Safety Data Sheet
Carbon Black

According to the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

1. IDENTIFICATION

1.1 GHS Product Identifier

Carbon Black
Trade Names: Thermax®* N990, Thermax® N907 Stainless, Thermax® N990 Ultra Pure, Thermax® N991 Powder, Thermax® N991 Powder Ultra Pure, Thermax® N908 Stainless Powder, Thermax® N908 Stainless Powder Ultra Pure, Fine Thermal, MFT, Carbocolor®, Carbocolor® Powder, TB Carbon.

*For a complete list of Cancarb's trademarks and the countries where they are registered go to www.cancarb.com/trademarks.

European Union REACH registration number: 01-2119384822-32

1.2 Other Means of Identification

N/A

1.3 Recommended Use of the Chemical and Restrictions on Use

Used as an additive / filler in rubber and plastic products, a colorant/pigment, a carburizer and reducing agent, and refractory additive.

Not recommended as a human tattooing pigment.

1.4 Supplier's Details

Cancarb Limited
1702 Brier Park Crescent NW.
Medicine Hat, Alberta
Canada, T1C 1T9
Phone number: +1.403.527.1121
Email: customer_service@cancarb.com

European Union Only Representative:

Charles River Laboratories Den Bosch B.V.
Hambakenwetering 7
5231 s-Hertogenbosch
The Netherlands

1.5 Emergency Phone Number

Global: CHEMTREC (chemical emergency only): 1.703.527.3887 *or see section 16 for in country telephone numbers.*
U.S.: CHEMTREC (chemical emergencies only): 1.800.424.9300
CANADA: CANUTEC: 1.613.996.6666
Cancarb Limited +1.403.527.1121 or email: customer_service@cancarb.com
Hours: 8:00am – 4:00pm MST

2. HAZARD IDENTIFICATION

2.1 Classification of the Substance or Mixture

According to the criteria in OSHA HCS (2012) for classifying hazardous substances, Carbon Black is not classified for any toxicological or eco-toxicological endpoint. As a combustible dust it is designated by OSHA as a hazardous chemical. See 2.2 Labelling and 2.3 "Hazards Not Otherwise Classified (HNOC)".

According to the criteria in GHS (UN) for classifying hazardous substances, Carbon Black is not classified for any physico-chemical, toxicological or eco-toxicological endpoint. See 2.3, "Other hazards which do not result in classification"

According to the criteria in Regulation (EC) No. 1272/2008 (CLP) for classifying hazardous substances, Carbon Black is not classified for any physico-chemical, toxicological or eco-toxicological endpoint.

According to the criteria in Canadian Hazardous Product Legislation known as Worker Hazardous Material Information System (WHMIS) carbon black is not classified for any health hazards. Carbon Black is classified as a Combustible Dust.

2.2 GHS Label Elements, Including Precautionary Statements

WARNING: May form explosible dust-air mixture if dispersed.
Keep away from all ignition sources including heat, sparks and flame.
Prevent dust accumulations to minimize explosion hazard.
Control dust exposures to below applicable occupational exposure limits.

2.3 Hazards Not Otherwise Classified (HNOC)

This substance is classified as hazardous as a combustible dust by the United States 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200) and the Canadian Hazardous Products Regulation (HPR) 2015.

Do not expose to temperatures above 400°C. Hazardous products of combustion can include carbon monoxide (CO), carbon dioxide (CO_2), oxides of sulfur, and organic products.

Principle Routes of Exposure:	Inhalation, Eye contact, Skin Contact
Eye Contact:	May cause mechanical irritation. Avoid contact with eyes.

Skin Contact:	May cause mechanical irritation, soiling, and skin drying. Avoid contact with skin. No cases of sensitization in humans have been reported.
Inhalation:	Dust may be irritating to respiratory tract. Provide appropriate local exhaust ventilation at machinery and at places where dust can be generated. See also Section 8.
Ingestion:	Adverse health effects are not expected. See Section 11.
Carcinogenicity:	Carbon Black is listed as an IARC (International Agency for Research on Cancer) Group 2B substance (possibly carcinogenic to humans). See also Section 11.
Target Organ Effects:	Lungs, See Section 11
Medical Conditions Aggravated by Exposure:	Asthma, Respiratory disorder
Potential Environmental Effects:	None known. See Section 12.

3 COMPOSITION / INFORMATION ON INGREDIENTS

3.1 Substances

Carbon Black, amorphous (100% by weight)
Chemical formula: C

Common name(s), synonym(s) of the substance:

Thermal carbon black, Medium Thermal carbon black, Fine Thermal carbon black

CAS number and other unique identifiers for the substance:

CAS number: 1333-86-4
EINECS number: 215-609-9

Impurities and stabilizing additives which are themselves classified and which contribute to the classification of the substance

3.2 Mixtures

Not Applicable

4 FIRSTAID MEASURES

4.1 Description of Necessary First-aid Measures

Inhalation
As conditions permit move person to fresh air and restore normal breathing. Short-term exposures to concentrations that are well above the occupational exposure limit may produce temporary discomfort to the upper respiratory tract, which may result in coughing and wheezing. Removal from carbon black exposure is normally sufficient to cause symptoms to subside without lasting effects. Carbon black is not a respiratory irritant, as defined by the Occupational Safety and Health Administration (OSHA) or UN GHS.

