



MATERIAL SAFETY DATA SHEET

(ISO 11014-1 / ANSI Z 400.1-1998 / 93/112/EC)

1. PRODUCT AND COMPANY IDENTIFICATION

Manufacturer's Name:	Columbian Chemicals Company	Chemical Name:	Carbon Black
Manufacturer's Address:	1800 West Oak Commons Court Marietta, Georgia 30062	Chemical Family:	Carbon
Department:	Safety, Health and Environmental Affairs	CAS Number:	1333-86-4
Telephone Number:	(800) 235-4003 or (770) 792-9400		
Emergency Number Canada:	CANUTEC (613)-996-6666		
Emergency Number US:	CHEMTREC (800)-424-9300		

Trade Name: **Raven®, including all Ultra® versions of these grades**

Product Form: **Powder or Beads**

Product Name:	Raven® 1035	Raven® 1100	Raven® 5000	Raven® 7000
	Raven® 1040			
Raven® 14	Raven® 1060	Raven® 1255	Raven® 5250	CD-5008
	Raven® 1080		Raven® 5750	
		Raven® 3500		

2. HAZARDS IDENTIFICATION

2.1 Most Important Hazards:

A black, odorless, insoluble, powder that can burn or smolder at temperatures greater than 572°F (>300°C). Hazardous products of decomposition can include carbon monoxide, carbon dioxide, and oxides of sulfur. May cause reversible mechanical irritation to the eyes and respiratory tract especially at concentrations above the occupational exposure limit. Some grades of carbon black are sufficiently electrically non-conductive to allow a build-up of static charge during handling. Take measures to prevent the build-up of electrostatic charge.

2.2 Product Classification

2.2.1 Canada	This material is classified as D2A under Canadian Worker Hazardous Materials Information System (WHMIS) criteria.
2.2.2 European Union	Not defined as a dangerous substance or preparation according to Council Directives 99/45/EC or 67/548/EEC and their various amendments and adaptations
2.3.3 United States	OSHA : Classified as hazardous

2.3 Routes of Exposure:

Skin, Eye, Inhalation

2.4 Potential Health Effects

2.4.1 Inhalation	Temporary discomfort to upper respiratory tract may occur due to mechanical irritation when exposures are well above the occupational exposure limit. Long-term exposure below the current occupational exposure limit of 3.5 mg/m ³ may result in a small loss in one aspect of lung function (FEV ₁).
2.4.2 Acute Ingestion	No evidence of adverse effects from available data.
2.4.3 Acute eye	High dust concentrations may cause mechanical irritation to eye.
2.4.4 Acute skin	May cause mechanical irritation, soiling, and skin drying.
2.4.5 Sensitization	No cases of sensitization in humans have been reported
2.4.6 Carcinogenicity	IARC listed; Group 2B (possibly carcinogenic to humans). Not listed as a carcinogen by NTP, ACGIH, OSHA or the European Union. There are no known human carcinogenic effects related to the PAH content of carbon blacks. Recent research has shown that the PAH content of carbon blacks is not released in biological fluids and thus not available for biological activity.

2.5 Potential Environmental Effects:

No significant environmental hazards are associated with carbon black release to the environment. Carbon black is not soluble in water. See Section 12.

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1	Composition:	Carbon Black (amorphous)	100%
3.2	Chemical formula:	C	
3.3	CAS number:	1333-86-4	
3.4	EINECS number:	215-609-9	

4. FIRST-AID MEASURES

4.1	Inhalation	Take affected persons into fresh air. - If necessary, restore normal breathing through standard first aid measures.
4.2	Skin	Wash skin with mild soap and water. If symptoms develop, seek medical attention.
4.3	Eye	Rinse eyes thoroughly with large volumes of water keeping eyelid open. If symptoms develop, seek medical attention.
4.4	Ingestion	Do not induce vomiting. If conscious, give several glasses of water. Never give anything by mouth to an unconscious person.
4.5	Note to physicians	Treat symptomatically.

