

COMPOUND SUMMARY

Carbon Black

[Cite](#)[Download](#)**PubChem Reference
Collection SID**[483937265](#)**PubChem CID**

Not available and might not be a discrete structure.

Synonyms

Carbon Black
Acetylene Black
Furnace black
Black pearls
C.I. 77266

[View More...](#)**Chemical Safety**

Health
Hazard

[Laboratory Chemical Safety Summary \(LCSS\) Datasheet](#)**Molecular Formula****C****Description**

Carbon black appears as odorless black pellets or extremely fine powder. Combustible solid that may contain flammable hydrocarbons. (NIOSH, 2024)

[▶ CAMEO Chemicals](#)

Produced by the incomplete combustion of hydrocarbons, carbon black is an insoluble pigment with demonstrated adverse effects on pulmonary function. Upon inhalation, carbon black has been reported to trigger an inflammatory response in the lung tissue and has been linked to carcinogenicity.

► DrugBank

See also:  **Carbon** (subclass of).

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1 Synonyms



Carbon Black	Furnex N 765	Raven	Regal 99	TM 30	CI 77266
Acetylene Black	Mogul	Raven 30	Regal SRF	Thermal black	CK3
Furnace black	Mogul L	Raven 420	Royal spectra	Thermax	Cancarb
Black pearls	Molacco	Raven 500	Spheron 6	215-609-9	Carbodis
C.I. 77266	Pelletex	Raven 8000	Statex	Aroflow	Carbolac
Carbolac 1	Philblack N 550	Regal	Statex N 550	Arogen	Carbomet
Channel Black	Philblack N 765	Regal 300	Sterling N 765	Arotone	Carbon Black BV and V
Corax P	Philblack O	Regal 330	Sterling NS	Arovel	Carbon black, acetylene

Elftex	Printex	Regal 400R	Sterling SO 1	Arrow	Carbon black, channel
Furnex	Printex 60	Regal 600	Superba	Atlantic	Carbon black, furnace

► PubChem

2 Names and Identifiers



2.1 Molecular Formula



► CAMEO Chemicals

2.2 Other Identifiers



2.2.1 CAS



1333-86-4

► Australian Industrial Chemicals Introduction Scheme (AICIS); CAMEO Chemicals; CAS Common C...

12768-98-8

► European Chemicals Agency (ECHA)

61512-59-2

► European Chemicals Agency (ECHA)

97793-37-8

► European Chemicals Agency (ECHA)

2.2.2 Deprecated CAS



101239-80-9, 106907-70-4, 109766-76-9, 1228663-53-3, 124760-06-1, 12768-98-8, 131640-45-4, 133136-50-2, 1343-03-9, 138464-41-2, 147335-73-7, 1584692-77-2, 179607-25-1, 181719-82-4, 186708-92-9, 186708-96-3, 208728-21-6, 214540-86-0, 2174005-17-3, 2245821-49-0, 2252327-02-7, 2377164-59-3, 2377634-09-6, 2410296-14-7, 2451359-26-3, 2580316-27-2, 2642622-10-2, 2653239-39-3, 2699030-86-7, 2705804-27-7, 2711036-51-8, 334869-08-8,

429685-07-4, 52623-24-2, 53095-52-6, 53851-02-8, 55353-42-9, 55607-95-9, 56257-79-5, 56257-80-8, 56274-59-0, 566149-76-6, 56729-25-0, 56729-26-1, 58517-29-6, 61512-59-2, 63661-31-4, 64427-56-1, 681225-93-4, 72536-89-1, 73560-38-0, 75026-75-4, 76632-92-3, 79921-09-8, 914651-14-2, 97708-44-6, 97793-37-8

► ChemIDplus

101239-80-9, 106907-70-4, 109766-76-9, 1228663-53-3, 124760-06-1, 12768-98-8, 131640-45-4, 133136-50-2, 1343-03-9, 138464-41-2, 147335-73-7, 1584692-77-2, 179607-25-1, 181719-82-4, 186708-92-9, 186708-96-3, 208728-21-6, 214540-86-0, 2174005-17-3, 2245821-49-0, 2252327-02-7, 2377164-59-3, 2377634-09-6, 2410296-14-7, 2451359-26-3, 2580316-27-2, 2642622-10-2, 2653239-39-3, 2699030-86-7, 2705804-27-7, 2711036-51-8, 2794958-37-3, 2920237-69-8, 2982607-22-5, 3009879-06-2, 3059084-82-8, 334869-08-8, 429685-07-4, 52623-24-2, 53095-52-6, 53851-02-8, 55353-42-9, 55607-95-9, 56257-79-5, 56257-80-8, 56274-59-0, 566149-76-6, 56729-25-0, 56729-26-1, 58517-29-6, 61512-59-2, 63661-31-4, 64427-56-1, 681225-93-4, 72536-89-1, 73560-38-0, 75026-75-4, 76632-92-3, 79921-09-8, 914651-14-2, 97708-44-6, 97793-37-8

► EPA Chemicals under the TSCA

101239-80-9, 106907-70-4, 109766-76-9, 1228663-53-3, 124760-06-1, 12768-98-8, 131640-45-4, 133136-50-2, 1343-03-9, 138464-41-2, 147335-73-7, 1584692-77-2, 179607-25-1, 181719-82-4, 186708-92-9, 186708-96-3, 214540-86-0, 334869-08-8, 429685-07-4, 52623-24-2, 53095-52-6, 53851-02-8, 55353-42-9, 55607-95-9, 56257-79-5, 56257-80-8, 56274-59-0, 566149-76-6, 56729-25-0, 56729-26-1, 58517-29-6, 61512-59-2, 63661-31-4, 64427-56-1, 681225-93-4, 72536-89-1, 73560-38-0, 75026-75-4, 76632-92-3, 79921-09-8, 914651-14-2, 97708-44-6, 97793-37-8

► EPA DSSTox

2.2.3 European Community (EC) Number



215-609-9

► European Chemicals Agency (ECHA)

603-226-3

► European Chemicals Agency (ECHA)

612-159-9

- ▶ European Chemicals Agency (ECHA)

619-291-6

- ▶ European Chemicals Agency (ECHA)

2.2.4 ICSC Number



0471

- ▶ ILO-WHO International Chemical Safety Cards (ICSCs)

2.2.5 RTECS Number



FF5800000

- ▶ The National Institute for Occupational Safety and Health (NIOSH)

2.2.6 UNII



4XYU5U00C4

- ▶ FDA Global Substance Registration System (GSRS)

2.2.7 DSSTox Substance ID



DTXSID7051216

- ▶ EPA DSSTox

2.2.8 Wikipedia



Carbon_black

- ▶ Wikipedia

2.2.9 RXCUI



2032

[▶ NLM RxNorm Terminology](#)

3 Chemical and Physical Properties



3.1 Experimental Properties



3.1.1 Physical Description



Carbon black appears as odorless black pellets or extremely fine powder. Combustible solid that may contain flammable hydrocarbons. (NIOSH, 2024)

[▶ CAMEO Chemicals](#)

Dry Powder, Liquid; Pellets or Large Crystals; Pellets or Large Crystals, Other Solid; Pellets or Large Crystals, Liquid; Dry Powder, Pellets or Large Crystals; NKRA; Pellets or Large Crystals, Liquid, Other Solid; Liquid, Other Solid; Other Solid; Dry Powder, Liquid, Other Solid; Liquid; Water or Solvent Wet Solid, Other Solid; Water or Solvent Wet Solid; Dry Powder

[▶ EPA Chemical Data Reporting \(CDR\)](#)

Black, odorless solid; [NIOSH]

[▶ Haz-Map, Information on Hazardous Chemicals and Occupational Diseases](#)

ODOURLESS BLACK PELLETS OR EXTREMELY FINE POWDER.

[▶ ILO-WHO International Chemical Safety Cards \(ICSCs\)](#)

Black, odorless solid or a dark colored liquid with a petroleum-like odor.

[▶ Occupational Safety and Health Administration \(OSHA\)](#)

Black, odorless solid.

