# Safety Data Sheet

National Institute of Advanced Industrial Science and Technology
AIST

## 1. Identification of the Substance/Mixture and the Supplier

| | | |
|---|---|---|
| Supplier | : | National Institute of Advanced Industrial Science and Technology (AIST) |
| Address | : | 1-3-1, Kasumigaseki, Chiyoda, Tokyo, Japan |
| Office in Charge | : | Reference Materials Office, Center for Quality Management of Metrology, National Metrology Institute of Japan (NMIJ) |
| Person in Charge | : | Person in Charge of Certified Reference Materials |
| Telephone No. | : | +81-29-861-4059 Fax No. : +81-29-861-4009 |
| Emergency Contact | : | Same as above |
| | | Prepared on : July 07, 2011 |
| | | Revised on : March 31, 2017 |
| | | Reference No. : 7308001 |
| Identity of Substance/Mixture | : | Certified Reference Material NMIJ CRM 7308-a Polycyclic Aromatic Hydrocarbons and Toxic Elements in Tunnel Dust) |
| Recommended Use of the Chemical and Restriction on Use | : | This reference material can be used for evaluating or validating analytical methods and instruments used for determination of polycyclic aromatic hydrocarbons (PAHs) and toxic elements in tunnel dust or similar matrices. Do not use this reference material for other purposes than testing/research. |

## 2. Hazards Identification

| | | |
|---|---|---|
| GHS Classification | : | Not classifiable |
| GHS Label Element | : | - |
| Signal Word | : | - |
| Hazard and Toxicity | : | - |
| Other hazard and Toxicity | : | Contains carcinogenic substances, avoid exposure |
| Precautionary Statement | : | [Safety measures]<br>Read and understand the safety precautions completely before handling.<br>Avoid emitting into the environment<br>If necessary, use individual protective equipment.<br>Avoid all kinds of exposure<br>[Emergency measures]<br>If swallowed : If feeling ill, seek medical advice.<br>If in eyes : Rinse carefully with water for several minutes<br>If on skin : Rinse with a large amount of water and soap.<br>If exposed or concerned about the exposure : Seek medical advice/treatment<br>Collect the spilled matter. |

[Storage]
Store in a clean place protected from light at a temperature of about 5 °C.
[Disposal]
Outsource to a professional industrial waste disposal contractor licensed by the prefectural governor.

Hazardous and toxic properties not specified in the above are neither the object of the classification nor classifiable.

## 3. Composition/Information on Ingredients

| | | |
|---|---|---|
| Single or Compound Product | : | Mixture |
| Ingredient 1 | : | - |
| Chemical name | : | Tunnel dust |
| Chemical formula | : | - |
| Molecular weight | : | - |
| CAS number | : | - |
| Content | : | - |
| Reference Number in Gazetted List in Japan | : | Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc. : -<br>Industrial Safety and Health Act : - |
| Ingredient 2 | : | |
| Chemical name | : | Fluorene |
| Chemical formula | : | $C_{13}H_{10}$ |
| Molecular weight | : | 166.21 |
| CAS number | : | 86-73-7 |
| Content | : | 2.64mg/kg |
| Reference Number in Gazetted List in Japan | : | Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc. : (4)-643<br>Industrial Safety and Health Act : Published |
| Ingredient 3 | : | |
| Chemical name | : | Anthracene |
| Chemical formula | : | $C_{14}H_{10}$ |
| Molecular weight | : | 178.23 |
| CAS number | : | 120-12-7 |
| Content | : | 4.6mg/kg |
| Reference Number in Gazetted List in Japan | : | Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc. : (4)-683<br>Industrial Safety and Health Act : Published |
| Ingredient 4 | : | |

| | | |
|---|---|---|
| Chemical name | : | Fluoranthene |
| Chemical formula | : | $C_{16}H_{10}$ |
| Molecular weight | : | 202.25 |
| CAS number | : | 206-44-0 |
| Content | : | 20.3mg/kg |
| Reference Number in Gazetted List in Japan | : | Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc. : (4)-2<br>Industrial Safety and Health Act : Published |