Skin
Wash skin with mild soap and water. Carbon black dust or powder may cause drying of the skin with repeated and prolonged contact. Carbon black is not a chemical skin irritant. Treat symptomatically for mechanical irritation.

Eye
Rinse eyes with clean water keeping eyelid open. If symptoms develop seek medical attention. Carbon black is not a chemical eye irritant. Treat symptomatically for mechanical irritation.

Ingestion
No adverse effects are expected from carbon black ingestion. Do not induce vomiting.

First-aid responders should wear an approved respirator where airborne dust concentrations are expected to exceed occupational exposure limits.

4.2 Most important symptoms/effects, acute and delayed – see inhalation above and Section 11.

4.3 Indication of immediate medical attention and special treatment needed, if necessary – see inhalation above.

5 FIRE FIGHTING MEASURES

5.1 Suitable Extinguishing Media

Use foam, carbon dioxide (CO_2), dry chemical, nitrogen (N_2), or water fog. A fog spray is recommended if water is used.

Do not use a high-pressure water stream as this may spread burning powder (burning powder will float and may spread fire).

Do not use a high-pressure media which could cause the formation of a potentially explosible dust-air mixture.

5.2 Specific Hazards Arising from the Chemical

Explosion: Avoid generating dust; fine dust dispersed in air in sufficient concentrations and in the presence of an ignition source is a potential dust explosion hazard.

May produce hazardous airborne concentrations of carbon monoxide if burning or smoldering

Carbon black can burn or smolder at temperatures greater than 400ºC (>752ºF) releasing hazardous products such as carbon monoxide (CO), carbon dioxide, and oxides of sulfur. At sufficient concentrations carbon monoxide, by itself, or when combined with carbon black can form an explosible hybrid mixture when dispersed in air.

Wet carbon black produces very slippery walking surfaces.

5.3 Special Protective Actions for Fire-Fighters

Wear full protective firefighting gear including self-contained breathing apparatus (SCBA).

6 ACCIDENTAL RELEASE MEASURES

6.1 Personal Precautions, Protective Equipment and Emergency Procedures

For non-emergency personnel:

Wear appropriate personal protective equipment and respiratory protection to avoid skin soiling and possible mechanical irritation to eyes and upper respiratory tract from airborne dust.

Dust deposits should not be allowed to accumulate on surfaces, as these may form an explosible mixture if they are released into the atmosphere in sufficient concentrations. Refer to NPFA 654 for good practices.

Remove ignition sources.

Avoid dispersal of dust in the air (e.g., refrain from clearing dust surfaces with compressed air).

Ensure adequate ventilation to control dust to below current occupational exposure limits.

Wet carbon black produces very slippery walking surfaces. See Section 8.

For emergency responders:

When airborne contaminants and concentrations cannot be immediately assessed self-contained breathing apparatus (SCBA) should be used.

Dust deposits should not be allowed to accumulate on surfaces, as these may form an explosible mixture if they are released into the atmosphere in sufficient concentrations. Refer to NPFA 654 for good practices.

Remove ignition sources.

Avoid dispersal of dust in the air (e.g., refrain from clearing dust surfaces with compressed air).

Non-sparking tools should be used.

Exposure to carbon black does not require the use of special impervious clothing or gloves. Use of gloves, boots and other clothing to protect skin and work clothing from soiling is optional.

6.2 Environmental Precautions

Carbon black is not a hazardous substance under the Comprehensive Environmental Response, Compensation and Liability Act (40 CFR 302), or the Clean Water Act (40 CFR 116), or a hazardous air pollutant under the Clean Air Act Amendments of 1990 (40 CFR 63).

Carbon black poses no significant environmental hazards. As a matter of good practice, minimize contamination of sewage water, soil, groundwater, drainage systems, or bodies of water.

6.3 Methods and materials for containment and cleaning up

Small spills should be vacuumed when possible. A vacuum equipped with HEPA (high efficiency particulate air) filtration is recommended.

Large spills may be shoveled into containers. See Section 13.

Avoid dispersal of dust in the air (e.g., refrain from clearing dust surfaces with compressed air).

Dry sweeping is not recommended. Water spray will produce very slippery walking surfaces and will not result in satisfactory removal of carbon black contamination.

7 HANDLING AND STORAGE

7.1 Precautions for safe handling

Minimize dust generation and accumulation on surfaces.

Avoid dust exposures above the occupational exposure limit.

Use local exhaust ventilation or other appropriate engineering controls to maintain dust below the occupational exposure limit.

Avoid contact with skin and eyes.

Dust may cause electrical shorts if able to penetrate electrical boxes and other electrical devices, possibly creating electrical hazards resulting in equipment failure. Electrical devices should be tightly sealed or purged with clean air, periodically inspected, and cleaned, as required.