[▶ The National Institute for Occupational Safety and Health \(NIOSH\)](#)

3.1.2 Color / Form



Fine black powder

Lide, D.R. CRC Handbook of Chemistry and Physics 88TH Edition 2007-2008. CRC Press, Taylor & Francis, Boca Raton, FL 2007, p. 4-56

► [Hazardous Substances Data Bank \(HSDB\)](#)

Black solid

NIOSH. NIOSH Pocket Guide to Chemical Hazards & Other Databases CD-ROM. Department of Health & Human Services, Centers for Disease Prevention & Control. National Institute for Occupational Safety & Health. DHHS (NIOSH) Publication No. 2005-151 (2005), p. 52

► [Hazardous Substances Data Bank \(HSDB\)](#)

3.1.3 Odor



Odorless

NIOSH. NIOSH Pocket Guide to Chemical Hazards & Other Databases CD-ROM. Department of Health & Human Services, Centers for Disease Prevention & Control. National Institute for Occupational Safety & Health. DHHS (NIOSH) Publication No. 2005-151 (2005)

► [Hazardous Substances Data Bank \(HSDB\)](#)

3.1.4 Boiling Point



Sublimes (NIOSH, 2024)

► [CAMEO Chemicals](#)

4200 °C

ITI. Toxic and Hazardous Industrial Chemicals Safety Manual. Tokyo, Japan: The International Technical Information Institute, 1988., p. 106

► [Hazardous Substances Data Bank \(HSDB\)](#)

sublimes

► [Occupational Safety and Health Administration \(OSHA\); The National Institute for Occupational S...](#)

3.1.5 Melting Point



Sublimes (NIOSH, 2024)

► [CAMEO Chemicals](#)

Sublimes

NIOSH. NIOSH Pocket Guide to Chemical Hazards & Other Databases CD-ROM. Department of Health & Human Services, Centers for Disease Prevention & Control. National Institute for Occupational Safety & Health. DHHS (NIOSH) Publication No. 2005-151 (2005)

▶ [Hazardous Substances Data Bank \(HSDB\); Occupational Safety and Health Administration \(OSHA\)...](#)

≈3550 °C

▶ [ILO-WHO International Chemical Safety Cards \(ICSCs\)](#)

3.1.6 Solubility



Insoluble (NIOSH, 2024)

▶ [CAMEO Chemicals](#)

INSOL IN ALL SOLVENTS

Hawley, G.G. *The Condensed Chemical Dictionary*. 10th ed. New York: Van Nostrand Reinhold Co., 1981., p. 195

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Insoluble in water

Lide, D.R. *CRC Handbook of Chemistry and Physics 88TH Edition 2007-2008*. CRC Press, Taylor & Francis, Boca Raton, FL 2007, p. 4-56

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Solubility in water: none

▶ [ILO-WHO International Chemical Safety Cards \(ICSCs\)](#)

Insoluble

▶ [The National Institute for Occupational Safety and Health \(NIOSH\)](#)

3.1.7 Density



1.8 to 2.1 (NIOSH, 2024)

▶ [CAMEO Chemicals](#)

1.8-2.1

Hawley, G.G. *The Condensed Chemical Dictionary*. 10th ed. New York: Van Nostrand Reinhold Co., 1981., p. 195

► [Hazardous Substances Data Bank \(HSDB\)](#); [The National Institute for Occupational Safety and Health](#)

Relative density (water = 1): 1.8-2.1

► [ILO-WHO International Chemical Safety Cards \(ICSCs\)](#)

3.1.8 Vapor Pressure



0 mmHg (approx) (NIOSH, 2024)

► [CAMEO Chemicals](#)

Negligible at 20 °C

American Conference of Governmental Industrial Hygienists. Documentation of the Threshold Limit Values and Biological Exposure Indices. 5th ed. Cincinnati, OH: American Conference of Governmental Industrial Hygienists, 1986., p. 101 (1986)

► [Hazardous Substances Data Bank \(HSDB\)](#)

0 mmHg (approx)

► [Occupational Safety and Health Administration \(OSHA\)](#); [The National Institute for Occupational Safety and Health](#)

3.1.9 Autoignition Temperature



>500 °C

► [ILO-WHO International Chemical Safety Cards \(ICSCs\)](#)

3.1.10 Other Experimental Properties



Sublimates at 3652-97 °C

Weast, R.C. (ed.). Handbook of Chemistry and Physics. 64th ed. Boca Raton, Florida: CRC Press Inc., 1983-84., p. B-81

► [Hazardous Substances Data Bank \(HSDB\)](#)

X-ray diffraction reveals a structure similar to, but less regular than graphite; particle sizes from 5-500 nm; appear spherical under electron microscope

International Labour Office. *Encyclopedia of Occupational Health and Safety*. Vols. I&II. Geneva, Switzerland: International Labour Office, 1983., p. 390

► [Hazardous Substances Data Bank \(HSDB\)](#)

3.1.11 Chemical Classes



Other Classes -> Elements, Nonmetallic

► [Haz-Map, Information on Hazardous Chemicals and Occupational Diseases](#)

4 Related Records



4.1 Substances



4.1.1 PubChem Reference Collection SID



483937265

► [PubChem](#)

4.2 Other Relationships



Carbon (subclass of)

► [PubChem](#)

5 Pharmacology and Biochemistry



5.1 Absorption, Distribution and Excretion



Uptake and retention of carbon black particles in lung macrophages have been observed following inhalation ... as well as following injection into the cerebral ventricles of rats ... or into the bladder wall of rats. ... Carbon black particles perfused into the abdominal aorta of rabbits were observed in the endothelial cells of the vessel.

IARC. *Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Humans*. Geneva: World Health Organization, International Agency for Research on Cancer, 1972-PRESENT. (Multivolume work). Available at: <https://monographs.iarc.fr/ENG/Classification/index.php>, p. V33 70 (1984)

► **Hazardous Substances Data Bank (HSDB)**

Particles were found in phagocytic cells in the proximal convoluted tubules and glomeruli of the kidneys in mice, together with amyloidosis and renal fibrosis. It was later reported that carbon black particles also accumulated in the lungs of exposed monkeys (total duration of exposure, 5784 hr) ...

IARC. Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Humans. Geneva: World Health Organization, International Agency for Research on Cancer, 1972-PRESENT. (Multivolume work). Available at: <https://monographs.iarc.fr/ENG/Classification/index.php>, p. V33 69 (1984)

► **Hazardous Substances Data Bank (HSDB)**

Mice (for their lifespan), guinea pigs, and monkeys (up to 13,000 total hr) were exposed to 1.6 mg/cu m of various types of furnace blacks for 7 hr/day, 5 days/wk. ... Carbon black was found scattered in lung tissue, both free-lying and inside macrophages (scavenger cells). In mice, the black was diffuse and finely distributed, while monkeys progressively developed diffusely distributed areas of nodularity where the black was concentrated. ... Carbon black was observed to infiltrate the pulmonary lymph nodes, and was also present in the liver, spleen, and kidneys of exposed animals.

USEPA; Chemical Hazard Information Profile: Carbon Black p.67 (1978) EPA-560/11-80-011

► **Hazardous Substances Data Bank (HSDB)**

The effect of continuous exposure to inert carbonaceous particles on the pulmonary clearance of inhaled diesel tracer particles was studied in male Fischer 344 rats. Submicron carbon black particles with a mass median aerodynamic diameter of 0.22 μm and having a size distribution similar to those particles from a GM 5.7 liter diesel engine were successfully generated and admin to test animals at a nominal concn of 6 mg/cu m for 20 hr/day, 7 day/wk, for periods lasting 1 to 11 wk. Immediately after the carbon black exposure, test animals were admin (14)C tagged diesel particles for 45 min in a nose only chamber. The pulmonary retention of inhaled radioactive tracer particles was determined at preselected time intervals. Based upon the data collected up to six months post exposure, prolonged exposure to carbon black particles exhibits the same inhibitory effect on pulmonary clearance as prolonged exposure to diesel exhaust with a comparable particulate dose. This observation, coupled with the observation that continuous exposure to nitrogen oxide at 2 ppm produced no significant incr on the pulmonary retention of radioactive diesel test particles, indicates that the accumulation of inert carbonaceous material is the predominant cause of impaired lung clearance.

Lee PS et al; Fed Proc 43 (3): (1984)

► **Hazardous Substances Data Bank (HSDB)**

For more Absorption, Distribution and Excretion (Complete) data for CARBON BLACK (10 total), please visit the [HSDB record page](#).