| | | |
|---|---|---|
| Ingredient 5 | : | |
| Chemical name | : | Pyrene |
| Chemical formula | : | $C_{16}H_{10}$ |
| Molecular weight | : | 202.25 |
| CAS number | : | 129-00-0 |
| Content | : | 18.8mg/kg |
| Reference Number in Gazetted List in Japan | : | Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc. : (4)-782<br>Industrial Safety and Health Act : Published |

| | | |
|---|---|---|
| Ingredient 6 | : | |
| Chemical name | : | Benz[*a*]anthracene |
| Chemical formula | : | $C_{18}H_{12}$ |
| Molecular weight | : | 228.29 |
| CAS number | : | 56-55-3 |
| Content | : | 2.62mg/kg |
| Reference Number in Gazetted List in Japan | : | Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc. : -<br>Industrial Safety and Health Act : - |

| | | |
|---|---|---|
| Ingredient 7 | : | |
| Chemical name | : | Benzo[*b*]fluoranthene |
| Chemical formula | : | $C_{20}H_{12}$ |
| Molecular weight | : | 252.31 |
| CAS number | : | 205-99-2 |
| Content | : | 1.96mg/kg |
| Reference Number in Gazetted List in Japan | : | Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc. : -<br>Industrial Safety and Health Act : - |

| | | |
|---|---|---|
| Ingredient 8 | : | |
| Chemical name | : | Benzo[*k*]fluoranthene |
| Chemical formula | : | $C_{20}H_{12}$ |
| Molecular weight | : | 252.31 |
| CAS number | : | 207-08-9 |
| Content | : | 0.899mg/kg |
| Reference Number in | : | Act on the Evaluation of Chemical Substances and Regulation |

| | | |
|---|---|---|
| Gazetted List in Japan | | of Their Manufacture, etc. : -<br>Industrial Safety and Health Act : - |
| Ingredient 9 | : | |
| Chemical name | : | Benzo[*a*]pyrene |
| Chemical formula | : | $C_{20}H_{12}$ |
| Molecular weight | : | 252.31 |
| CAS number | : | 50-32-8 |
| Content | : | 1.39mg/kg |
| Reference Number in Gazetted List in Japan | : | Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc. : -<br>Industrial Safety and Health Act : - |
| Ingredient 10 | : | |
| Chemical name | : | Perylene |
| Chemical formula | : | $C_{20}H_{12}$ |
| Molecular weight | : | 252.31 |
| CAS number | : | 198-55-0 |
| Content | : | 0.294mg/kg |
| Reference Number in Gazetted List in Japan | : | Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc. : -<br>Industrial Safety and Health Act : - |
| Ingredient 11 | : | |
| Chemical name | : | Indeno[1,2,3-*cd*]pyrene |
| Chemical formula | : | $C_{22}H_{12}$ |
| Molecular weight | : | 276.33 |
| CAS number | : | 193-39-5 |
| Content | : | 1.41mg/kg |
| Reference Number in Gazetted List in Japan | : | Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc. : -<br>Industrial Safety and Health Act : - |
| Ingredient 12 | : | |
| Chemical name | : | Benzo[*ghi*]perylene |
| Chemical formula | : | $C_{22}H_{12}$ |
| Molecular weight | : | 276.33 |
| CAS number | : | 191-24-2 |
| Content | : | 2.54mg/kg |
| Reference Number in Gazetted List in Japan | : | Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc. : -<br>Industrial Safety and Health Act : - |
| Ingredient 13 | | |
| Chemical name | : | Chromium |
| Chemical formula | : | Cr |

| | | |
|---|---|---|
| Molecular weight | : | 51.96 |
| CAS number | : | 7440-47-3 |
| Content | : | 1.071% |
| Reference Number in Gazetted List in Japan | : | Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc. : -<br>Industrial Safety and Health Act : - |

