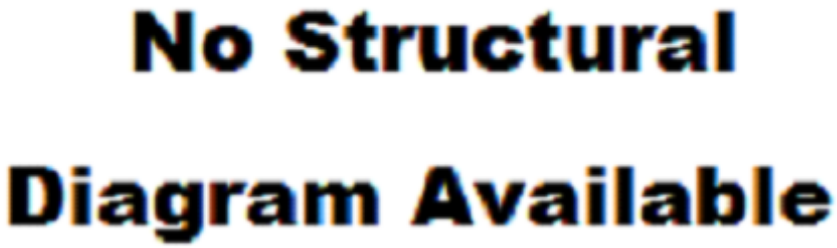
Chemical Name in the Inventory and Synonyms	**Distillates, petroleum, benzene unit hydrotreater dipentanizer overheads** Dependanizer overhead liquid
CAS Number	68602-79-9
Structural Formula	

	
Molecular Formula	Unspecified
Molecular Weight	N/A

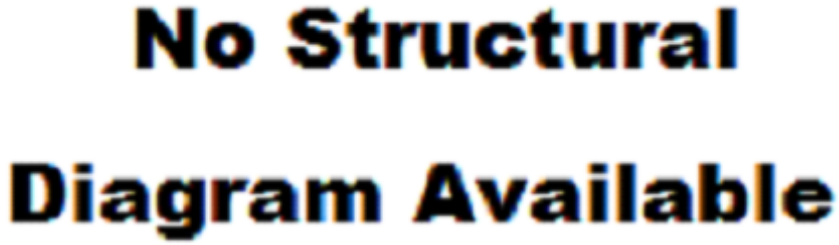
Chemical Name in the Inventory and Synonyms	**Distillates, petroleum, thermal cracked naphtha and gas oil** Thermal cracked aliphatic and alicyclic hydrocarbon distillate
CAS Number	68603-00-9
Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	N/A

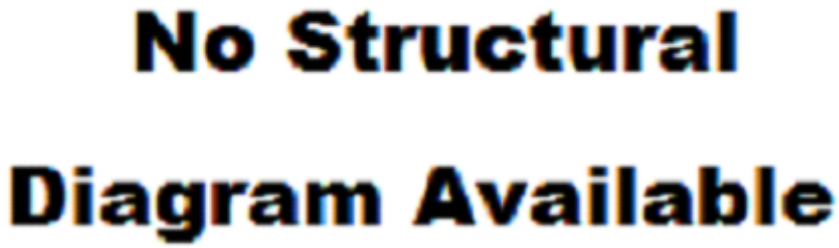
Chemical Name in the Inventory and Synonyms	**Distillates, petroleum, thermal cracked naphtha and gas oil, C5 dimer containing** Thermal cracked aliphatic and alicyclic C5 hydrocarbon distillate
CAS Number	68603-01-0
Structural Formula	

	
Molecular Formula	Unspecified
Molecular Weight	N/A

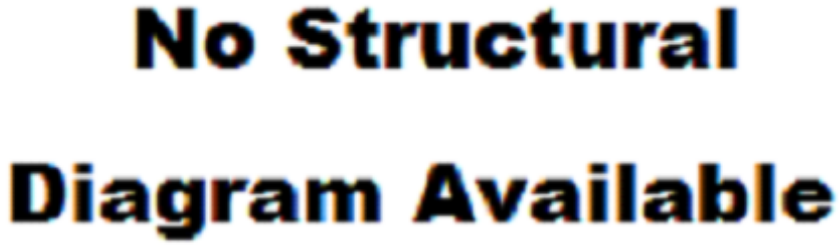
Chemical Name in the Inventory and Synonyms	**Distillates, petroleum, thermal cracked naphtha and gas oil, extractive** Thermal cracked aliphatic hydrocarbon distillate
CAS Number	68603-03-2
Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	N/A