► [Hazardous Substances Data Bank \(HSDB\)](#)

5.2 Mechanism of Action



Macrophages were treated with carbon black and carbon black adsorbate complexes to determine whether the presence, identity and coverage of the adsorbate altered the phagocytic ingestion of the carbon black particles. This study was performed to determine the effect of such treatment on the capacity of the macrophages to phagocytize a secondary particle challenge via its Fc membrane receptor. Rat alveolar macrophages were incubated in vitro with two carbon blacks that had 15 fold differences in specific surface areas (ASTM-N339 less than Black-Pearls-2000) sorbed with 0.5 and 1.0 monolayer coverages of a polar and semi polar adsorbate; acrolein and benzofuran. One half monolayer coverages of N339 with either adsorbate significantly suppressed the phagocytosis of the carbon black, whereas one monolayer coverage did not. Neither adsorbate at either coverages affected the phagocytosis of Black-Pearls-2000. It was concluded that these results indicate that the surface properties of the particles, the chemical properties of chemical pollutants, and the interactions between particles and pollutants can play a major role in defining the biological effects of particles that are carried to the distal lung.

[PMID:2088744](#)

Full text: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1567780>

Jakab GJ et al; *Environmental Health Perspectives* 89: 169-74 (1990)

► [Hazardous Substances Data Bank \(HSDB\)](#)

The desorption of adsorbed molecules from amorphous carbon black was investigated. Five oil furnace carbon blacks consisting of pelletized agglomerates of 0.20 to 0.24 nanometer aciniform particles and 13 adsorbates were used. The adsorbates consisted of organic compounds containing functional groups characteristic of organic molecules formed on particles generated by combustion of organic material. The carbon blacks were incorporated into liquid chromatographic columns. n-Hexane, dichloromethane, tetrahydrofuran, methanol, and water were used as mobile phases. Ten microliter sample aliquots were injected into the chromatographs. The data showed that the adsorbates displaced the mobile phase molecules from the surface. The extent of desorption increased with increasing solubility of the adsorbate in the mobile phase. Desorption also depended on the heat of desorption. With the exception of basic adsorbates adsorbed on the least polar carbon black, N765, most of the compounds were adsorbed irreversibly when the mobile phase was water. The adsorption isotherms showed that desorption depended on the extent of surface coverage and increased as the

extent of coverage approached one monolayer. It was concluded that adsorbed molecules are desorbed from particulate surfaces to different extents, the amount desorbed depending on the polarity of the physiological fluid that interacts with the surface. Desorption also depends on the extent of adsorbent surface covered.

Risby TH et al; Environ Health Perspectives 77: 141-9 (1988)

► [Hazardous Substances Data Bank \(HSDB\)](#)

Exposure to ambient ultrafine particles induces airway inflammatory reactions and tissue remodeling. In this experiment, to determine whether ultrafine carbon black (ufCB) affects proliferation of airway epithelium and, if so, what the mechanism of action is, ... human primary bronchial epithelial cell cultures /were studied/. Incubation of cells in the serum-free medium with ufCB increased incorporations of [(3)H]thymidine and [(3)H]leucine into cells in a time- and dose-dependent manner. This effect was attenuated by Cu- and Zn-containing superoxide dismutase (Cu/Zn SOD) and apocynin, an inhibitor of NADPH oxidase, and completely inhibited by pretreatment with the epidermal growth factor receptor (EGF-R) tyrosine kinase inhibitors AG-1478 and BIBX-1382, and the mitogen-activated protein kinase kinase inhibitor PD-98059. Transfection of a dominant-negative mutant of H-Ras likewise abolished the effect ufCB. Stimulation with ufCB also induced processing of membrane-anchored proheparin-binding (HB)-EGF, release of soluble HB-EGF into the medium, association of phosphorylated EGF-R and Shc with glutathione-S-transferase-Grb2 fusion protein, and phosphorylation of extracellular signal-regulated kinase (ERK). Pretreatment with AG-1478, [Glu(52)]Diphtheria toxin, a specific inhibitor of HB-EGF, neutralizing HB-EGF antibody, Cu/Zn SOD, and apocynin each inhibited ufCB-induced ERK activation. These results suggest that ufCB causes oxidative stress-mediated proliferation of airway epithelium, involving processing of HB-EGF and the concomitant activation of EGF-R and ERK cascade.

[PMID:15298855](#)

Tamaoki J et al; Am J Physiol 287 (6): 1127-33 (2004)

► [Hazardous Substances Data Bank \(HSDB\)](#)

... Ultrafine carbon black (ufCB) does not have its effects via transition metal-mediated mechanisms. However, ufCB and other ultrafines generate free radicals at their surface as measured by a number of chemical assays and are able to cause oxidative stress to cells and this is likely to be a factor in their ability to cause inflammation. Changes in calcium resulting from oxidative stress within cells may be an additional factor leading to transcription of pro-inflammatory genes...

[PMID:12762574](#)

MacNee W, Donaldson K; Eur Resp J Suppl 40: 47-51 (2003)

► [Hazardous Substances Data Bank \(HSDB\)](#)

6 Use and Manufacturing



6.1 Uses



Sources/Uses

Used mainly in rubber (90%) and as a pigment (9%); [ACGIH] Carbon black is a manufactured material while soot is a waste product of combustion. Compared to soot, carbon black particles are more homogeneous and less biologically active. [AIHAJ 2001;62(2):218-28]

ACGIH - Documentation of the TLVs and BEIs, 7th Ed. Cincinnati: ACGIH Worldwide, 2020.

AIHAJ - American Industrial Hygiene Association Journal 2001;62(2):218-28

► [Haz-Map, Information on Hazardous Chemicals and Occupational Diseases](#)

Industrial Processes with risk of exposure

Painting (Pigments, Binders, and Biocides) [Category: Paint]

► [Haz-Map, Information on Hazardous Chemicals and Occupational Diseases](#)

Activities with risk of exposure

Lithography printing [Category: Hobbies]

► [Haz-Map, Information on Hazardous Chemicals and Occupational Diseases](#)

USED AS A PIGMENT FOR RUBBER TIRES, FOR PRINTING, STENCILING & DRAWING INKS; FOR LEATHER, STOVE POLISH, PHONOGRAPH RECORDS, FOR ELECTRICAL INSULATING APPARATUS.

The Merck Index. 10th ed. Rahway, New Jersey: Merck Co., Inc., 1983., p. 251

► [Hazardous Substances Data Bank \(HSDB\)](#)

CHEMICAL REDUCING AGENT

International Labour Office. Encyclopedia of Occupational Health and Safety. Vols. I&II. Geneva, Switzerland: International Labour Office, 1983., p. 391

► [Hazardous Substances Data Bank \(HSDB\)](#)

Finely divided carbon black is a plastics stabilizer from uv radiation.

Wang M-J et al; Kirk-Othmer Encyclopedia of Chemical Technology. (2001). NY, NY: John Wiley & Sons; Carbon Black. Online Posting Date: Nov 14, 2003.

► [Hazardous Substances Data Bank \(HSDB\)](#)

Tire treads, belt covers, and other abrasion-resistant rubber products; plastics as reinforcing agent, opacifier, electrical conductor, UV-light absorber; colorant for printing inks; carbon paper; typewriter ribbons; paint pigment; nucleating agent in weather modifications; expanders in battery plates; solar-energy absorber.

Lewis, R.J. Sr.; Hawley's Condensed Chemical Dictionary 15th Edition. John Wiley & Sons, Inc. New York, NY 2007., p. 233

► [Hazardous Substances Data Bank \(HSDB\)](#)

For more Uses (Complete) data for CARBON BLACK (12 total), please visit the [HSDB record page](#).

► [Hazardous Substances Data Bank \(HSDB\)](#)

6.1.1 Use Classification



Hazard Classes and Categories -> Carcinogens

► [NJDOH RTK Hazardous Substance List](#)

6.1.2 Industry Uses



Pigment	Dyes	Photosensitive agent
Anti-static agent	Intermediates	Filler
UV stabilizer	Sealant (barrier)	Binder
Dehydrating agent (desiccant)	Intermediate	Paint additives and coating
Fillers	Fuel	Catalyst
Lubricants and lubricant additives	Not Known or Reasonably Ascertainable	Conductive agent
Other (specify)	Photosensitizers	
Adhesion/cohesion promoter	Pigments	
Surface modifier	Other	
Adhesives and sealant chemicals	Dye	

<https://www.epa.gov/chemical-data-reporting>

► [EPA Chemical Data Reporting \(CDR\)](#)

6.1.3 Consumer Uses



Dye	Anti-static agent
Other	Adhesion/cohesion promoter
Pigments	Other (specify)
Filler	Intermediates
Photosensitive agent	Adhesives and sealant chemicals
Paint additives and coating additives not described by other categories	Dyes
Conductive agent	Not Known or Reasonably Ascertained
Fillers	Fuel
UV stabilizer	Intermediate
Pigment	Sealant (barrier)

<https://www.epa.gov/chemical-data-reporting>

► [EPA Chemical Data Reporting \(CDR\)](#)

6.1.4 Household Products



California Safe Cosmetics Program (CSCP)

Cosmetics product ingredient: Carbon black

Source: Carbon black is made by burning tars or vegetable oils. It is similar to soot or charcoal. It is a dark black powder added to cosmetics to provide a black color.

