Material Safety Data Sheet
Bitumen

Section 1   Chemical Product And Company Identification

Product name : Bitumen
Synonyms : Coker Feed, LC-Finer Feed,
Company Identification : Tradeasia International Pte Limited
Address : 133 Cecil Street # 12-03 Keck Seng Tower, Singapore
          Tel:+65 6227 6365
          Fax:+65 6225 6286
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Section 2   Composition And Information On Ingredients

<table>
<thead>
<tr>
<th>CAS#</th>
<th>Chemical Name</th>
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<td>8052-42-4</td>
<td>Bitumen</td>
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Section 3   Hazards Identification

Emergency Overview:
A black or dark brown highly viscous liquid. Heated bitumen can cause severe skin burns and eye injury. Eye, skin, gastrointestinal, and respiratory tract irritation can occur. Poisonous hydrogen sulfide gas may accumulate in confined spaces.

Route of Entry: Skin contact, Eye contact, Inhalation, Ingestion

Effects of Acute Exposure:

Eyes:
Hot bitumen and bitumen fumes may cause severe irritation and burns. Cold bitumen may cause slight irritation. Bitumen dust may cause irritation characterized by burning, redness, swelling and watering.

Skin:
Hot bitumen and bitumen fumes may cause moderate to severe irritation and burns. Cold bitumen may cause moderate irritation. Bitumen dust may cause irritation characterized by redness and occasional drying and peeling.

**Ingestion:**
Irritation of gastrointestinal tract, vomiting and a danger of aspiration. Aspiration can develop into potentially fatal chemical pneumonitis.

**Inhalation:**
Bitumen fumes may cause moderate to severe irritation of the nose, throat and respiratory tract. May cause headache, nausea, sore throat, nasal congestion, dizziness and nervousness. Confined spaces may accumulate hydrogen sulfide gas. Hydrogen sulfide may cause respiratory tract irritation, nausea, headache, dizziness, pulmonary edema, loss of consciousness, brain damage and death.

**Effects of Chronic Exposure:**
**Eyes:** Effects not reported.

**Skin:**
Repeated exposure to hot bitumen or bitumen fumes may cause inflammation of the skin, acne like lesions, development of horny growths on the skin, darkening of the skin and sensitization of the skin to light. Bitumen may cause hair loss, dryness, scaling, and dermatitis. May aggravate existing skin conditions. Bitumen contains chemicals that may have a carcinogenic potential.

**Ingestion:** Effects not reported.

**Inhalation:**
Prolonged exposure to bitumen fumes may cause inflammation of the lungs and mucous membranes of the nose and throat. May cause chronic bronchitis, pulmonary congestion, laryngitis, hoarseness, coughing, fatigue and atrophy and/or death of the epithelium. May aggravate existing respiratory conditions.

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**Section 4 First Aid Measures**

**Eyes:**
Immediately flush eyes with water for at least 15 minutes. If irritation persists, seek medical attention.

**Skin:**
Remove contaminated clothing. Use a light mineral oil (e.g. baby oil) to help remove bitumen from the skin. Wash affected area with soap and water. Avoid abrading the skin during washing. If irritation persists, seek medical attention.

**Ingestion:**
DO NOT INDUCE VOMITING BECAUSE OF DANGER OF ASPIRATING LIQUID INTO LUNGS. If spontaneous vomiting occurs, monitor for breathing difficulty. Get immediate medical attention.

**Inhalation:**
Move victim to uncontaminated area. If breathing has stopped, trained personnel should begin artificial respiration, or, if the heart has stopped, cardiopulmonary resuscitation (CPR) immediately. Oxygen may be beneficial if administered by a person trained in its use, preferably on a physician's advice.

**General:** In all cases, seek medical attention.

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### Section 5  Fire And Explosion Data

**Flash Point** : 166 °C (Cleveland Open Cup)

**Flammable Limits (% by volume)** : Upper - 7.0 Lower - 2.0

**Auto-Inignition Temperature** : Not available.

**Fire and Explosion Hazards** :
Flammable in presence of ignition source when heated above flashpoint temperature.

**Extinguishing Media** :
Foam, Carbon, Dioxide, dry chemical, water fog. Caution: Hot bitumen will react violently with water.

**Fire Fighting Procedures** :
DO NOT USE WATER on a bitumen tank fire; it may cause violent eruption and spreading of burning bitumen. Hot material may ignite flammable mixtures (liquids) on contact. Material will not burn unless preheated. Exposed firefighters must wear full bunker gear, including a NIOSH approved positive pressure self-contained breathing apparatus with full-face mask. Containers exposed to intense heat from fires should be cooled with water to prevent vapour pressure build-up, which could result in container rupture. Container areas exposed to direct flame contact should be cooled with large quantities of water as needed to prevent weakening of container structure.

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### Section 6  Accidental Release Measures
**Leak and Spill Procedure:**
Shut off fuel source and ventilate spill area. Dike large spills with non-flammable material. Absorb on inert material and place in closed container for recycling or disposal.

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**Section 7 Handling And Storage**

**Handling Procedures and Equipment:**
Avoid excessive heating and oxidizing materials. Wash hands thoroughly after handling.

**Storage Requirements:**

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**Section 8 Exposure Controls/ Personal Protection**

**Engineering Controls:**
Mechanical ventilation necessary to maintain concentrations below appropriate OEL’s. Ventilate confined spaces before entry.