5. FIRE-FIGHTING MEASURES

- 5.1 Extinguishing Media
Use foam, carbon dioxide (CO₂), dry chemical, or water fog. DO NOT USE high pressure water stream as this may spread burning powder (burning powder will float).
- 5.2 Special Exposure Hazards
It may not be obvious that carbon black is burning unless the material is stirred and sparks are apparent. Carbon black that has been on fire should be observed closely for at least 48 hours to ensure no smoldering material is present. Products of combustion include carbon monoxide (CO), carbon dioxide (CO₂), and oxides of sulfur.
- 5.3 Protection of Firefighters
Wear full protective fire fighting gear including self-contained breathing apparatus (SCBA).

6. ACCIDENTAL RELEASE MEASURES

NOTE: Wet carbon black produces slippery walking surfaces.

- 6.1 **Personal Precautions**
Wear appropriate personal protective equipment and respiratory protection. See section 8.
- 6.2 **Environmental Precautions**
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 for Cleaning Up**
Small spills should be vacuumed when possible. Dry sweeping is not recommended. A vacuum equipped with HEPA (high efficiency particulate air) filtration is recommended. If necessary, light water spray will reduce dust for dry sweeping. Large spills may be shoveled into containers. See Section 13.
- 6.4 Carbon black is not a hazardous substance under the comprehensive environmental response, compensation and liability act (CERCLA, 40 CFR 302), or the clean water act (40 CFR 116), or a hazardous air pollutant under the clean air act amendments of 1990 (CAA 40 CFR).

7. HANDLING AND STORAGE

- 7.1 **Handling**
Avoid dust exposures above the occupational exposure limit. Wash exposed skin daily. Use engineering controls to limit exposures to below the occupational exposure limits. Fine dust may cause electrical shorts and is capable of penetrating electrical equipment unless tightly sealed. If hot work (welding, torch cutting, etc.) is required the immediate work area must be cleared of carbon black product and dust.
- 7.2 **Storage**
Store in a dry place away from ignition sources and strong oxidizers. Before entering closed vessels and confined spaces containing carbon black test for adequate oxygen, flammable gases and potential toxic air contaminants (e.g. CO). Follow safe practices when entering confined spaces.

8. **EXPOSURE CONTROLS/PERSONAL PROTECTION**

8.1 Exposure Limit Values

<u>Country</u>		<u>Occupational Exposure Limit, mg/m³</u>	<u>Country</u>		<u>Occupational Exposure Limit, mg/m³</u>
Australia		3.0 TWA	Korea		3.5
Canada		3.5 TWA	Spain		3.5
France		3.5 TWA	Sweden		3.5
Germany	MAK	1.0 TWA (respirable) ^A	United Kingdom	WEL	3.5 (Inhalable)
		4.0 TWA (inhalable) ^A			7.0 STEL (Inhalable)
	TRGS	3.0 TWA (respirable) ^B	United States	OSHA PEL	3.5
		6.0 TWA (respirable) ^C			ACGIH TLV
	10.0 TWA (inhalable) ^D		NIOSH REL	3.5 See Section 11	
Italy		3.5			

Footnotes:

^A annual average.

^B applies to all activities except those exempted, consult regulatory agency.

^C applies to certain exempt industries, consult regulatory authority.

^D effective April 2004, consult regulatory agency.

8.2 Engineering Controls

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

8.3 Personal Protective Equipment (PPE)

8.3.1 Respiratory

Approved respirators should be used where airborne concentrations are expected to exceed occupational exposure limits.

8.3.2 Hand Protection

Wash hands and other exposed skin with mild soap. Use of a barrier cream may help to prevent skin drying. General protective gloves may be used to protect hands from carbon black soiling.

8.3.3 Eye Protection

Wear safety glasses or goggles.

8.3.4 Skin Protection

Wear general protective clothing to minimize skin contact. Work clothes should not be taken home and should be washed daily.