If hot work (welding, torch cutting, etc.) is required the immediate work area must be cleared of carbon black product, dust and other combustible materials. Approved fire and heat resistant welding blankets may provide additional thermal protection from sparks and splatter. Follow standard safe practices for welding, cutting, and allied processes as described in ANSI Z49.1.

Routine housekeeping should be instituted to ensure that dusts do not accumulate on surfaces. Refer to NPFA 654 for good practices.

Dry powders can build static electricity charges when subjected to the friction of transfer and mixing operations. Provide adequate precautions, such as electrical grounding and bonding, or inert atmospheres.

Some grades of carbon black may be less electrically conductive, permitting a build-up of static energy during handling. Grounding of equipment and conveying systems may be required under certain conditions. Safe work practices include the elimination of potential ignition sources in proximity to carbon black dust; good housekeeping to avoid accumulations of dust on all surfaces; appropriate exhaust ventilation design and maintenance to control airborne dust levels to below the applicable occupational exposure limit; avoidance of dry sweeping or pressurized air for cleanup; avoidance of use of carbon black with incompatible materials (e.g., chlorates and nitrates), and appropriate employee hazard training.

7.2 Conditions for Safe Storage, Including Incompatibilities

Store carbon black in dry location away from ignition sources and strong oxidizers.

Carbon black is not classifiable as a Division 4.2 self-heating substance under the UN test criteria. However, current UN criteria for determining if a substance is self-heating is volume dependent, i.e., the auto-ignition temperature decreases with increasing volume. This classification may not be appropriate for large volume storage containers, e.g., silos.

Before entering vessels and confined spaces containing carbon black test for adequate oxygen, flammable gases and potential toxic air contaminants, e.g., CO.

8 EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control Parameters

Representative occupational exposure limits currently available for carbon black (CAS number: 1333-86-4). Country listing not all inclusive.

Country	Concentration, mg/m^3
Argentina	3.5, TWA
Australia	3.0, TWA, inhalable
Belgium	3.6, TWA
Brazil	3.5, TWA
Canada (Ontario)	3.0, TWA, inhalable
China	4.0, TWA
	8.0, TWA, STEL (15 min)
Colombia	3.0, TWA, inhalable
Czech Republic	2.0, TWA
Egypt	3.5, TWA
Finland	3.5, TWA
	7.0, STEL
France – INRS	3.5, TWA/VME inhalable
Germany – AGW	1.5, TWA, respirable; 4.0, TWA, inhalable
Germany – TRGS 900	3.0, TWA, respirable; 10, TWA, inhalable
Hong Kong	3.5, TWA
Indonesia	3.5, TWA/NABs
Ireland	3.5, TWA; 7.0, STEL
Italy	3.5, TWA, inhalable
Japan – MHLW	3.0
Japan – SOH	4.0, TWA; 1.0, TWA, respirable
Korea	3.5, TWA
Malaysia	3.5, TWA
Mexico	3.5, TWA
Russia	4.0, TWA
Spain	3.5, TWA (VLA-ED)
Sweden	3.0, TWA
United Kingdom	3.5, TWA, inhalable
	7.0, STEL, inhalable
EU REACH DNEL	2.0 (inhalable)
United States	3.5, TWA, OSHA-PEL
	3.0, TWA, ACGIH-TLV®, inhalable
	3.5, TWA, NIOSH-REL

*Please consult the current version of the standard or regulation that may apply to your operations.

ACGIH®	American Conference of Governmental Industrial Hygienists
mg/m^3	milligrams per cubic meter
DNEL	Derived no-effect level
NIOSH	National Institute for Occupational Safety and Health
OES	occupational exposure standard

OSHA	Occupational Safety and Health Administration
PEL	permissible exposure limit
REL	recommended exposure limit
STEL	short-term exposure limit
TLV	threshold limit value
	TRGS Technische Regeln für Gefahrstoffe (Technical Rules for Hazardous Substances)
TWA	time weighted average, eight (8) hours unless otherwise specified

8.2 Appropriate Engineering Controls

Use process enclosures and/or exhaust ventilation to keep airborne dust concentrations below the applicable occupational exposure limit.

Depending on processing requirements, equipment, and the composition, concentration, and energy requirements of intermediates and/or finished products, dust control systems may require explosion relief vents, or an explosion suppression system, or an oxygen-deficient environment. See NFPA 654 and 68.

Local exhaust ventilation recommended for all transfer points to mixers, blenders, batch feeding processes and point sources that may release dust to work environment.

Recommend mechanical handling to minimize human contact with dust.

Recommend ongoing preventive maintenance and housekeeping programs to minimize dust release from ventilation control systems and the build-up of dust on surfaces in work environments. See NFPA 654.

8.3 Individual Protection Measures, Such as Personal Protective Equipment (PPE)

Consistent with good occupational hygiene (and safe) practices, personal protective equipment (PPE) should be used in conjunction with other control measures, including engineering controls, ventilation and isolation.

PPE recommended:

Eye/face protection: Safety glasses or goggles are recommended as a matter of good practice.