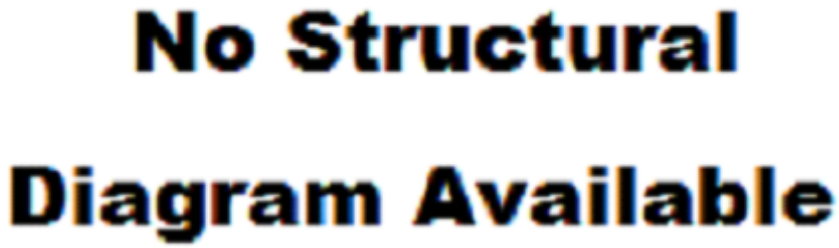
Chemical Name in the Inventory and Synonyms	**Naphtha, petroleum, aromatic containing** Heavy fractionated hydrocarbons
CAS Number	68603-08-7
Structural Formula	

	
Molecular Formula	Unspecified
Molecular Weight	N/A

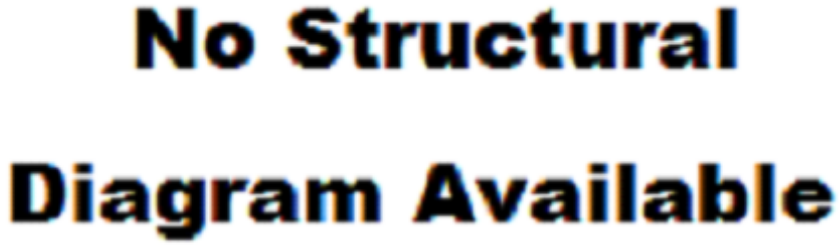
Chemical Name in the Inventory and Synonyms	**Naphtha, petroleum, catalytic cracked light distilled** Light distilled catalytic cracked naphtha, petroleum
CAS Number	68783-09-5
Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	N/A

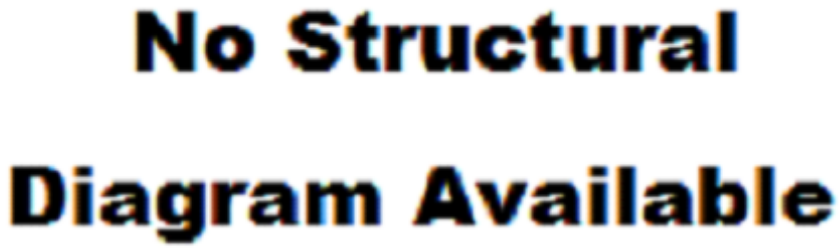
Chemical Name in the Inventory and Synonyms	**Naphtha, petroleum, light polymerization** Light polymerization naphtha, petroleum
CAS Number	68783-11-9
Structural Formula	

	
Molecular Formula	Unspecified
Molecular Weight	N/A

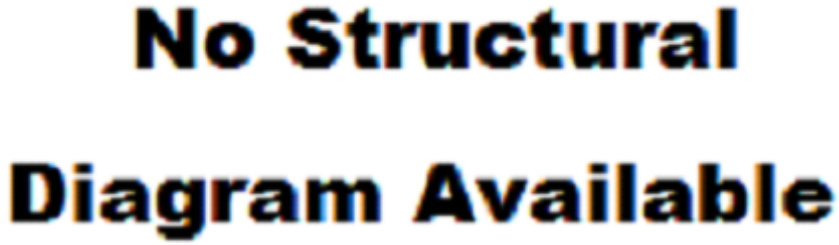
Chemical Name in the Inventory and Synonyms	**Naphtha, petroleum, unsweetened** Unsweetened naphtha, petroleum
CAS Number	68783-12-0
Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	N/A

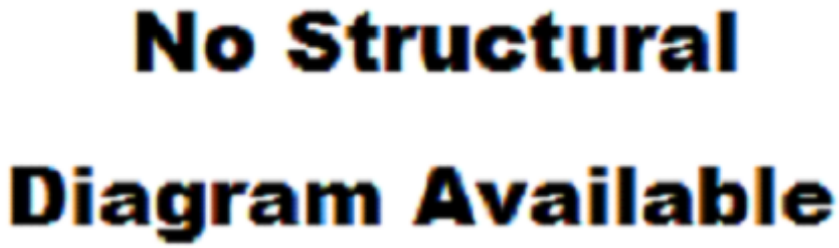
Chemical Name in the Inventory and Synonyms	**Naphtha, petroleum, light, sweetened** Refinery butanes, petroleum
CAS Number	68783-66-4
Structural Formula	