Potential health impacts: People are mainly exposed to carbon black by breathing it in. Studies have shown higher levels of lung cancer in rats that inhaled it. Studies involving humans have had mixed results. Two studies from Europe showed higher levels of lung cancer in humans who worked with carbon black. A larger study from the U.S. did not show a significant increase in lung cancer among workers exposed to it. The International Agency for Research on Cancer (IARC) considers carbon black an animal carcinogen and a possible human carcinogen.

California Proposition 65 lists airborne particles of respirable size of carbon black as a carcinogen. The U.S. FDA has banned it as a food additive.

Product count: 1753

► [California Safe Cosmetics Program \(CSCP\) Product Database](#)

Household & Commercial/Institutional Products

Information on 407 consumer products that contain Carbon black in the following categories is provided:

- Auto Products
- Commercial / Institutional
- Hobby/Craft
- Home Maintenance
- Home Office
- Inside the Home
- Landscaping/Yard
- Personal Care

► [Consumer Product Information Database \(CPID\)](#)

6.2 Methods of Manufacturing



QUASI-GRAPHITIC FORM OF CARBON OF SMALL PARTICLE SIZE. BY TERM CARBON BLACK SEVERAL FORMS OF ARTIFICIALLY PREPD CARBON OR CHARCOAL ARE DESIGNATED EG: 1. ANIMAL CHARCOAL OBTAINED BY CHARRING BONES, MEAT, BLOOD, ETC; 2. GAS BLACK: FURNACE BLACK; CHANNEL BLACK: OBTAINED BY INCOMPLETE COMBUSTION OF NATURAL GAS ... 3. LAMP BLACK, OBTAINED BY BURNING VARIOUS FATS, OILS, RESIN, ETC, UNDER SUITABLE CONDITIONS; 4. ACTIVATED CHARCOAL ... PREPD FROM WOOD AND VEGETABLES.

The Merck Index. 10th ed. Rahway, New Jersey: Merck Co., Inc., 1983., p. 250

► [Hazardous Substances Data Bank \(HSDB\)](#)

A finely divided form of carbon, practically all of which is made by burning vaporized heavy-oil fractions in a furnace with 50% of the air required for complete combustion (partial oxidation). This type is also called furnace black. Carbon black can also be made from methane or natural gas by cracking (thermal black) or direct combustion (channel black), but these methods are virtually obsolete. All types are characterized by extremely fine particle size, which accounts for their reinforcing and pigmenting effectiveness.

Lewis, R.J. Sr.; Hawley's Condensed Chemical Dictionary 15th Edition. John Wiley & Sons, Inc. New York, NY 2007., p. 232

► [Hazardous Substances Data Bank \(HSDB\)](#)

The Tosco II process pyrolysis research study was conceived to develop process equipment and to maximize carbon black production and quality. ... Chopped tires are fed into a rotary drum with hot ceramic balls at 480-549 °C in a reducing atmosphere. The rubber pyrolyzes and forms a solid residue, some oil vapor, and off-gases. ... A trommel screen separates the fine

carbon black from the ceramic balls. The carbon is pelletized after steel, fiber glass, and other contaminants have been removed. ... The pilot plant process was designed to handle 15 tons of tires per day, and generally one ton of tires produced ... 1270-1540 kg of carbon black. The types of blacks and other related contents in the residue from tire pyrolysis ... are unpredictable. However, carbon blacks are carefully chosen to achieve specific properties in compounded rubbers. Thus, the diverse and unpredictable residue mixture is useful only as a low grade filler for mechanical goods and is unsuitable as a carbon black source.

Kirk-Othmer Encyclopedia of Chemical Technology. 3rd ed., Volumes 1-26. New York, NY: John Wiley and Sons, 1978-1984., p. V19 1002 (1982)

► [Hazardous Substances Data Bank \(HSDB\)](#)

Carbon black can be produced by four basic manufacturing processes; three of which employ partial oxidation and one which utilizes a cracking type process. The partial oxidation processes are the channel, gas furnace, and oil furnace while the so called thermal process is a cracking type process

CHEMICAL PRODUCTS SYNOPSIS: Carbon black, 1982

► [Hazardous Substances Data Bank \(HSDB\)](#)

For more Methods of Manufacturing (Complete) data for CARBON BLACK (14 total), please visit the [HSDB record page](#).

► [Hazardous Substances Data Bank \(HSDB\)](#)

6.3 Impurities



Benzene extract, 0-1.7%; Ash, 0-1.0%; Sulfur, 0-1.5% volatile matter, 0.4-9.0%

IARC. Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Humans. Geneva: World Health Organization, International Agency for Research on Cancer, 1972-PRESENT. (Multivolume work). Available at: <https://monographs.iarc.fr/ENG/Classification/index.php>, p. V33 38 (1984)

► [Hazardous Substances Data Bank \(HSDB\)](#)

Polyaromatic hydrocarbons (PAH) are reportedly present in carbon blacks /Carbon blacks/

Zenz, C. Occupational Medicine-Principles and Practical Applications. 2nd ed. St. Louis, MO: Mosby-Yearbook, Inc, 1988., p. 1002

► [Hazardous Substances Data Bank \(HSDB\)](#)

6.4 Formulations / Preparations



DEPENDING ON THE PROCESS OF MANUFACTURE THERE ARE VARIATIONS IN THE CHEM COMPOSITION OF CARBON BLACK. IT CONTAINS 88-99.5% OF CARBON; 0.3-11% OF OXYGEN; 0.1-1% OF HYDROGEN; UP TO 1% INORG MATERIALS; SMALL AMT OF TARRY MATTER AND TRACES OF SULFUR.

International Labour Office. Encyclopedia of Occupational Health and Safety. Vols. I&II. Geneva, Switzerland: International Labour Office, 1983., p. 390

► [Hazardous Substances Data Bank \(HSDB\)](#)

FORMS: POWDER; PELLETS; PASTES. GRADES: (ASTM) /AMERICAN SOCIETY FOR TESTING & MATERIALS/ N660, N550, N330, N110, N220, N761, N762, N601, 5300 (CHANNEL), 5301.

Hawley, G.G. The Condensed Chemical Dictionary. 10th ed. New York: Van Nostrand Reinhold Co., 1981., p. 195

► [Hazardous Substances Data Bank \(HSDB\)](#)

Grades: HAF (high abrasion furnace), FEF (fast extrusion furnace), SRF (semireinforcing furnace), HMF (high modules furnace), GPF (general purpose furnace), SAF (super abrasion furnace), ISAF (intermediate abrasion furnace), FF (fine furnace), XCF (electrically conductive furnace), APF (all-purpose furnace), FT (fine thermal), MT (medium thermal), MT-NS-FF (medium thermal, non-staining, free flowing)

CHEMICAL PRODUCTS SYNOPSIS: Carbon black, 1982

► [Hazardous Substances Data Bank \(HSDB\)](#)

6.5 Consumption Patterns



94% IS USED IN ELASTOMERS (OF WHICH 12% IS USED IN MASTERBATCHED STYRENE-BUTADIENE RUBBER ELASTOMERS); 3% IS USED IN PAINT & PRINTING INKS; AND 3% IS USED IN OTHER APPLICATIONS, INCL PAPER (1973)

SRI

► [Hazardous Substances Data Bank \(HSDB\)](#)

Tires, 65%; Other fabricated rubber products, 25%; Colorant and filler for plastics, inks, etc 10% (1985)

Chem Eng News 63 (31): 14 (1985)

► [Hazardous Substances Data Bank \(HSDB\)](#)

CHEMICAL PROFILE: Carbon black: Rubber, 88% (tires, 68%; industrial rubber products, 20%); miscellaneous non-rubber (inks, paints, plastics, etc), 9%; exports, 3%.