8.3.5 General Hygiene Considerations

Emergency eyewash and safety shower should be in close proximity. Wash hands and face thoroughly with mild soap before eating and drinking.

9. **PHYSICAL AND CHEMICAL PROPERTIES**

Appearance:	powder or pellet
Color:	black
Odor:	odorless
Molecular formula:	C
Molecular weight (as carbon):	12
Melting point/range:	not applicable
Boiling point/range:	not applicable
Vapor pressure:	not applicable
Density: (20°C)	1.7 – 1.9 g/cm ³
Bulk density:	1.25-40 lb/ft ³ , 20-640 kg/m ³
	Pellets 200-680 kg/m ³
	Powder (fluffy) 20-380 kg/m ³
Solubility:	insoluble in water
pH value:	2.3 – 3.2 [50 g/l water, 68°F (20°C)]
Partition coefficient:	not applicable
Viscosity:	not applicable
Decomposition temperature:	572°F (300°C)

9.1 Flammable and Explosive Properties

Flashpoint not applicable

Flammability Classification (as defined by OSHA 1910.1200): not applicable

Explosive Limits (dust):

Furnace black: (VDI 2263)

Lower : 50 g/m³

Upper: not determined

Thermal black: (VDI 2263)	
Lower:	375 g/m ³
Upper:	not determined
Dust Explosion Class (VDI 2263, EC 84/449)	ST 1
Maximum Absolute Explosion Pressure	10 bar
Maximum Rate of Pressure Rise ¹	30-100 bar/sec.
Spontaneous Ignition (Autoignition)	>284°F (>140°C)
Minimum Ignition Temperature (VDI 2263)	
BAM Furnace	>932°F (>500°C)
Godbert-Greenwald Furnace	>600°F (>315°C)
Minimum Ignition Energy	>10 J
Burn Rate (VDI 2263, EC 84/449)	>45 seconds
	(not classifiable as "Highly Flammable", or "Easily Ignitable")
Ignition Energy (VDI 2263)	
Furnace black:	>1 kJ
Thermal black:	>20 kJ

10. STABILITY AND REACTIVITY

Stability:	stable under normal ambient conditions; decomposition: >572°F (>300°C)
Conditions to avoid:	prevent exposure to high temperatures >572°F (>300°C) and open flames.
Materials to avoid:	strong oxidizers such as chlorates, bromates, and nitrates.
Hazardous decomposition products:	carbon monoxide, carbon dioxide, organic products of decomposition, oxides or sulfur (sulfoxides) form if heated above decomposition temperature.
Hazardous polymerization:	will not occur

11. TOXICOLOGICAL INFORMATION

11.1 Acute toxicity:

Acute oral toxicity: LD50 (rat), > 8000 mg/kg
Primary irritation:
skin (rabbit), non-irritative, index score 0.6/8 (4.0 = severe edema)
eye (rabbit), non-irritative, Draize score 10-17/110 (100 maximally irritating)
Sensitization: no animal data available.

11.2 Subchronic toxicity:

Rat, inhalation, duration 90 days
Target organ: lungs
Effect: inflammation, hyperplasia, fibrosis
NOEL = 1.1 mg/m ³

11.3 Chronic 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 related to the fine particle overload phenomenon rather than to a specific chemical effect of the dust particles in the lung. These effects in rats have been reported in studies on other inorganic insoluble particles and appear to be species specific. Tumors have not been observed in other species (i.e., mouse and hamster) for carbon black under similar circumstances and study conditions.

11.4 Carcinogenicity

In 1995 IARC concluded, "There is *inadequate evidence* in humans for the carcinogenicity of carbon black." Based on rat inhalation studies IARC concluded that there is, "*sufficient evidence* in experimental animals for the carcinogenicity of carbon black," IARC's overall evaluation was that, "Carbon black is *possibly carcinogenic to humans (Group 2B)*". This conclusion was based on IARC's guidelines, which require such a classification if one species exhibits carcinogenicity in two or more studies. IARC performed another review in 2006, and again classified carbon black as *possibly carcinogenic to humans (Group 2B)*.