Skin protection: Wear general protective clothing to minimize skin exposure and soiling. Work clothes should not be taken home and should be washed daily.

No special glove composition is required for carbon black. General duty gloves may be used to protect hands from carbon black soiling. Use of a barrier cream may help prevent skin drying and minimize soiling. Wash hands and other exposed skin with mild soap and water.

Respiratory protection: Approved air purifying respirator (APR) should be used where airborne dust concentrations are expected to exceed occupational exposure limits. Use a positive-pressure, air supplied respirator if there is any potential for

uncontrolled release, exposure levels are not known, or in circumstances where APRs may not provide adequate protection.

When respiratory protection is required to minimize exposures to carbon black, programs should follow the requirements of the appropriate governing body for the country, province or state. Selected references to respiratory protection standards are provided below:

- OSHA 29CFR1910.134, Respiratory Protection
- CR592 Guidelines for Selection and Use of Respiratory Protective Devices (CEN)
- German/European Standard DIN/EN 143, Respiratory Protective Devices for Dusty Materials (CEN)

8.4 General hygiene considerations.

Wash hands and face thoroughly with mild soap and water before eating and drinking.

9 PHYSICAL AND CHEMICAL PROPERTIES

Appearance/Color	powder or pellet/black
Odor	odorless
Odor threshold limit	not applicable
pH value (ASTM 1512)	4-11 [50 g/l water, 68ºF (20ºC)]
Melting point/range	>3000 ^{0}C
Boiling point/range	>3000 ^{0}C
Flash Point	not applicable
Evaporation rate	not applicable
Flammability	not flammable[1]
Upper/lower flammability or explosive limits	not applicable, see Table 1 below
Vapor pressure	not applicable
Vapor Density	not applicable
Relative Density: (20ºC)	1.7 – 1.9 g/cm^3
Bulk density	1.25-40 lb/ft3, 20-700 kg/m^3
Pellets	200-700 kg/m^3
Powder (fluffy)	20-380 kg/m^3
Solubility (in Water)	insoluble
Partition coefficient (n-octanol/water)	not applicable
Auto-ignition temperature	>140ºC (>284ºF)[2] IMDG Code for transport
Decomposition temperature	not applicable
Viscosity	not applicable
Volatile Content	<2.0 %

[1]Not a flammable solid, per test method N.1 as described in Part III, sub-section 33.2.1 of the UN Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria

[2]Not classifiable as a Division 4.2 self-heating substance as defined by UN Recommendations on the Transport of Dangerous Goods and the International Maritime Dangerous Goods Code. (Based on 100mm sample cube.)

Explosible dust

"Different dusts of the same chemical material can have different ignitability and explosibility characteristics, depending upon physical characteristics such as particle size, shape, and moisture content. These physical characteristics can change during manufacturing, use, or while the material is being processed." (OSHA 3371-08 2009.)

Table 1. Explosible Properties

Metric	Furnace Black	Thermal Black	Method
Kst (bar-m/sec)	30-100	9	ASTM 1226-10 or VDI 2263-1 (1990) or DIN 14034 using a 2 – 5 kJ igniter in a 1m^3 vessel.
Pmax (bar)	10	5.7	ASTM 1226-10 or VDI 2263-1 (1990) or DIN 14034 using a 2 - 5 kJ igniters in a 1m^3 vessel.
MEC (g/m^3)	50	625	ASTM E1515 Minimum Explosive Concentration (MEC)
Hazard Class	ST-1	ST-1	Dust explosion class (OSHA)
MAIT (°C)	>400	>450	ASTM E2021-09 Minimum auto-ignition temperature of a dust layer (MAIT)
MIT (°C)	>600	>600	ASTM 1491-97 Minimum ignition temperature of a dust cloud (MIT) (BAM Oven)
MIE (kJ)	>1	>1	ASTM E2019-03 Minimum Ignition Energy (MIE)

10 STABILITY AND REACTIVITY

10.1 Reactivity

Stable under normal ambient conditions.

10.2 Chemical Stability

Stable under normal storage conditions.
Prevent exposure to high temperatures and open flames

Stable under normal ambient conditions. Prevent exposure to high temperatures and open flames.

10.3 Possibility of Hazardous Reactions

Hazardous polymerization will not occur under normal conditions.

10.4 Conditions to Avoid

Avoid high temperatures >400°C (>752°F) and sources of ignition.

Take precautionary measures against static discharges. Avoid dust formation. Grounding of equipment and conveying systems may be required under certain conditions.

10.5 Incompatibility Materials

Avoid strong oxidizers such as chlorates, bromates, and nitrates.

10.6 Hazardous decomposition products

Carbon monoxide (CO), carbon dioxide (CO_2), organic products of decomposition, oxides of sulfur form if heated above decomposition temperature.

11 TOXICOLOGICAL INFORMATION

11.1 Information on Toxicological Effects

Acute Toxicity

Oral LD50:	LD50/oral/rat = > 8000 mg/kg. (Equivalent to OECD TG 401).
Inhalation LC50:	No data available
Dermal LD50:	No data available

Skin Corrosion/Irritation:

Rabbit: not irritating. (Equivalent to OECD TG 404). Edema = 0 (max. attainable irritation score: 4). Erythema = 0 (max. attainable irritation score: 4). Assessment: Not irritating to skin.