| | | |
|---|---|---|
| Ingredient 14 | : | |
| Chemical name | : | Nickel |
| Chemical formula | : | Ni |
| Molecular weight | : | 58.69 |
| CAS number | : | 7440-02-0 |
| Content | : | 0.285% |
| Reference Number in Gazetted List in Japan | : | Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc. : -<br>Industrial Safety and Health Act : - |

| | | |
|---|---|---|
| Ingredient 15 | : | |
| Chemical name | : | Lead |
| Chemical formula | : | Pb |
| Molecular weight | : | 207.2 |
| CAS number | : | 7439-92-1 |
| Content | : | 0.108% |
| Reference Number in Gazetted List in Japan | : | Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc. : -<br>Industrial Safety and Health Act : - |

| | | |
|---|---|---|
| Ingredient 16 | : | |
| Chemical name | : | Manganese |
| Chemical formula | : | Mn |
| Molecular weight | : | 54.93 |
| CAS number | : | 7439-96-5 |
| Content | : | 645mg/kg |
| Reference Number in Gazetted List in Japan | : | Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc. : -<br>Industrial Safety and Health Act : - |

| | | |
|---|---|---|
| Ingredient 17 | : | |
| Chemical name | : | Cadmium |
| Chemical formula | : | Cd |
| Molecular weight | : | 112.41 |
| CAS number | : | 7440-43-9 |
| Content | : | 43.4mg/kg |
| Reference Number in Gazetted List in Japan | : | Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc. : -<br>Industrial Safety and Health Act : - |

| | | |
|---|---|---|
| Ingredient 18 | : | |
| Chemical name | : | Naphthalene |
| Chemical formula | : | $C_{10}H_8$ |
| Molecular weight | : | 128.17 |
| CAS number | : | 91-20-3 |
| Content | : | 11.6mg/kg |
| Reference Number in Gazetted List in Japan | : | Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc. : (4)-311<br>Industrial Safety and Health Act : Published |

| | | |
|---|---|---|
| Ingredient 19 | : | |
| Chemical name | : | Phenanthrene |
| Chemical formula | : | $C_{14}H_{10}$ |
| Molecular weight | : | 178.23 |
| CAS number | : | 85-01-8 |
| Content | : | 46mg/kg |
| Reference Number in Gazetted List in Japan | : | Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc. : (4)-635<br>Industrial Safety and Health Act : Published |

| | | |
|---|---|---|
| Ingredient 20 | : | |
| Chemical name | : | Benzo[*c*]phenanthrene |
| Chemical formula | : | $C_{18}H_{12}$ |
| Molecular weight | : | 228.29 |
| CAS number | : | 195-19-7 |
| Content | : | 0.72mg/kg |
| Reference Number in Gazetted List in Japan | : | Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc. : -<br>Industrial Safety and Health Act : - |

| | | |
|---|---|---|
| Ingredient 21 | : | |
| Chemical name | : | Chrysene |
| Chemical formula | : | $C_{18}H_{12}$ |
| Molecular weight | : | 228.29 |
| CAS number | : | 218-01-9 |
| Content | : | 2.4mg/kg |
| Reference Number in Gazetted List in Japan | : | Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc. : -<br>Industrial Safety and Health Act : - |

| | | |
|---|---|---|
| Ingredient 22 | : | |
| Chemical name | : | Benzo[*e*]pyrene |
| Chemical formula | : | $C_{20}H_{12}$ |
| Molecular weight | : | 252.31 |
| CAS number | : | 192-97-2 |

| | | |
|---|---|---|
| Content | : | 2.4mg/kg |
| Reference Number in Gazetted List in Japan | : | Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc. : -<br>Industrial Safety and Health Act : - |
| Ingredient 23 | : | |
| Chemical name | : | Zinc |
| Chemical formula | : | Zn |
| Molecular weight | : | 65.40 |
| CAS number | : | 7440-66-6 |
| Content | : | 8.85% |
| Reference Number in Gazetted List in Japan | : | Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc. : -<br>Industrial Safety and Health Act : - |