In its 1987 review IARC concluded, "There is *sufficient evidence* in experimental animals for the carcinogenicity of carbon black extracts." Carbon black extracts are classified as, *possibly carcinogenic to humans (Group 2B)*.

Carbon black is not designated a carcinogen by the U.S. National Toxicology Program (NTP), the U.S. Occupational Safety and Health Administration (OSHA) or the European Union (EU).

The American Conference of Governmental Industrial Hygienists classifies carbon black as A4, *Not Classifiable as a Human Carcinogen*.

The U.S. National Institute of Occupational Safety and Health (NIOSH) 1978 criteria document on carbon black recommends that only carbon blacks with PAH contaminant levels greater than 0.1% require the measurement of PAHs in air. As some PAHs are possible human carcinogens, NIOSH recommends an exposure limit of 0.1 mg/m³ for PAHs in air, measured as the cyclohexane-extractable fraction.

11.5 Sensitization: no animal data available.

11.6 Mutagenic effects

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" which led to chronic inflammation and release of oxygen species. (see Chronic toxicity above). This is thus considered to be a secondary genotoxic effect and thus carbon black itself would not be considered to be mutagenic.

11.7 Reproductive effects:

No effects have been reported in long-term animal studies.

11.8 Epidemiology:

Results of epidemiological studies of carbon black production workers suggest that cumulative exposure to carbon black may result in small decrements in lung function, as measured by FEV1. A recent U.S. respiratory morbidity study suggested a 27 ml decline in FEV1 from a 1 mg/m³ (inhalable fraction) exposure over a 40-year period. An older European investigation suggested an exposure to 1 mg/m³ (inhalable fraction) of carbon black over a 40-year working-lifetime will result in a 48 ml decline in FEV1. In contrast, normal age related decline over a similar period of time would be approximately 1200 ml.

The relationship between symptoms and exposure to carbon black is less clear. In the U.S. study, 9% of the highest 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 drawing of definitive conclusions about symptoms. This study, however, indicated a link between carbon black and small opacities on chest films, with negligible effects on lung function.

A study on carbon black production workers in the UK (Sorahan *et al* 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 (Wellmann *et al*. 2006, Morfeld *et al*. 2006(a), Buechte *et al*. 2006, Morfeld *et al*. 2006(b)) found a similar increase in lung cancer risk but, like the 2001 UK study, found no association with carbon black exposure. In contrast, a large US study (Dell *et al*. 2006) of 18 plants showed a reduction in lung cancer risk in carbon black production workers. Based upon these studies, the February 2006 Working Group at IARC concluded that the human evidence for carcinogenicity was *inadequate* (Baan *et al*. 2006).

Since this IARC evaluation of carbon black, Sorahan and Harrington (2007) 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 (2007) 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. This view is consistent with the IARC evaluation in 2006.

11.9 Reproductive effects:

No effects have been reported in reproductive organs in long term animal studies.

12. ECOLOGICAL DATA

12.1 Aquatic toxicity:

12.1.1 Acute algae toxicity: EC 50 (72 h) > 10,000 mg/l, NOEC 50 ≥ 10,000 mg/l (*Scenedesmus subspicatus*), (OECD Guideline 201).

12.1.2 Acute fish toxicity: LC50 (96 h) > 1000mg/l, *Brachydanio rerio* (zebrafish), (OECD Guideline 203).

12.1.3 Acute water flea toxicity: EC50 (24 h) > 5600 mg/l, *Daphnia magna* (waterflea), (OECD Guideline 202).

12.2 Behavior in water treatment plants:

Activated sludge, EC0 (3 h) ≥ 800 mg/l.