Kavaler AR; Chemical Marketing Reporter 234 (26): 42 (1988)

► [Hazardous Substances Data Bank \(HSDB\)](#)

CHEMICAL PROFILE: Carbon black: End-use Pattern for carbon black in 1991

Table: Carbon black: End-use pattern (%) for carbon black in 1991

End-use	Percent
Rubber	84
- Tires, tubes and tread	- 66
- Industrial rubber products	- 18
Miscellaneous non-rubber (paints, plastics, paper, ink)	9
Exports	7

Anonymous; Chemical Marketing Reporter, 240 (24): 25,54 (1991); 9 December 1991

► [Hazardous Substances Data Bank \(HSDB\)](#)

For more Consumption Patterns (Complete) data for CARBON BLACK (16 total), please visit the [HSDB record page](#).

► [Hazardous Substances Data Bank \(HSDB\)](#)

6.6 U.S. Production



Aggregated Product Volume

2019: 1,000,000,000 - <5,000,000,000 lb

2018: 1,000,000,000 - <5,000,000,000 lb

2017: 1,000,000,000 - <5,000,000,000 lb

2016: 1,000,000,000 - <5,000,000,000 lb

<https://www.epa.gov/chemical-data-reporting>

► [EPA Chemical Data Reporting \(CDR\)](#)

(1972) 1.45X10+12 G

SRI

► [Hazardous Substances Data Bank \(HSDB\)](#)

(1975) 1.25X10+12 G (EXCLUDING CHANNEL PROCESS)

SRI

► [Hazardous Substances Data Bank \(HSDB\)](#)

(1985) 1.17X10+12 g

Chem Eng News 64 (16): 13 (1986)

► [Hazardous Substances Data Bank \(HSDB\)](#)

(1991) 3.40x10+9 lbs

SRI. 1992 *Directory of Chemical Producers-United States of America*. Menlo Park, CA: SRI International, 1992., p. 519

► [Hazardous Substances Data Bank \(HSDB\)](#)

For more U.S. Production (Complete) data for CARBON BLACK (20 total), please visit the [HSDB record page](#).

► [Hazardous Substances Data Bank \(HSDB\)](#)

6.7 U.S. Imports



(1972) 5.22X10+8 G

SRI

► [Hazardous Substances Data Bank \(HSDB\)](#)

(1975) 1.50X10+10 G

SRI

► [Hazardous Substances Data Bank \(HSDB\)](#)

CHEMICAL PROFILE: Carbon black. US Imports: 2003: 631 million pounds; 2004: 439 million pounds

Kirschner M; Chemical Market Reporter, 267 (25): 50 (2005); 20-26 June 2005

► [Hazardous Substances Data Bank \(HSDB\)](#)

CHEMICAL PROFILE: Carbon black. US Imports: 2006: 343 million pounds; 2007: 363 million pounds

Kirschner M; ICIS Chemical Business, 275 (1): 37 (2009); 5-11 January 2009

► [Hazardous Substances Data Bank \(HSDB\)](#)

6.8 U.S. Exports



(1972) 5.05X10+10 G

SRI

► [Hazardous Substances Data Bank \(HSDB\)](#)

(1975) 4.0X10+10 G

SRI

► [Hazardous Substances Data Bank \(HSDB\)](#)

CHEMICAL PROFILE: Carbon black. US Exports: 2003: 393 million pounds; 2004: 391 million pounds

Kirschner M; Chemical Market Reporter, 267 (25): 50 (2005); 20-26 June 2005

► [Hazardous Substances Data Bank \(HSDB\)](#)

CHEMICAL PROFILE: Carbon black. US Exports: 2006: 326 million pounds; 2007: 351 million pounds

Kirschner M; ICIS Chemical Business, 275 (1): 37 (2009); 5-11 January 2009

► [Hazardous Substances Data Bank \(HSDB\)](#)

6.9 General Manufacturing Information



Industry Processing Sectors

Synthetic Rubber Manufacturing
Plastics Material and Resin Manufacturing
Not Known or Reasonably Ascertainable
Non-metallic Mineral Product Manufacturing (includes clay, glass, cement, concrete, lime, gypsum, and other non-metallic mineral product manufacturing)
Furniture and Related Product Manufacturing
Printing and Related Support Activities
All Other Chemical Product and Preparation Manufacturing
Custom Compounding of Purchased Resins
Construction

https://pubchem.ncbi.nlm.nih.gov/compound/carbon_black

22/67

► **EPA Chemical Data Reporting (CDR)**

EPA TSCA Commercial Activity Status

Carbon black: ACTIVE

► **EPA Chemicals under the TSCA**

THERMAL BLACK CONSISTS OF RELATIVELY COARSE PARTICLES & IS USED PRINCIPALLY AS PIGMENT. FURNACE BLACK PRODUCED FROM NATURAL GAS HAS INTERMEDIATE PARTICLE SIZE WHILE THAT PRODUCED FROM OIL CAN BE MADE IN WIDE RANGE OF CONTROLLED PARTICLE SIZES & IS PARTICULARLY SUITABLE FOR REINFORCING SYNTHETIC RUBBER.

Hawley, G.G. The Condensed Chemical Dictionary. 10th ed. New York: Van Nostrand Reinhold Co., 1981., p. 195

► **Hazardous Substances Data Bank (HSDB)**

IN USA, ONLY CARBON BLACK MADE BY CHANNEL PROCESS MAY BE USED IN CONTACT WITH FOODSTUFFS.

Lefaux, R. Practical Toxicology of Plastics. Cleveland: CRC Press Inc., 1968., p. 404

► **Hazardous Substances Data Bank (HSDB)**

Carbon black is a general term used to designate a finely divided form of carbon made by thermal decomp of natural gas or oil or a mixture of both. It should not be confused with animal and mineral blacks, which possess the nature of chars, ... lamp black, generally made of coal tar creosote, nor acetylene black which is produced from this gas.

International Labour Office. Encyclopedia of Occupational Health and Safety. Vols. I&II. Geneva, Switzerland: International Labour Office, 1983., p. 390

► **Hazardous Substances Data Bank (HSDB)**

... CARBON BLACKS OR FURNACE-BLACK TYPE CONTAIN SEVERAL POLYCYCLIC AROMATIC HYDROCARBONS; FOLLOWING 7 WERE IDENTIFIED: PYRENE, FLUORANTHENE, BENZO(A)PYRENE, BENZO(E)PYRENE, ANTHANTHRENE, BENZO(G,H,I)PERYLENE & CORONENE, & ARE READILY EXTRACTABLE ... FROM SOOT HAVING AVG PARTICLE DIAMETER OF 40 MICROMETERS OR MORE.

IARC. Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Humans. Geneva: World Health Organization, International Agency for Research on Cancer, 1972-PRESENT. (Multivolume work). Available at: <https://monographs.iarc.fr/ENG/Classification/index.php>, p. V3 24 (1973)

► [Hazardous Substances Data Bank \(HSDB\)](#)

For more General Manufacturing Information (Complete) data for CARBON BLACK (6 total), please visit the [HSDB record page](#).

► [Hazardous Substances Data Bank \(HSDB\)](#)

6.10 Sampling Procedures



A known volume of air is drawn through a glass fiber filter followed by a 0.8 um pore size silver membrane filter to collect carbon black particles and associated polycyclic aromatic hydrocarbons. The original method recommended a polyvinyl chloride filter, but the glass fiber and silver membrane filters have been substituted to allow for greater accuracy in the subsequent determination of the cyclohexane extractable fraction.

NIOSH; Criteria Document: Carbon Black p.80 (1978) DHEW Pub. NIOSH 78-204

► [Hazardous Substances Data Bank \(HSDB\)](#)

To collect carbon black, a personal sampler pump is used to pull air through a silver membrane filter preceded by a glass fiber filter. The filter holder is held together by tape or a shrinkable band. If the filter holder is not tightened snugly, the contaminant will leak around the filter. A piece of flexible tubing is used to connect the filter holder to the pump. Sample at a flow rate of 1-2 liters/min. After sampling, remove small plugs to seal filter cassettes.

NIOSH; Criteria Document: Carbon Black p.82 (1978) DHEW Pub. NIOSH 78-204

► [Hazardous Substances Data Bank \(HSDB\)](#)

A sampling survey involving workers from 7 carbon black producers was initiated in late 1979. Acceptable samples (1546 total dust and 387 respirable dust) were collected from closed face filter cassettes worn by carbon black workers performing normal work operations. A 1 cm cyclone separator was employed for respirable dust sampling. Characterization of the particulate exposures to workers was provided for the various areas of employment and specific jobs within these areas.