## 4. First-aid Measures

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| Eyes | : | Rinse carefully with water for several minutes. Seek medical advice. |
| Skin | : | Rinse with a large amount of water and soap. Take off the contaminated clothes and shoes, etc., seek medical advice. |
| Inhalation | : | Move to a fresh air keep warm and rest. Seek medical advice. |
| Swallowed | : | Wash the mouth well with water. If feeling ill, seek medical advice. |
| Anticipated acute and delayed symptoms | : | - |
| Most important characteristics and symptoms | : | - |
| Measures to be taken to protect the person applying first aid | : | - |

## 5. Fire Fighting Measures

| | | |
|---|---|---|
| Extinguishing Media | : | Initial extinguishing by powder, powder extinguishing facility, equipment.<br>Powder, sand, water. |
| Prohibited Extinguishing Media | : | Carbon monoxide, foam. |
| Specific Hazards | : | May form irritating or toxic fume (or gas) at the time of fire. |
| Specific Extinguishing Measure | : | Remove any combustible sources from the seat of fire and extinguish using appropriate extinguishing agent. Transfer the movable container to a safe place promptly. If impossible to transfer, use water spray to cool the periphery. |
| Protecting Fire-Fighting Personnel | : | Extinguishing activities on windward side, avoid inhaling toxic gases. Use protective equipment such as fire-resistant |

protective clothing, heat resistant protective clothing, protective clothing, self-contained compressed air breathing apparatus, closed circuit breathing apparatus, rubber gloves, rubber boots, etc.

## 6. Accidental Release Measures

| | | |
|---|---|---|
| Personal Precautions | : | Promptly remove fire sources from the periphery. Be ready with extinguishing equipment at hand in case of a fire |
| Protective Equipment and Emergency Procedure | : | If released indoor, ventilate well until the treatment is completed. Use suitable protective equipment to protect the skin from airborne droplets and to avoid inhaling dust and gas. |
| Environmental Precaution | : | To prevent causing environmental impact, do not release the spilled material into rivers, etc. directly. Treat the contaminated waste water appropriately before discharging to the environment. |
| Recovery, Neutralization | : | Adsorb the spilled liquid to waste cloth or to sand and soil and collect in an empty container. Wash away the area with a large amount of water. |
| Measures to Prevent Secondary accident | : | Rope-off the leaked area and restrict access only to the authorized persons. Evacuate the people on the leeward and work on the windward side. |

## 7. Handling and Storage

Handling

| | | |
|---|---|---|
| Technical Counter-Measure | : | Fire prohibited<br>Avoid high temperature matters, sparks and keep away from strong oxidizers. |
| Precautions for Safe Handling | : | Do not handle the container roughly to overturn, drop or give a shock, drag, etc.<br>Avoid leak, overflow, scatter and prevent from exuding vapor.<br>Seal the container airtight after use.<br>Rinse hands, face, etc. and gargle after handling.<br>Eating, drinking and smoking only at the designated places.<br>Do not enter resting area with the contaminated protective equipment such as gloves, etc. on.<br>Enter the handling area only by authorized persons.<br>Use protective equipment to prevent from inhalation, contact with eyes, skin and clothes<br>Use local exhaust ventilation system when handling in indoor work place. |

Storage

| | | |
|---|---|---|
| Appropriate Condition | : | Store in a clean place protected from light at a temperature of about 5 °C. |
| Safe Packing Material | : | Glass |

## 8. Exposure Control/Personal Protection

Administrative Level
Not established
Occupational Exposure Level

| | | |
|---|---|---|
| ・ACGIH TLV-TWA | : | Not established |
| ・Japan Society for Occupational Health | : | Not established |

Facility Engineering

| | | |
|---|---|---|
| Ventilation, Exhaust | : | Local ventilation exhaust system or general ventilation system (in case of handling in a large amount and exuding dust) |
| Safety Management, Gas Detection | : | - |
| Storage Precaution | : | - |