	
Molecular Formula	Unspecified
Molecular Weight	N/A

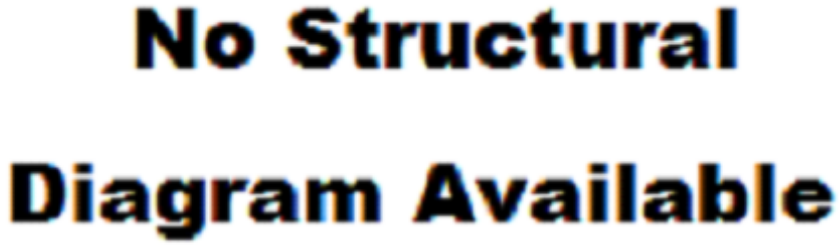
Chemical Name in the Inventory and Synonyms	**Hydrocarbons, C6-12, benzene recovery** Heavy recovered hydrocarbons
CAS Number	68919-15-3
Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	N/A

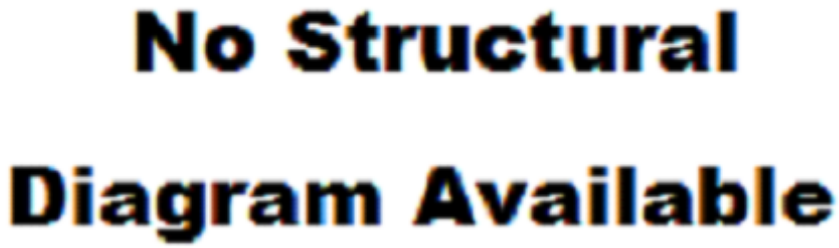
Chemical Name in the Inventory and Synonyms	**Naphtha, petroleum, full range reformed** Full range reformed naphtha, petroleum
CAS Number	68919-37-9
Structural Formula	

	
Molecular Formula	Unspecified
Molecular Weight	N/A

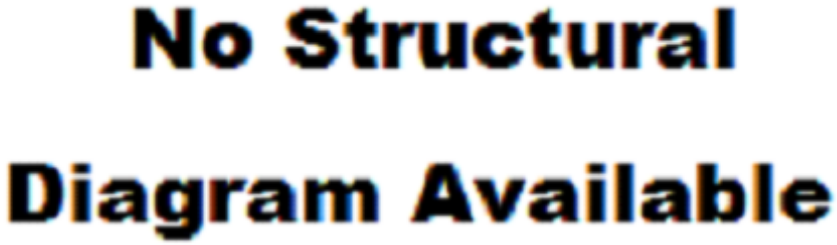
Chemical Name in the Inventory and Synonyms	**Hydrocarbons, C7-9** Xylene range aromatic solvent Caswell No. 907
CAS Number	68920-06-9
Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	N/A

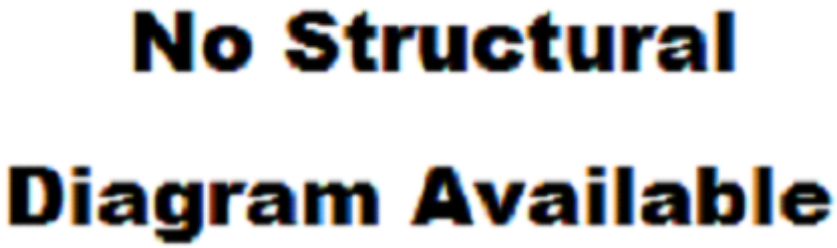
Chemical Name in the Inventory and Synonyms	**Distillates, petroleum, light straight run gasoline fractionation stabilizer overheads** Light straight run stabilizer overhead liquid
CAS Number	68921-08-4
Structural Formula	