Serious Eye Damage/Eye Irritation:

Rabbit: not irritating. (OECD TG 405). Cornea: 0 (max. attainable irritation score: 4). Iris: 0 (max. attainable irritation score: 2). Conjunctivae: 0 (max. attainable irritation score: 3). Chemosis: 0 (max. attainable irritation score: 4).

Assessment: Not irritating to the eyes.

Sensitization: Guinea pig skin (Buehler Test): Not sensitizing (OECD TG 406).

Assessment: Not sensitizing in animals. No cases of sensitization in humans have been reported.

Germ Cell Mutagenicity

In Vitro

Carbon black is not suitable to be tested in bacterial (Ames test) and other in vitro systems because of its insolubility. However, when organic solvent extracts of carbon black have been tested, results showed no mutagenic effects. Organic solvent extracts of carbon black can contain traces of polycyclic aromatic hydrocarbons (PAHs). A study to examine the

bioavailability of these PAHs showed that PAHs are very tightly bound to carbon black and not bioavailable. (Borm, 2005)

In Vivo

In an experimental investigation, mutational changes in the HPRT gene were reported in alveolar epithelial cells in the rat following inhalation exposure to carbon black. This observation is believed to be rat specific and a consequence of "lung overload" (Driscoll,

1997) which led to chronic inflammation and release of reactive oxygen species. This is considered to be a secondary genotoxic effect and, thus, carbon black itself would not be considered to be mutagenic.

Assessment: In vivo mutagenicity in rats occurs by mechanisms secondary to a threshold effect and is a consequence of "lung overload," which leads to chronic inflammation and the release of genotoxic oxygen species. This mechanism is considered to be a secondary genotoxic effect and, thus, carbon black itself would not be considered to be mutagenic.

Carcinogenicity:

Animal Toxicity:

Rat, oral, duration 2 years. Effect: no tumors.

Mouse, oral, duration 2 years. Effect: no tumors.

Mouse, dermal, duration 18 months. Effect: no skin tumors.

Rat, inhalation, duration 2 years. Target organ: lungs.
Effect: inflammation, fibrosis, tumors.

Note: Tumors in the rat lung are considered to be related to the "lung overload" rather than to a specific chemical effect of carbon black itself in the lung. These effects in rats have been reported in many studies on other poorly soluble inorganic particles and appear to be rat specific (ILSI, 2000). Tumors have not been observed in other species (i.e., mouse and hamster) for carbon black or other poorly soluble particles under similar circumstances and study conditions.

Mortality Studies (Human Data):

A study on carbon black production workers in the UK (Sorahan, 2001) found an increased risk of lung cancer in two of the five plants studied; however, the increase was not related to the dose of carbon black. Thus, the authors did not consider the increased risk in lung cancer to be due to carbon black exposure. A German study of carbon black workers at one plant (Morfeld, 2006; Buechte, 2006) found a similar increase in lung cancer risk but, like the Sorahan, 2001 (UK study), found no association with carbon black exposure. A large US study of 18 plants showed a reduction in lung cancer risk in carbon black production workers (Dell, 2006). Based upon these studies, the February 2006 Working Group at the International Agency for Research on Cancer (IARC) concluded that the human evidence for carcinogenicity was inadequate (IARC, 2010).

Since the IARC evaluation of carbon black, Sorahan and Harrington (2007) have re-analyzed the UK study data using an alternative exposure hypothesis and found a positive association with carbon black exposure in two of the five plants. The same exposure hypothesis was applied by Morfeld and McCunney (2009) to the German cohort; in contrast, they found no association between carbon black exposure and lung cancer risk and, thus, no support for the alternative exposure hypothesis used by Sorahan and Harrington.

Overall, as a result of these detailed investigations, no causative link between carbon black exposure and cancer risk in humans has been demonstrated.

IARC Cancer Classification:

In 2006 IARC re-affirmed its 1995 finding that there is "inadequate evidence" from human health studies to assess whether carbon black causes cancer in humans. IARC concluded that there is "sufficient evidence" in experimental animal studies for the carcinogenicity of carbon black. IARC's overall evaluation is that carbon black is "possibly carcinogenic to humans (Group 2B)". This conclusion was based on IARC's guidelines, which generally require such a classification if one species exhibits carcinogenicity in two or more animal studies (IARC, 2010).

Solvent extracts of carbon black were used in one study of rats in which skin tumors were found after dermal application and several studies of mice in which sarcomas were found following subcutaneous injection. IARC concluded that there was "sufficient evidence" that carbon black extracts can cause cancer in animals (Group 2B).

ACGIH Cancer Classification:

Confirmed Animal Carcinogen with Unknown Relevance to Humans (Category A3 Carcinogen).