Protective Equipment

| | | |
|---|---|---|
| Respiratory Organ | : | Respiratory protection equipment |
| Hands | : | Protective gloves |
| Eyes | : | Safety goggles |
| Skin and Body | : | Protective clothes |

## 9. Physical and Chemical Properties

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|---|---|---|
| ・Appearance, etc. | : | Powder |
| ・Color | : | Black |
| ・Odor | : | No data |
| ・pH | : | No data |
| ・Melting point | : | No data |
| ・Boiling point | : | No data |
| ・Flashing point | : | No data |
| ・Explosive range | : | No data |
| ・Vapor pressure | : | No data |
| ・Relative vapor density(Air=1) | : | No data |
| ・Specific gravity or bulk specific gravity | : | No data |
| ・Solubility | : | No data |
| ・*n*-Octanol/water partition coefficient (Log Po/w) | : | No data |
| ・Auto-ignition temperature | : | No data |

## 10. Stability and Reactivity

◇Stability
・Stable under normal condition
◇Reactivity
・May react in contact with strong oxidizer.
◇Conditions to Avoid
・Contact with sunlight, heat, oxidizers.

◇Hazardous Decomposition Products
・Carbon monoxide

## 11. Toxicological Information

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|---|---|
| Acute Toxicity | Pyrene: May be toxic if swallowed.<br>May cause nausea, vomit, stomachache, headache, cyanosis when ingested orally.<br>Oral rat LD50＝2,700 mg/kg<br>Cadmium: Toxic if swallowed<br>May cause chest pain, breathing difficulty, bronchitis, pneumonia when inhaling the dust and fume.<br>Oral rat LD50=1,140 mg/kg<br>Oral mouse LD50=890 mg/kg<br>Inhalation rat LC=0.0031 mg/L<br>Inhalation human LCL0=39 mg/m$^3$/20M<br>Intravenous injection rat LD50＝1,800 μg/kg<br>Intraperitoneal injection rat LD50=4 mg/kg |
| Skin Corrosivity/ Irritation | Pyrene: Mild skin irritation<br>Skin rabbit 500 mg/24H Moderate<br>Benzo[*a*]pyrene:Skin irritant<br>No actual skin symptom reported, but erythema and feverish irritation to human skin.<br>Skin mouse 14 μg mild<br>Manganese: Mild skin irritation.<br>The result of skin irritation test, 24-hour adaptation experiment using rabbit observed mild irritation described. |
| Severe Damage to Eyes/ Eye Irritation | Anthracene: Severe eye irritation<br>Edematous eyelid, conjunctival congestion on humans described<br>Chrome: Eye irritation<br>Possible mechanical irritation possible due to the powder<br>Manganese: Eye irritation<br>Observed mild irritation in rabbit eyes |
| Respiratory Sensitization | May cause respiratory impairment due to the accumulation in respiratory organ when inhaled a large amount of dust.<br>Chrome: May cause allergy, asthma or breathing difficulty if inhaled.<br>Based on the description in the list of Japanese Society of Occupational and Environmental Allergy. In addition, it is classified as a 'substance may be considered sensitizing to humans' by Japan Society for Occupational Health<br>Nickel: May cause allergy, asthma or breathing difficulty if inhaled.<br>Classified as respiratory tract sensitizing substance (Group 2) in Recommendation of Occupational Exposure Level, etc. by Japan Society for Occupational Health |
| Skin Sensitization | Anthracene: May cause allergic reaction on skin.<br>As for humans, it is described that after applying this material to |

the skin and expose the applied part to ultraviolet irradiation, observed red flare, urtication or wheal, and in one of the cases, no red flare observed to the group subjected only to ultraviolet irradiation.

Chrome: May cause allergic reaction on skin

Described that no sensitization observed in the forms of chromium metal, chromium alloy, chrome plating, but possible skin sensitization due to the exposure to chromium ion resolved by humidity.