	
Molecular Formula	Unspecified
Molecular Weight	N/A

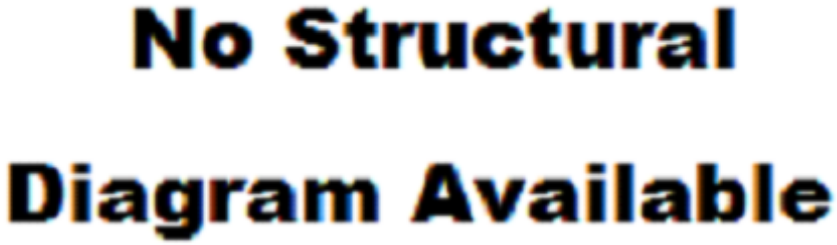
Chemical Name in the Inventory and Synonyms	**Distillates, petroleum, naphtha unifiner stripper** Naphtha, unifiner stripper overhead liquid
CAS Number	68921-09-5
Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	N/A

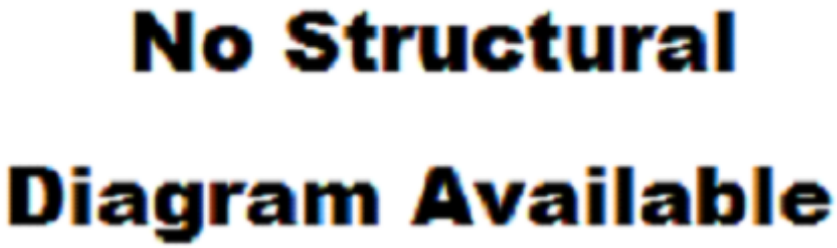
Chemical Name in the Inventory and Synonyms	**Distillates, petroleum, light thermal cracked, debutanized aromatic**
CAS Number	68955-29-3
Structural Formula	

	
Molecular Formula	Unspecified
Molecular Weight	N/A

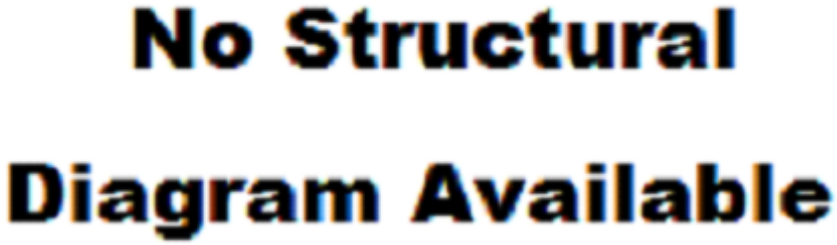
Chemical Name in the Inventory and Synonyms	**Naphtha, petroleum, catalytic reformed** Catalytic reformed naphtha, petroleum
CAS Number	68955-35-1
Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	N/A

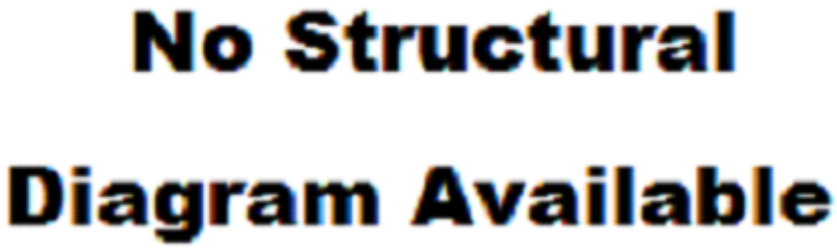
Chemical Name in the Inventory and Synonyms	**Fuel oil, residual, wastewater skimmings**
CAS Number	68956-48-9
Structural Formula	

	
Molecular Formula	Unspecified
Molecular Weight	N/A

Chemical Name in the Inventory and Synonyms	**Petroleum products, C5-12, reclaimed, wastewater treatment** Petroleum products, reclaimed, wastewater treatment
CAS Number	68956-70-7
Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	N/A

Chemical Name in the Inventory and Synonyms	**Aromatic hydrocarbons, C9-11**
CAS Number	70693-06-0
Structural Formula	

	
Molecular Formula	Unspecified
Molecular Weight	N/A

Chemical Name in the Inventory and Synonyms	**Alkanes, C4-6** Splitter butane
CAS Number	70955-08-7
Structural Formula	
Molecular Formula	Unspecified
Molecular Weight	N/A

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