**Personal Protective Equipment:**

- **Gloves**: Acrylonitrile latex. Change if contaminated.
- **Respirator**: NIOSH approved air purifying organic vapour.
- **Eyes**: Safety glasses, monogoggles, or faceshield.
- **Clothing**: Coveralls, apron as required.
- **Footwear**:

**Exposure Limits:** Bitumen 8-hour OEL = mg/m³

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**Section 9 Physical And Chemical Properties**

- **Appearance**: Black or brownish, tarry texture.
- **Odor**: Solvent-like odour
- **Physical State**: Viscous liquid
- **pH**: Not applicable
- **Vapour Pressure**: Not available
- **Vapour Density (Air = 1)**: Not available
- **Freezing/ Melting Point**: Not applicable
Boiling Range (deg C): IBP 290 °C; 40-45 % boiling at 524 °C
Specific Gravity: 1.02 @ 20 °C
Evaporation Rate: (n-Butyl Acetate = 1): Essentially non-volatile at ambient temperatures
Coefficient of Water/Oil Distribution: Not miscible with water
Odor Threshold: Not available

Section 10 Stability And Reactivity Data
Stability: Stable
Conditions to avoid: Not applicable
Materials to Avoid: Strong oxidizing materials. This product may dissolve or soften some plastics.
Hazardous Combustion Products:
Carbon monoxide, Carbon dioxide, oxides of nitrogen and sulphur, soot, uncombusted hydrocarbons.

Section 11 Toxicological Information
LD50:
5 to 15 g/kg (oral), >5 g/kg (oral) - mice, rats
3-8 g/kg (rat-intragastric), >3.16 g/kg (dermal) - rabbits
LC50:
No data found.

Acute:
An acute oral, dermal, ocular and inhalation toxicity study was performed using bitumen (bitumen diluted with naphtha) from the Alberta oil sands. No animals (rats and mice) died following a single oral dose of 5 g/kg. No animals (rabbits) died following a single dermal dose of 3.16 g/kg. The rabbits did experience moderate skin irritation (Draize score of 3/8) and desquamation. Rabbits experienced slight eye irritation (Draize score of 4/110) with conjunctival redness. No mortalities (rats) occurred following a 6-hour inhalation exposure to 1.46 g/m3, however, lung discolouration and decreased lung weight was observed.

Chronic:
Several epidemiological studies have been performed and results indicate that there are no differences in the general health of bitumen workers as compared to the general public. In a mouse skin painting study (twice/day for life), hair loss, dryness and scaling of the skin and papiloma formation was reported. Mice were exposed to heated asphalt fumes for 6 - 7.5 hours per day, five days a week for 21 months. Peribronchial round cell infiltration, bronchitis, pneumonitis, abscess...
formation, loss of cilia, epithelial atrophy and necrosis were common in the mice. Squamous cell hyperplasia was also observed.

**Carcinogenicity:**

There is inadequate evidence of carcinogenicity in humans and limited to sufficient evidence in animals. Bitumen is not considered to be carcinogenic to humans, but does contain carcinogenic components. Results from several epidemiological studies indicate that there is no difference in the number of skin and/or lung cancers attributed to working with bitumen. A review of epidemiological publications regarding the carcinogenic potential of bitumen was conducted. The authors concluded that although many of the studies show an increased risk of cancer, they do not show a casual relationship between exposure to bitumen and development of cancer. Nearly all the studies suffer from a lack of data on exposure and/or potential confounders. An evaluation of the dermal carcinogenic potential of bitumen from the Athabasca oil sands was conducted. Mice were dermally applied three times per week (52.50 mg/wk) for life. Out of 50 animals, two developed tumours with a mean latency of 145 weeks. This was not significantly different from the controls. The authors concluded that the bitumen from the Athabasca oil sands produced weak evidence of carcinogenic potential, but was consistent with conventional petroleum-derived bitumen. An evaluation of the dermal carcinogenic potential of bitumen from the Cold Lake oil sands was conducted. Mice were dermally applied three times per week (56.25 mg/wk) for life. Out of 50 animals, 13 developed tumours with a mean latency of 106 weeks. This was significantly different from the controls. The authors concluded that this result is consistent with conventional petroleum-derived bitumen.

**Reproduction:** No data.

**Teratology:** No data.

**Mutagenicity:**

Bitumen has given negative or marginally position findings in most mutagenicity assays conducted. Adult and foetal human skin were treated with bitumen and analysed for the presence of DNA-adducts. Levels of 3 and 15 g of bitumen significantly increased the number of DNA-adducts. The genotoxic activity of bitumen was tested using Salmonella typhimurium and DNA damage in rats. No mutagenic activity was noted in the absence or presence of metabolic activation with Salmonella typhimurium. Bitumen gave negative results for in vivo DNA damage.

**Toxicologically Synergistic Products:** No data
Section 12 Ecological Information

Not available

Section 13 Disposal Considerations

Waste Disposal:
Recycle and reuse material if possible. Off-site spills should be dealt with according to relevant legislation. Bury in approved landfill if acceptable.

Section 14 Transport Information

Canadian TDG : Not Regulated
Hazard Class : Not applicable.
Proper Shipping Name : Not applicable.

Section 15 Other Regulatory Information

WHMIS CLASS: D-2B
This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR. All compounds in this product are listed in the Canada Domestic Substances List (DSL) and the United States Toxic Substances Control Act (TSCA) Chemical Substance Inventory (1985).

Section 16 : Other Information

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no way shall Tradeasia International Pte. Ltd. be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Tradeasia International Pte.Ltd. Has been advised of the possibility of such damages.