Nickel: May cause allergic reaction on skin

Classified as skin sensitizing substance (Group 1) in Recommendation of Occupational Exposure Level, etc. by Japan Society for Occupational Health.

Germ Cell Mutagenicity

Benz[*a*]anthracene: Genetic disorder may be suspected

Positive results in chromosomal abnormality test using hamster bone-marrow cells and erythrocyte micronucleus test using red blood cells, and erythrocyte micronucleus test using rat red blood cells with in vivo somatic cells mutagenicity tests,

Benzo[*a*]pyrene: Positive result in dominant lethal test using mouse with in vivo heritable germ cells mutagenicity test.

Chrome: Genetic disorder may be suspected.

Positive result in chromosome aberration of peripheral blood lymphocyte in rats with in vivo somatic cells mutagenicity test.

Lead: Genetic disorder may be suspected.

Even though chromosomal abnormality of peripheral blood lymphocyte of the workers involved in lead related work is not observed, but, there is a description that lead itself has chromosome aberration/micronuclei induction action.

Cadmium: Genetic disorder may be suspected.

About half of the results were positive from chromosome aberration test using somatic cells of humans who had been exposed to the material epidemiologically and occupationally.

Carcinogenicity

Anthracene: May be suspected of being carcinogenic

Performed 2-year oral application test using rat and mouse, observed increase in development of cancer in male and female rat liver, bladder in male rat, kidney/bladder/uterus/mammary gland in female rat, and described that there is a clear indication of carcinogenicity in male/female rats and female mouse.

Benz[*a*]anthracene: May be carcinogenic

IARC classifies into Group 2A(May be human carcinogen)

Benzo[*b*]fluoranthene: May be carcinogenic

IARC classifies into Group 2B (Possible human carcinogen)
Category 2 (Substance must be considered as human carcinogen) by EU, A2 (Suspected human carcinogen) by ACGIH

Benzo[*k*]fluoranthene: May be suspected carcinogen

IARC classifies into Group 2B (Possible human carcinogen).

Category 2 (Substance must be considered as human carcinogen) by EU.
Skin mouse TDLo=2,820 mg/kg/47weeks
Subcutaneous mouse TDLo=72 mg/kg/9weeks

Benzo[*a*]pyrene: May be carcinogenic
EPA classifies into B2, but Group 2A (May be human carcinogen) by IARC, 2A by Japan Society for Occupational Health, A2 by ACGIH, R (Human carcinogen) by NTP, Category 2 (Substance must be considered as human carcinogen) by EU.

Indeno[1,2,3-*cd*]pyrene: May be suspected human carcinogen
IARC classifies into 2B (Possible human carcinogen).
Skin mouse TDLo=40 mg/kg/20days
Subcutaneous mouse TDLo=72 mg/kg/9weeks

Nickel: May be suspected human carcinogen
Japan Society for Industrial Health classifies into Group 2B (Substance may be considered as human carcinogen, but relatively lacking in sufficient evidence as a carcinogen).

Lead: May be suspected human carcinogen.
Japan Society for Industrial Health classifies into Group 2B (Substance may be considered as human carcinogen, but relatively lacking in sufficient evidence as a carcinogen).

Cadmium: May be carcinogenic
Japan Society for Industrial Health classifies into Group 1 (Human carcinogenic substance)

Reproductive Toxicity

Benzo[*a*]pyrene: Harmful to reproductive function and fetus
Oral administration test using mouse during pregnancy, though strain-dependency, effect on reproductive function observed in dosage not generally toxic to mother animal.

Nickel: May be harmful to reproductive function and fetus
Oral administration (water administration) to rat, concentration up to 250ppm caused weight loss of the pups, increase in the death of pups before and after the delivery, and examples of death before implantation and few examples of deformed offspring, from which the effect of developmental toxicity is considered in dosage not generally toxic to parent animal.

Lead: May be harmful to reproductive function and fetus
Adverse effect on spermatogenesis in the examples of human exposure described, also female occupational exposure examples observed ovulatory dysfunction.