Assessment: Applying the guidelines of self-classification under the Globally Harmonized System of Classification and Labeling of Chemicals, carbon black is not classified as a carcinogen. Lung tumors are induced in rats as a result of repeated exposure to inert, poorly soluble particles like carbon black and other poorly soluble particles. Rat tumors are a result of a secondary non-genotoxic mechanism associated with the phenomenon of lung overload. This is a species-specific mechanism that has questionable relevance for classification in humans. In support of this opinion, the CLP Guidance for Specific Target Organ Toxicity – Repeated Exposure (STOT-RE), cites lung overload under mechanisms not relevant to humans. Human health studies show that exposure to carbon black does not increase the risk of carcinogenicity.

Reproductive and Developmental Toxicity:

Assessment: No effects on reproductive organs or fetal development have been reported in long-term repeated dose dies in animals.

STOT – Single Exposure:

Assessment: Based on available data, specific target organ toxicity is not expected after single oral, single inhalation, or single dermal exposure.

STOT - Repeated Exposure:

Animal Toxicity

Repeated dose toxicity: inhalation (rat), 90 days, No Observed Adverse Effect Concentration (NOAEC) = 1.1 mg/m^3 (respirable). Target organ effects at higher doses are lung inflammation, hyperplasia, and fibrosis.

Repeated dose toxicity: oral (mouse), 2 yrs, No Observed Effect Level (NOEL) = 137 mg/kg (body wt.)

Repeated dose toxicity: oral (rat), 2 yrs, NOEL = 52 mg/kg (body wt.)

Although carbon black produces pulmonary irritation, cellular proliferation, fibrosis, and lung tumors in the rat under conditions of "lung overload", there is evidence to demonstrate that this response is principally a species-specific response that is not relevant to humans.

Morbidity Studies (Human Data)

Results of epidemiological studies of carbon black production workers suggest that cumulative exposure to carbon black may result in small, non-clinical decrements in lung function. A U.S. respiratory morbidity study suggested a 27 ml decline in FEV1 from a 1 mg/m^3 8 hour TWA daily (inhalable fraction) exposure over a 40-year period (Harber, 2003). An earlier European investigation suggested that exposure to 1 mg/m^3 (inhalable fraction) of carbon black over a 40-year working lifetime would result in a 48 ml decline in FEV1 (Gardiner, 2001). However, the estimates from both studies were only of borderline statistical significance. Normal age-related decline over a similar period of time would be approximately 1200 ml.

In the U.S. study, 9% of the highest non-smokers exposure group (in contrast to 5% of the unexposed group) reported symptoms consistent with chronic bronchitis. In the European study, methodological limitations in the administration of the questionnaire limit the conclusions that can be drawn about reported symptoms. This study, however, indicated a link between carbon black and small opacities on chest films, with negligible effects on lung function.

Inhalation Assessment

Applying the guidelines of self-classification under GHS, carbon black is not classified under STOT-RE for effects on the lung. Classification is not warranted on the basis of the unique response of rats resulting from the "lung overload" following exposure to poorly soluble particles such as carbon black. The pattern of pulmonary effects in the rat, such as inflammation and fibrotic responses, are not observed in other rodent species, non-human primates, or humans under similar exposure conditions. Lung overload does not appear to be relevant for human health. Overall, the epidemiological evidence from well-conducted investigations has shown no causative link between carbon black exposure and the risk of non-malignant respiratory disease in humans. A STOT-RE classification for carbon black after repeated inhalation exposure is not warranted.

Oral Assessment

Based on available data, specific target organ toxicity is not expected after repeated oral exposure.

Dermal Assessment

Based on available data and the chemical-physical properties (insolubility, low absorption potential), specific target organ toxicity is not expected after repeated dermal exposure.

Aspiration Hazard

Assessment: Based on industrial experience and the available data, no aspiration hazard is expected.

12 ECOLOGICAL INFORMATION

12.1 Toxicity

Aquatic toxicity

Acute fish toxicity:

LC50 (96 h) > 1000mg/l,
Species: Brachydanio rerio (zebrafish),
Method: OECD Guideline 203

Acute invertebrate toxicity:
EC50 (24 h) > 5600 mg/l.

Species: Daphnia magna (waterflea),
Method: OECD Guideline 202

Acute algae toxicity:
EC 50 (72 h) >10,000 mg/l
NOEC 50 >10,000 mg/l
Species: Scenedesmus subspicatus,
Method: OEC D Guideline 201

Activated sludge:
EC0 (3 h) >= 800 mg/l.
Method: DEV L3 (TTC test)

12.2 Persistence and Degradability;(Environmental fate)

Not soluble in water. Expected to remain on soil surface. Not expected to degrade.

12.3 Bioaccumulative Potential

Bioaccumulation is not expected due to physico-chemical properties of the substance.

12.4 Mobility in Soil

Not soluble in water. Not expected to migrate.

12.5 Other Adverse Effects.

No other data are available.

13 DISPOSAL CONSIDERATIONS

Disclaimer: Information in this section pertains to the product as shipped in its intended composition as described in Section 3 of this SDS. Contamination or processing may change waste characteristics and requirements. Regulations may also apply to empty containers, liners or rinsate. State/provincial and local regulations may be different from federal regulations.