DEV L3 (TTC test)

12.3 Environmental fate:
Mobility: Not soluble in water.

12.4 Bioaccumulation:
Potential bioaccumulation is not expected because of physiochemical properties of the substance.

13. DISPOSAL CONSIDERATIONS

13.1 Product should be disposed in accordance with the regulations issued by the appropriate federal, provincial, state and local authorities.

Canada: Not a hazardous waste under provincial regulations.

EU: EU Waste Code No. 61303 per Council Directive 75/422/EEC

U.S.: Not a hazardous waste under U.S. RCRA, 40 CFR 261.

13.2 Container/Packaging. Return reusable containers to manufacturer. Paper bags may be incinerated, or recycled, or disposed of in an appropriate landfill in accordance with national and local laws.

14. TRANSPORT INFORMATION

Carbon blacks covered by this Material Safety Data Sheet are **not restricted** for transport, and are **not considered to be "dangerous goods"** by the following regulations:

- Canadian Transport of Dangerous Goods (TDG)
- European Carriage of Dangerous Goods by Rail (RID), by Road (ADR), or on the Rhine (ADNR)
- International Air Transport Association (IATA)
Note: listed as "carbon black, non-activated, mineral origin"
- International Civil Air Organization-Technical Instructions (ICAO-TI)
Note: listed as "carbon black, non-activated, mineral origin"
- International Maritime Dangerous Goods Code (IMDG)
Note: listed as "carbon black, non-activated, mineral origin"
- United Nations Recommendations on the Transport of Dangerous Goods
- United States Department of Transportation Hazardous Materials Regulations (DOT)

15. REGULATORY INFORMATION

Canada: WHMIS, class D2A .

EU: Carbon black is not defined as a dangerous substance regarding EU Directive 67/548/EEC and its various amendments and adaptations.

Japan: Carbon black is not classified under the PDSC as a Poisonous, Deleterious or Specified Poisonous Substance. Carbon Black is not classified as Class 1, 2 or Designated under the law concerning the Examination and Regulation of Manufacture of Chemical Substances.

U.S.: Carbon black is not a hazardous substance under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA, 40 CFR 302), or the Clean Water Act (40 CFR 116), or a hazardous air pollutant under the Clean Air Act Amendments of 1990 (CAA 40 CFR). Carbon black is on the Chemical Hazard Information Profile (CHIP) list under TSCA.

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

- Australia: AICS (Australian Inventory of Chemical Substances)
- Canada: CEPA (Canadian Environmental Protection Act), domestic substance list (DSL).
- China: NEPA , Registration Certificate for Environmental Management on Import/Export of Chemicals: FC021105494
- Europe (EU): EINECS (European Inventory of Existing Commercial Chemical Substances), EINECS-RN: 215-609-9.
- Japan: MITI (Ministry of International Trade and Industry) List of Existing Chemicals Substances. 10-3074/5-3328 and 10-3073/5-5222 (Section-Structure No./Class Reference No.)
- Korea: TCC-ECL (Toxic Chemical Control Law Existing Chemical List. KE-04682
- New Zealand: HSNO Approval Code HSR002801 (New Zealand Inventory of Chemicals)
- Philippine Inventory of Chemical Substances under the Environment Management Bureau, Department of Environment and Natural Resources.
- United States: 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 – MSDS 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

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.

16. FURTHER INFORMATION

NFPA (National Fire Protection Association) Rating:

Health: 0
Flammability: 1
Reactivity: 0

HMIS® III (Hazardous Materials Identification System®) Rating:

Health: 1* (*designates chronic hazard)
Flammability: 1
Physical Hazard: 0



0 = minimal, 1 = slight, 2 = moderate, 3 = serious, 4 = severe

HMIS® is a registered trademark of the National Paint and Coatings Association

The carbon black industry continues to sponsor research designed to identify adverse health effects from long term exposure to carbon black. This MSDS is updated as new health and safety information becomes available.

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 health and safety 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 MSDS is updated on a periodic basis in accordance with applicable health and safety standards.

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