Manganese: May be harmful to reproductive function and fetus
No description of general toxicity to parent animal, but teratogenic test using mouse by interperitoneal administration observed embryonic lethal and deformed fetus (exencephaly).

Cadmium: May be suspected harmful to reproductive function and fetus

No description of general toxicity to parent animal, but decrease in the number of litter, fetal death, fetal growth inhibition and deformation observed, also growth inhibition and motor dysfunction of the newborn observed.

Particular Target Organ/ Systemic Toxicity (Single Exposure)

Anthracene: May irritate respiratory organ
As for animals, exposure to the spray of this substance irritates respiratory tract.

Chrome: May result in disorder due to systemic toxicity.
May irritate respiratory organ
Possible formation of metallic fume heat described.
Respiratory tract irritation in humans reported.

Nickel: Impairment of respiratory organ, kidney.
As for humans, impairment of alveolar wall of alveolar area and hydrops, noticeable tubulonecrosis at kidney described.

Manganese: Impairment of respiratory organ
Sudden exposure to manganese dust (especially $MnO_2$ and $M_3nO_4$) causes lung inflammation and induces pulmonary impairment over time. Toxicity to lung increases the degree of infectiousness and results in manganese pneumonia, described.

Cadmium: Impairment of lung and respiratory organ
Exposure to humans to the fume formed by heating the substance results in bronchitis, pneumonia, pulmonary edema, etc. and may be lethal. Also inhalation of the highly concentrated substance causes lethal pulmonary edema to animals, etc. described

Particular Target Organ/ Systemic Toxicity (Repeated Exposure)

Pyrene: Impairment of kidney and blood due to long-term or repeated exposure. The result of the forced oral administration of 0,75,125,250 mg/kg/day for 13 weeks using mouse, observed the increase in dose-related developmental rate of nephropathy to the female group administered more than 75 mg/kg/day, reached half the number of the female group administered 250mg/kg/day, but not in a significant number to the male administered 250mg/kg/day. Moreover, the decrease in red blood cell number, packed cell volume and concentration of hemoglobin observed in the group of male administered more than 75 mg/kg/day.

Benzo[*a*]pyrene: May impair bone marrow, respiratory organ due to long-term or repeated exposure
Oral administration test using mouse observed, though strain-dependent, myelosuppression when administered class 2 guidance value range. But it is said that chronic effect to humans related to respiratory organ damage, emphysema is described, but no actual case has been reported.

Nickel: Impairment to respiratory organ due to long-term or repeated exposure. As for experimental animals, pleural inflammation, pneumonia, congestion and hydrops, increased lining layer bounded to alveolar membrane described.

Lead: Impairment of hematopoietic organ, nervous system,

kidney, central nerve, peripheral nerve, cardiovascular, immune system due to long-term or repeated exposure.
Described target organs are, hematopoietic, nervous system, kidney and cardiovascular. In the cases of human exposure, defect in heme synthesis, nephropathy, cerebropathy, effect to peripheral nerve and central nerve function, and also immunosuppressive effect.

Manganese: Impairment of respiratory organ, nervous system due to long-term or repeated exposure.
The most general manganese containing inorganic substances are manganese dioxide, manganese carbonate manganese silicate, manganese trioxide. Described that excessive exposure to manganese compound for 14 days or shorter (short-term) or one year (medium-term) normally affects respiratory organ and nervous system, but not other organs.
Cadmium: Impairment of kidney, lung, blood, bone, respiratory Organ due to long-term or repeated exposure. Described are, in animal experiment, chronic pneumonia, emphysema, protein urea, etc. observed, and to humans, long-term occupational exposure causes serious chronic effect mainly to lung and kidney. Also causes osteoporosis, osteomalacia. Chronic exposure to humans causes anemia eosinophilia, sinus infection, lung emphysema, decolorization of teeth, kidney disease, etc.