List of Waste Codes:

EU Waste Code: No. 61303.
RCRA: Not a hazardous waste under U.S. RCRA, 40 CFR 261.
Canadian Waste Classification: Not a hazardous waste under provincial regulations.

13.1. Waste treatment methods

Waste should not be released to sewers. Product, as supplied, can be burned in suitable incineration facilities or should be disposed of in accordance with the regulations issued by the appropriate federal, state and local authorities. Same consideration should be given to containers and packaging.

14 TRANSPORT INFORMATION

UN Number: No UN number

UN Proper Shipping Name: Not regulated

Transport Hazard Class: Not regulated

Packing Group, if applicable: Not regulated

Environmental Hazards: Marine hazard: Not regulated

Special Precautions for User: None

Additional information:

US-DOT transport information: Not regulated.

International transport identification: "Carbon black, non-activated, mineral origin." Carbon black is not a Division 4.2 hazard.

Seven (7) ASTM reference carbon blacks were tested according to the UN method, Self Heating Solids, and found to be "Not a self-heating substance of Division 4.2"; the same carbon blacks were tested according to the UN method, Readily Combustible Solids, and found to be "Not a readily combustible solid of Division 4.1"; under current UN Recommendations on the Transport of Dangerous Goods.

The following organizations do not classify carbon black as a "hazardous cargo" or a "dangerous good" if it is "carbon, non-activated, mineral origin". Cancarb carbon blacks meet this definition.

- UN Model Regulations on the Transport of Dangerous Goods
- European Agreement concerning the International Carriage of Dangerous Goods by Road, as amended (ADR)
- European Agreement concerning the International Carriage of Dangerous Goods by Rail, as amended (RID)
- European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways, as amended (ADN)
- International Convention for the Safety of Life at Sea – International Maritime Dangerous Goods Code (IMDG)
- Convention on International Civil Aviation – Annex 18 – Safe Transport of Dangerous Goods by Air
- International Air Transport Association (IATA-DGR)
- MARPOL 73/78, Annex II
- International Bulk Chemical Code (IBC)
- United States Department of Transportation
- Canadian Transport of Dangerous Goods Regulation
- Australian Dangerous Goods Code

15 REGULATORY INFORMATION

15.1 European Union

Label Information:

Carbon black is not defined as a dangerous substance or preparation according to Regulation (EC) No. 1272/2008 (CLP) or Council Directive 67/548/EEC and its various amendments and adaptations.

Symbol – none required.

15.2 Germany

Water Classification:

WGK Number (Kenn-Nr): 1742
WGK Class (Wassergefährdungsklasse): nwg (non-hazardous to waters)

15.3 Switzerland

Swiss Poison Class:

Not Applicable (tested and found to be not toxic): G-8938

15.4 Canada

Workplace Hazardous Material Information System (WHMIS) Classification:

Combustible Dust

"This product has been classified in accordance with the hazard criteria of the Hazardous Products Regulations and the SDS contains all the information required by the Hazardous Products Regulations."

15.5 United States

Superfund Amendments and Reauthorization Act (SARA) Title III
Section 313 Toxic Substances: Does not contain any components subject to this section.

OSHA, Hazard Communication Standard, 29 CFR 1910.1200

Toxic Release Inventory (TRI)

Under EPA's Toxics Release Inventory (TRI) program the reporting threshold for 21 Polycyclic Aromatic Compounds (PACs) has been lowered to 100 pounds per year manufactured, processed, or otherwise used. (64 Fed. Reg. 58666 (Oct. 29, 1999).) The 100 pounds/yr applies to the cumulative total of 21 specific PACs. Section 1.5.1 indicates that the de minimis exemption (i.e., disregarding amounts less than 0.1%) has been eliminated for PACs. Carbon black may contain certain of these PACs and the user is advised to evaluate their own TRI reporting

responsibilities. (Note: Benzo (g,h,i) perylene is listed separately and has a 10 lb. reporting threshold.)

California Safe Drinking Water and Toxics Enforcement Act of 1986 (Proposition 65): "Carbon black (airborne, unbound particles of respirable size)" is a California Proposition 65 listed substance. Certain polycyclic aromatic hydrocarbons (PAHs) that may be found adsorbed onto the surface of carbon black are California Proposition 65 listed substances. "Carbon-black extracts" is a California Proposition 65 listed substance. Certain metals, including arsenic, cadmium, lead, mercury, or nickel, may be present on and/or in carbon black and are California Proposition 65 listed substances.

15.6 Korea:

Industrial Safety and Health Law, a hazardous factor for which the exposure limit has been established (TWA 3.5 mg/㎥). Dangerous Substance Safety Management Law, not applicable.

Waste Management Law. Dispose of contents/containers in accordance with regulations prescribed in the Waste Management Law. This substance is not classified as a designated waste.

15.7 National Registries and Other Applicable Regulations (not all inclusive):

Carbon black, CAS number 1333-86-4, appears on the following inventories:

Australia: Australian Inventory of Chemical Substances (AICS).