Smith RG, Musch DC; Am Ind Hyg Assoc 43 (12): 925-30 (1982)

► [Hazardous Substances Data Bank \(HSDB\)](#)

7 Identification



7.1 Analytic Laboratory Methods



GLASS CAPILLARY GAS CHROMATOGRAPHY AND FLAME IONIZATION DETECTOR HAVE BEEN USED TO COMPARE EXTRACTION BY VACUUM SUBLIMATION AND SOXHLET EXTRACTION FOR THE YIELD OF POLYCYCLIC COMPOUNDS ORIGINATING FROM CARBON BLACK AND SOOT FROM AN ALUMINUM INDUSTRY.

STENBERG UR, ALSBERG TE; ANAL CHEM 53: 2067-72 (1981)

► [Hazardous Substances Data Bank \(HSDB\)](#)

Sampling and determination of natural and anthropogenic hydrocarbons in air by gas chromatography/mass spectrometry were discussed.

Ciccioli P et al; Sci Total Environ 36: 255-60 (1984)

► [Hazardous Substances Data Bank \(HSDB\)](#)

Determination of carbon black on silver membrane filters from rubber factory dust /using gravimetric techniques/ is discussed.

[PMID:7158606](#)

Mehler JE et al; Am Ind Hyg Assoc J 43 (12): 908-11 (1982)

► [Hazardous Substances Data Bank \(HSDB\)](#)

The cyclohexane soluble material in the particulates on the glass fiber and silver membrane filters is extracted with cyclohexane aided by ultrasonication. Blank filters are extracted along with, and in the same manner as, the samples. After extraction, the cyclohexane solution is filtered through a fritted glass funnel. The total material extracted is determined by weighing a dried aliquot of the extract.

NIOSH; Criteria Document: Carbon Black p.86 (1978) DHEW Pub. NIOSH 78-204

► [Hazardous Substances Data Bank \(HSDB\)](#)

For more Analytic Laboratory Methods (Complete) data for CARBON BLACK (7 total), please visit the [HSDB record page](#).

► [Hazardous Substances Data Bank \(HSDB\)](#)

8 Safety and Hazards



8.1 Hazards Identification



8.1.1 GHS Classification



1 of 5 View All 	
Note	<i>This chemical does not meet GHS hazard criteria for 70.9% (2922 of 4121) of all reports. Pictograms displayed are for 29.1% (1199 of 4121) of reports that indicate hazard statements.</i>
Pictogram(s)	 Health Hazard
Signal	<u>Warning</u>
GHS Hazard Statements	H351 (27.3%): Suspected of causing cancer [<u>Warning</u> Carcinogenicity]
Precautionary Statement Codes	P203, P280, P318, P405, and P501 (The corresponding statement to each P-code can be found at the GHS Classification page.)
ECHA C&L Notifications Summary	<p><i>Aggregated GHS information provided per 4121 reports by companies from 50 notifications to the ECHA C&L Inventory.</i></p> <p><i>Reported as not meeting GHS hazard criteria per 2922 of 4121 reports by companies.</i></p> <p><i>There are 46 notifications provided by 1199 of 4121 reports by companies with hazard statement code(s).</i></p> <p><i>Information may vary between notifications depending on impurities, additives, and other factors. The percentage value in parenthesis indicates the notified classification ratio from companies that provide hazard codes. Only hazard codes with percentage values above 10% are shown. For more detailed information, please visit ECHA C&L website.</i></p>

► [European Chemicals Agency \(ECHA\)](#)

8.1.2 Hazard Classes and Categories



Carc. 2 (27.3%)

► [European Chemicals Agency \(ECHA\)](#)

Specific target organ toxicity (repeated exposure) - category 2

► [Hazardous Chemical Information System \(HCIS\), Safe Work Australia](#)

[View More...](#)

8.1.3 Health Hazards



Excerpt from NIOSH Pocket Guide for Carbon black:

Exposure Routes: Inhalation, skin and/or eye contact

Symptoms: Cough; irritation eyes; in presence of polycyclic aromatic hydrocarbons: [potential occupational carcinogen]

Target Organs: Respiratory system, eyes

Cancer Site: Lymphatic cancer (in presence of PAHs) (NIOSH, 2024)

► [CAMEO Chemicals](#)

8.1.4 Fire Hazards



Combustible. Finely dispersed particles form explosive mixtures in air.

► [ILO-WHO International Chemical Safety Cards \(ICSCs\)](#)

8.1.5 Hazards Summary



The TLV Basis is bronchitis; Carbon black (CB) contains less than 0.3% extractable impurities; Workers who inhale CB have very low exposure to PAHs; Epidemiology studies have found an association with small opacities on chest x-ray, but there is doubt on their biological significance. Respiratory symptoms and chest x-ray abnormalities may be reversible after cessation of exposure; [ACGIH]

ACGIH - Documentation of the TLVs and BEIs, 7th Ed. Cincinnati: ACGIH Worldwide, 2020.

► [Haz-Map, Information on Hazardous Chemicals and Occupational Diseases](#)

8.1.6 Fire Potential



SLIGHT, WHEN EXPOSED TO HEAT OR FLAME.

Sax, N.I. Dangerous Properties of Industrial Materials. 5th ed. New York: Van Nostrand Reinhold, 1979., p. 992

► [Hazardous Substances Data Bank \(HSDB\)](#)

Carbon black can be ignited in the presence of open flames, and burns slowly with production of carbon monoxide.

International Labour Office. Encyclopedia of Occupational Health and Safety. Vols. I&II. Geneva, Switzerland: International Labour Office, 1983., p. 392

► [Hazardous Substances Data Bank \(HSDB\)](#)

8.1.7 Skin, Eye, and Respiratory Irritations



May cause skin and respiratory irritation.

NIOSH; Criteria Document: Carbon Black p.3 (1978) DHEW Pub. NIOSH 78-204

► [Hazardous Substances Data Bank \(HSDB\)](#)

As superficial foreign bodies, carbon black ... may be slightly irritating mechanically and may cause discoloration of lids and conjunctivae, but they are chemically inert.

Grant, W.M. Toxicology of the Eye. 3rd ed. Springfield, IL: Charles C. Thomas Publisher, 1986., p. 178

► [Hazardous Substances Data Bank \(HSDB\)](#)

8.2 Safety and Hazard Properties



8.2.1 Flammable Limits



Flammability

Combustible Solid that may contain flammable hydrocarbons.

► [The National Institute for Occupational Safety and Health \(NIOSH\)](#)

8.2.2 Physical Dangers



Dust clouds can be ignited on contact with intensely heated surfaces (above 500 °C).

► [ILO-WHO International Chemical Safety Cards \(ICSCs\)](#)

8.2.3 Explosive Limits and Potential



When carbon black contains more than 8% volatile material it should be considered an explosion hazard.

International Labour Office. *Encyclopedia of Occupational Health and Safety*. Vols. I&II. Geneva, Switzerland: International Labour Office, 1983., p. 392

► [Hazardous Substances Data Bank \(HSDB\)](#)

Carbon black dust may form explosive mixtures in air.

Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). *NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards*. DHHS(NIOSH) Publication No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981.

► [Hazardous Substances Data Bank \(HSDB\)](#)

8.2.4 OSHA Standards



Permissible Exposure Limit: Table Z-1 8-hr Time Weighted Avg: 3.5 mg/cu m.

29 CFR 1910.1000 (USEPA); U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of February 27, 2009: <https://www.ecfr.gov>

► [Hazardous Substances Data Bank \(HSDB\)](#)

8.2.5 NIOSH Recommendations



Recommended Exposure Limit: 10 Hr Time-Weighted Avg: 3.5 mg/cu m

NIOSH. *NIOSH Pocket Guide to Chemical Hazards & Other Databases CD-ROM*. Department of Health & Human Services, Centers for Disease Prevention & Control. National Institute for Occupational Safety & Health. DHHS (NIOSH) Publication No. 2005-151 (2005)

► [Hazardous Substances Data Bank \(HSDB\)](#)

Recommended Exposure Limit: 10 Hr Time-Weighted Avg: 0.1 mg/cu m /Carbon black in presence of polycyclic aromatic hydrocarbons/

NIOSH. *NIOSH Pocket Guide to Chemical Hazards & Other Databases CD-ROM*. Department of Health & Human Services, Centers for Disease Prevention & Control. National Institute for Occupational Safety & Health. DHHS (NIOSH) Publication No. 2005-151 (2005)

► [Hazardous Substances Data Bank \(HSDB\)](#)

NIOSH considers carbon black to be a potential occupational carcinogen.