## 12. Ecological Information

Degradability, Concentration
・No data available
Bioaccumulation
・No data available
Ecotoxicity
Anthracene: Aquatic toxicity (Acute) Severe toxicity to aquatic organisms
Aquatic toxicity (Chronic) Severe toxicity to aquatic organisms due to long-term effect
Fish (Bluegill) LC=50=0.12 mg/L/96H
Pyrene: Aquatic toxicity (Acute) Toxicity to aquatic organisms
Aquatic toxicity (Chronic) Severe toxicity to aquatic organisms due to long-term effect
Crustacean (Daphnia magna) EC50=1.6 mg/L/48H
Benzo[*b*]fluoranthene: Aquatic toxicity (Chronic) Toxicity to aquatic organisms due to long-term effect
No report on acute toxicity up to the water soluble concentration, but presumably does not decompose rapidly and is bioaccumulative.
log Kow=5.78
Benzo[*k*]fluoranthene: Aquatic toxicity (Acute) Severe toxicity to aquatic organisms
Aquatic toxicity (Chronic) Severe toxicity to aquatic organisms due to long-term effect
Crustacean (Daphnia magna) LC50=0.014 mg/L (1.54d)
Does not decompose rapidly

log Pow=6.11 NOEC:<1 mg/L

Benzo[*a*]pyrene: Aquatic toxicity (Acute) Severe toxicity to aquatic organisms
Aquatic toxicity (Chronic) Severe toxicity to aquatic organisms due to long-term effect.
Crustacean (Daphnia magna) EC50=40 μg/L
Presumably does not decompose rapidly and is bioaccumulative.
log Pow=6.13

Indeno[1,2,3-*cd*]pyrene: Aquatic toxicity (Acute) Severe toxicity to aquatic organisms
Aquatic toxicity (Chronic) Severe toxicity to aquatic organisms due to long-term effect.
Algae (Selenastrum) EC50=0.0002 mg/L/72H
Dose not decompose rapidly
log Pow=6.70 NOEC:<1 mg/L

Nickel: Aquatic toxicity (Chronic) May be toxic to aquatic organisms due to long-term effect.

Manganese: Aquatic toxicity (Chronic) May be toxic to aquatic organisms due to long-term effect.

Cadmium: Aquatic toxicity (Chronic) May be toxic to aquatic organisms due to long-term effect.

## 13. Disposal Consideration

Outsource to a professional industrial waste disposal contractor licensed by the prefectural governor.

## 14. Transport Information

| | | |
|---|---|---|
| UN Number | : | Not applicable |
| UN Classification | : | Not applicable |
| Material Name | : | - |
| Container Grade | : | - |
| ICAO/IATA | : | - |
| Marine Pollutant | : | - |
| Precautions | : | Avoid sunlight, transfer very carefully not to cause leakage or fire by dropping, overturning, etc. |

## 15. Regulatory Information

◇Act on Confirmation, etc. of Release Amounts of Specific Chemical Substances in the Environment and Promotion of Improvements to the Management Thereof (PRTR system Pollutant Release and Transfer Register)
Class 1 Designated chemical substance (Cabinet Order No 87):Cr

◇Industrial Safety and Health Act
・Article 57-2 (Enforcement Order: Article 18) Hazardous substance whose name, etc. must be labeled.
・Article 57-2 (Enforcement Order: Article 18-2) Hazardous substance whose name, etc. must be notified No.No.142、No.418、No.411

◎ **This SDS is originally prepared for the use of the material in Japan, thus the stated laws and regulations are stipulated and carried out in Japan. The use of the material in other countries should be referred to and by application of the relevant laws and**

**regulations of the country in which the material will be used.**

## 16.Other Information

Others

The information in this document is not intended to be exhaustive and is based on currently available information and data. The measures given in this document are applicable only to normal handling conditions. When handling this reference material under special conditions etc., it is recommended to take safety measures appropriate to each specific application and context of use. This document is intended to provide information and not intended to guarantee anything in handling this reference material.