Canada: Domestic Substance List (DSL);

China: Inventory of Existing Chemical Substances in China (IECSC).

European Union: European Inventory of Existing Commercial Chemical Substances (EINECS), 215-609-9.

European Union: REACH Regulation (EC) No. 1907/2006: Company specific registration is required; contact your supplier for additional information.

Germany: VDI guideline 2580, Emission Control Production Plants for Carbon Black - Classification of Carbon Black in Water: Water Endangering Class (WGK) is not water endangering, ID number 1742.

Japan: Existing and New Chemical Substances (ENCS), Industrial Safety and Health Law Inventory (ISHL)

Korea: Toxic Chemical Control Law (TCCL), Korean Existing Chemicals Inventory (KECI)

Philippines: Philippine Inventory of Chemicals and Chemical Substances (PICCS).

Taiwan: Chemical Substance Nomination and Notification (CSNN)

United States: Toxic Substances Control Act (TSCA) Inventory

SARA (Super Fund Amendments and Reauthorization Act), Sections 311/312 apply if carbon black is present at any one time in amounts equal to or greater than 10,000 pounds. Under Section 311/312 – SDS requirements, carbon black is determined to be hazardous according to the following EPA hazard categories:

Immediate health hazard:	No
Delayed (chronic) health hazard:	Yes
Sudden release of pressure hazard:	No
Reactive hazard:	No

Clean Air Act Amendments of 1990 (CAA, Section 112, 40 CFR 82):
This product does not contain any components listed as a Hazardous Air Pollutant, Flammable Substance, Toxic Substance, or Class 1 or 2 Ozone Depletor.

CWA (Clean Water Act)
This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42).

CERCLA
This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material.

Industrial Safety & Health Law (ISHL)
No. 130: Carbon Black (>0.1% weight), Hazardous substance of which SDS must be disclosed, article 18-2, Appendix 9 of Cabinet Order, Article 57-2 of ISHL

15.8 Chemical Safety Assessment

EU Chemical safety Assessment:
Per Article 14.1 of the REACH Regulation a Chemical Safety Assessment has been carried out.

EU Exposure Scenarios:
Per Article 14.4 of the REACH Regulation, no exposure scenario has been developed as the substance is not hazardous.

Note: Readers are urged to review their national, provincial, state, and local safety, health, and environmental regulations, as well as their carbon black supplier's safety data sheet (SDS). Specific questions should be addressed to your carbon black supplier.

16 OTHER INFORMATION

Carbon Black Extracts

Manufactured carbon blacks generally contain less than 0.1% of solvent extractable polycyclic aromatic hydrocarbons (PAH). Solvent extractable PAH content depends on numerous factors including, but not limited to, the manufacturing process, desired product specifications, and the analytical procedure used to measure and identify solvent extractable materials.

Questions concerning PAH content of carbon black and analytical procedures should be addressed to your carbon black supplier.

National Fire Protection Association (NFPA) Rating:

Health: 0
Flammability: 2
Reactivity: 0
0 = minimal, 1 = slight, 2 = moderate, 3 = serious, 4 = severe

In-Country Chemtrec Numbers	Local # Provided in Country	Toll Free in Country
Argentina (Buenos Aires)	+(54)-1159839431	
Australia (Sydney)	+(61)-290372994	
Bahrain (Bahrain)	+(973)-16199372	
Brazil (Rio De Janeiro)	+(55)-2139581449	
Chile (Santiago)	+(56)-225814934	
China	**4001-204937***	
Colombia		01800-710-2151
Czech Republic (Prague)	+(420)-228880039	
France	+(33)-975181407	
Germany		0800-181-7059
Hong Kong (Hong Kong)		800-968-793
Hungary (Budapest)	+(36)-18088425	
India		000-800-100-7141
Indonesia		**001-803-017-9114***
Israel (Tel Aviv)	+(972)-37630639	
Italy		800-789-767
Japan (Tokyo)	+(81)-345209637	
Malaysia		1-800-815-308
Mexico		**01-800-681-9531***
Netherlands	+(31)-858880596	
Philippines		1-800-1-116-1020
Poland (Warsaw	+(48)-223988029	
Singapore	+(65)-31581349	800-101-2201
South Africa		**0-800-983-611***
South Korea		**00-308-13-2549***
Spain		900-868538
Sweden (Stockholm)	+(46)-852503403	
Taiwan		**00801-14-8954***
Thailand		001-800-13-203-9987
UK (London)	+(44)-870-8200418	
Vietnam	**+84-444581938**	

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The data and information presented herein corresponds to the present state of our knowledge and experience and is intended to describe our product with respect to possible occupational safety and health concerns. The user of this product has sole responsibility to determine the suitability of the product for any use and manner of use intended, and for determining the regulations applicable to such use in the relevant jurisdiction. This SDS is updated on a periodic basis in accordance with applicable health and safety standards. In the event of a discrepancy between the information on the non-English document and its English counterpart, the English version shall supersede.

Prepared by: Cancarb Limited - Safety, Health and Environmental Department