NIOSH. *NIOSH Pocket Guide to Chemical Hazards & Other Databases CD-ROM*. Department of Health & Human Services, Centers for Disease Prevention & Control. National Institute for Occupational Safety & Health. DHHS (NIOSH) Publication No. 2005-151 (2005)

► [Hazardous Substances Data Bank \(HSDB\)](#)

NIOSH usually recommends that occupational exposures to carcinogens be limited to the lowest feasible concentration.

NIOSH. NIOSH Pocket Guide to Chemical Hazards & Other Databases CD-ROM. Department of Health & Human Services, Centers for Disease Prevention & Control. National Institute for Occupational Safety & Health. DHHS (NIOSH) Publication No. 2005-151 (2005)

► [Hazardous Substances Data Bank \(HSDB\)](#)

8.3 First Aid Measures



Inhalation First Aid

Fresh air, rest.

► [ILO-WHO International Chemical Safety Cards \(ICSCs\)](#)

Skin First Aid

Rinse and then wash skin with water and soap.

► [ILO-WHO International Chemical Safety Cards \(ICSCs\)](#)

Eye First Aid

Rinse with plenty of water (remove contact lenses if easily possible).

► [ILO-WHO International Chemical Safety Cards \(ICSCs\)](#)

Ingestion First Aid

Rinse mouth.

► [ILO-WHO International Chemical Safety Cards \(ICSCs\)](#)

8.3.1 First Aid



Excerpt from NIOSH Pocket Guide for Carbon black:

Eye: IRRIGATE PROMPTLY - If this chemical contacts the eyes, promptly wash (irrigate) the eyes with large amounts of water, occasionally lifting the lower and upper lids. Get medical attention if any discomfort continues.

Breathing: FRESH AIR - If a person breathes large amounts of this chemical, move the exposed person to fresh air at once. Other measures are usually unnecessary. (NIOSH, 2024)

► [CAMEO Chemicals](#)

([See general first aid procedures](#))

Eye: Irrigate promptly - If this chemical contacts the eyes, promptly wash (irrigate) the eyes with large amounts of water, occasionally lifting the lower and upper lids. Get medical attention if any discomfort continues.

Breathing: Fresh air

► [The National Institute for Occupational Safety and Health \(NIOSH\)](#)

8.4 Fire Fighting



Use powder, water spray, foam, carbon dioxide. In case of fire: keep drums, etc., cool by spraying with water.

► [ILO-WHO International Chemical Safety Cards \(ICSCs\)](#)

8.4.1 Fire Fighting Procedures



If material on fire or involved in fire: Do not extinguish fire unless flow can be stopped Use water in flooding quantities as fog Solid streams of water may spread fire Cool all affected containers with flooding quantities of water Apply water from as far a distance as possible Use foam, dry chemical, or carbon dioxide

Association of American Railroads; Bureau of Explosives. Emergency Handling of Hazardous Materials in Surface Transportation. Association of American Railroads, Pueblo, CO. 2005, p. 191

► [Hazardous Substances Data Bank \(HSDB\)](#)

8.5 Accidental Release Measures



8.5.1 Spillage Disposal



Personal protection: complete protective clothing including self-contained breathing apparatus. Sweep spilled substance into covered containers. If appropriate, moisten first to prevent dusting. Carefully collect remainder. Then store and dispose of according to local regulations.

► [ILO-WHO International Chemical Safety Cards \(ICSCs\)](#)

8.5.2 Cleanup Methods



Electroflotation coagulation separation of carbon black from acetylene production wastewater was studied.

Avetisyan DP et al; Khim Tekhnol Vody 6 (4): 345-6 (1984)

► [Hazardous Substances Data Bank \(HSDB\)](#)

If carbon black is spilled or leaked, the following steps should be taken: Remove all ignition sources. Ventilate area of spill or leak. Carbon black dust may be collected by vacuuming with an appropriate high efficiency filtration system or by using wet methods; it should then be placed in an appropriate container. If a vacuum system is used, there should be no sources of ignition in the vicinity of the spill, and flashback prevention devices should be provided.

Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981.

► [Hazardous Substances Data Bank \(HSDB\)](#)

/SRP: If time permits, pits, ponds, lagoons, soak holes, or holding areas should be sealed with an impermeable flexible membrane liner./ Land spill - Dig a pit, pond, lagoon, holding area to contain liquid or solid material. Dike surface flow using soil, sand bags, foamed polyurethane, or foamed concrete. Absorb bulk liquid with fly ash, cement powder, or commercial sorbents.

Association of American Railroads; Bureau of Explosives. Emergency Handling of Hazardous Materials in Surface Transportation. Association of American Railroads, Pueblo, CO. 2005, p. 191

► [Hazardous Substances Data Bank \(HSDB\)](#)

Environmental considerations: Water spill Use natural barriers or oil spill control booms to limit spill travel. Remove trapped material with suction hoses.

Association of American Railroads; Bureau of Explosives. Emergency Handling of Hazardous Materials in Surface Transportation. Association of American Railroads, Pueblo, CO. 2005, p. 191

► [Hazardous Substances Data Bank \(HSDB\)](#)

For more Cleanup Methods (Complete) data for CARBON BLACK (6 total), please visit the [HSDB record page](#).

► [Hazardous Substances Data Bank \(HSDB\)](#)

8.5.3 Disposal Methods



SRP: The most favorable course of action is to use an alternative chemical product with less inherent propensity for occupational exposure or environmental contamination. Recycle any unused portion of the material for its approved use or return it to the manufacturer or supplier. Ultimate disposal of the chemical must consider: the material's impact on air quality; potential migration in soil or water; effects on animal, aquatic, and plant life; and conformance with environmental and public health regulations.

► [Hazardous Substances Data Bank \(HSDB\)](#)

PRECAUTIONS FOR "CARCINOGENS": There is no universal method of disposal that has been proved satisfactory for all carcinogenic compounds & specific methods of chem destruction ... published have not been tested on all kinds of carcinogen-containing waste. ... summary of avail methods & recommendations ... /given/ must be treated as guide only. /Chemical Carcinogens/

Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory: Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 14

► [Hazardous Substances Data Bank \(HSDB\)](#)

PRECAUTIONS FOR "CARCINOGENS": ... Incineration may be only feasible method for disposal of contaminated laboratory waste from biological expt. However, not all incinerators are suitable for this purpose. The most efficient type ... is probably the gas-fired type, in which a first-stage combustion with a less than stoichiometric air:fuel ratio is followed by a second stage with excess air. Some ... are designed to accept ... aqueous & organic-solvent solutions, otherwise it is necessary ... to absorb soln onto suitable combustible material, such as sawdust. Alternatively, chem destruction may be used, esp when small quantities ... are to be destroyed in laboratory. /Chemical Carcinogens/

Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory: Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 15

► [Hazardous Substances Data Bank \(HSDB\)](#)

PRECAUTIONS FOR "CARCINOGENS": HEPA (high-efficiency particulate arrestor) filters ... can be disposed of by incineration. For spent charcoal filters, the adsorbed material can be stripped off at high temp & carcinogenic wastes generated by this treatment conducted to & burned in an incinerator. ... LIQUID WASTE: ... Disposal should be carried out by incineration at temp that ... ensure complete combustion. SOLID WASTE: Carcasses of lab animals, cage litter & misc solid wastes ... should be disposed of by incineration at temp high enough to ensure destruction of chem carcinogens or their metabolites. /Chemical Carcinogens/

Montesano, R., H. Bartsch, E. Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A. B. Swan, L. Tomatis, and W. Davis (eds.). *Handling Chemical Carcinogens in the Laboratory: Problems of Safety*. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 15

► [Hazardous Substances Data Bank \(HSDB\)](#)

For more Disposal Methods (Complete) data for CARBON BLACK (6 total), please visit the [HSDB record page](#).

► [Hazardous Substances Data Bank \(HSDB\)](#)

8.5.4 Preventive Measures



SRP: Local exhaust ventilation should be applied wherever there is an incidence of point source emissions or dispersion of regulated contaminants in the work area. Ventilation control of the contaminant as close to its point of generation is both the most economical and safest method to minimize personnel exposure to airborne contaminants.

► [Hazardous Substances Data Bank \(HSDB\)](#)

SRP: The scientific literature for the use of contact lenses in industry is conflicting. The benefit or detrimental effects of wearing contact lenses depend not only upon the substance, but also on factors including the form of the substance, characteristics and duration of the exposure, the uses of other eye protection equipment, and the hygiene of the lenses. However, there may be individual substances whose irritating or corrosive properties are such that the wearing of contact lenses would be harmful to the eye. In those specific cases, contact lenses should not be worn. In any event, the usual eye protection equipment should be worn even when contact lenses are in place.

► [Hazardous Substances Data Bank \(HSDB\)](#)

... SUBSTITUTION OF LESS IRRITATING SUBSTANCES ... REDESIGN OF OPERATIONS ... PREVENT CONTACT, PROVISION OF A PHYSICAL BARRIER AGAINST CONTACT, PROPER WASHING FACILITIES, WORK CLOTHING AND STORAGE FACILITIES, PROTECTIVE CLOTHING, AND BARRIER CREAMS. MEDICAL CONTROL ...

Sax, N.I. *Dangerous Properties of Industrial Materials*. 4th ed. New York: Van Nostrand Reinhold, 1975., p. 1121

► [Hazardous Substances Data Bank \(HSDB\)](#)

The employer shall ensure that respirators are adequately maintained, and stored in a dust free condition and that employees are instructed and drilled at least annually in the proper use, fit, and testing for leakage of respirators assigned to them. ... The employer shall ensure that, at

the conclusion of the workshift, all clothing is removed only in change rooms. ... And that contaminated protective clothing that is to be cleaned, laundered, or disposed of is placed in a closed container in the change room.

NIOSH; Criteria Document: Carbon Black p.5 (1978) DHEW Pub. NIOSH 78-204

► [Hazardous Substances Data Bank \(HSDB\)](#)

For more Preventive Measures (Complete) data for CARBON BLACK (21 total), please visit the [HSDB record page](#).

► [Hazardous Substances Data Bank \(HSDB\)](#)

8.6 Handling and Storage



8.6.1 Safe Storage



Well closed. Separated from food and feedstuffs. See Chemical Dangers.

► [ILO-WHO International Chemical Safety Cards \(ICSCs\)](#)

8.6.2 Storage Conditions



PRECAUTIONS FOR "CARCINOGENS": Storage site should be as close as practical to lab in which carcinogens are to be used, so that only small quantities required for ... expt need to be carried. Carcinogens should be kept in only one section of cupboard, an explosion-proof refrigerator or freezer (depending on chemico-physical properties ...) that bears appropriate label. An inventory ... should be kept, showing quantity of carcinogen & date it was acquired ... Facilities for dispensing ... should be contiguous to storage area. /Chemical Carcinogens/

Montesano, R., H. Bartsch, E. Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A. B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory: Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 13

► [Hazardous Substances Data Bank \(HSDB\)](#)

8.7 Exposure Control and Personal Protection



8.7.1 Recommended Exposure Limit (REL)



REL-TWA (Time Weighted Average)

3.5 mg/m³, 0.1 mg PAHs/m³ (carbon black in the presence of PAHs)

▶ [Occupational Safety and Health Administration \(OSHA\)](#)

TWA 3.5 mg/m³ Ca TWA 0.1 mg PAHs/m³ [Carbon black in presence of polycyclic aromatic hydrocarbons (PAHs)] [See Appendix A](#)[See Appendix C](#)

▶ [The National Institute for Occupational Safety and Health \(NIOSH\)](#)

8.7.2 Permissible Exposure Limit (PEL)



3.5 [mg/m³]

▶ [Haz-Map, Information on Hazardous Chemicals and Occupational Diseases](#)

PEL-TWA (8-Hour Time Weighted Average)

3.5 mg/m³

▶ [Occupational Safety and Health Administration \(OSHA\)](#)

TWA 3.5 mg/m³

▶ [The National Institute for Occupational Safety and Health \(NIOSH\)](#)

8.7.3 Immediately Dangerous to Life or Health (IDLH)



1750 mg/m³ (NIOSH, 2024)

▶ [CAMEO Chemicals](#)

1750.0 [mg/m³]

Excerpts from Documentation for IDLHs: Animal or human data: None indicating that high concentrations of carbon black would have significant health effects to workers within 30 minutes.

▶ [Haz-Map, Information on Hazardous Chemicals and Occupational Diseases](#)

1750 mg/cu m

NIOSH. NIOSH Pocket Guide to Chemical Hazards & Other Databases CD-ROM. Department of Health & Human Services, Centers for Disease Prevention & Control. National Institute for Occupational Safety & Health. DHHS (NIOSH) Publication No. 2005-151 (2005)

► [Hazardous Substances Data Bank \(HSDB\)](#)

1750 mg/m³

► [Occupational Safety and Health Administration \(OSHA\)](#)

1750 mg/m³

See: [1333864](#)

► [The National Institute for Occupational Safety and Health \(NIOSH\)](#)

8.7.4 Threshold Limit Values (TLV)



3.0 [mg/m³], inhalable fraction

► [Haz-Map, Information on Hazardous Chemicals and Occupational Diseases](#)

8 hr Time Weighted Avg (TWA): 3.5 mg/cu m.

American Conference of Governmental Industrial Hygienists TLVs and BEIs. Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices. Cincinnati, OH, 2008, p. 17

► [Hazardous Substances Data Bank \(HSDB\)](#)

Excursion Limit Recommendation: Excursions in worker exposure levels may exceed 3 times the TLV-TWA for no more than a total of 30 minutes during a work day, and under no circumstances should they exceed 5 times the TLV-TWA, provided that the TLV-TWA is not exceeded.

American Conference of Governmental Industrial Hygienists TLVs and BEIs. Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices. Cincinnati, OH, 2008, p. 5

► [Hazardous Substances Data Bank \(HSDB\)](#)

A4; Not classifiable as a human carcinogen.

American Conference of Governmental Industrial Hygienists TLVs and BEIs. Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices. Cincinnati, OH, 2008, p. 17

► [Hazardous Substances Data Bank \(HSDB\)](#)

(inhalable fraction): 3 mg/m

► [ILO-WHO International Chemical Safety Cards \(ICSCs\)](#)

TLV-TWA (Time Weighted Average)

3 mg/m³ (inhalable particulate matter) [2010]

► [Occupational Safety and Health Administration \(OSHA\)](#)

8.7.5 Inhalation Risk



A harmful concentration of airborne particles can be reached quickly when dispersed.

► [ILO-WHO International Chemical Safety Cards \(ICSCs\)](#)

8.7.6 Effects of Short Term Exposure



May cause mechanical irritation.

► [ILO-WHO International Chemical Safety Cards \(ICSCs\)](#)

8.7.7 Effects of Long Term Exposure



Lungs may be affected by repeated or prolonged exposure. This substance is possibly carcinogenic to humans.

► [ILO-WHO International Chemical Safety Cards \(ICSCs\)](#)

8.7.8 Allowable Tolerances



Residues of carbon black are exempted from the requirement of a tolerance when used in accordance with good agricultural practice as inert (or occasionally active) ingredients in pesticide formulations applied to animals. Use: colorant/pigment in animal tags. Limit: none.

40 CFR 180.930 (USEPA); U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of March 3, 2009: <https://www.ecfr.gov>

► [Hazardous Substances Data Bank \(HSDB\)](#)

8.7.9 Personal Protective Equipment (PPE)



Excerpt from NIOSH Pocket Guide for Carbon black:

Skin: No recommendation is made specifying the need for personal protective equipment for the body.

Eyes: PREVENT EYE CONTACT - Wear appropriate eye protection to prevent eye contact.

Wash skin: DAILY - The worker should wash daily at the end of each work shift, and prior to eating, drinking, smoking, etc.

Remove: No recommendation is made specifying the need for removing clothing that becomes wet or contaminated.

Change: No recommendation is made specifying the need for the worker to change clothing after the workshift. (NIOSH, 2024)

► **CAMEO Chemicals**

The employer shall provide and shall require employees working with carbon black to wear appropriate full body clothing, with elastic cuffs at the wrists and ankles, gloves, and shoes, which are resistant to penetration by carbon black to minimize skin contact with carbon black. ... Chemical safety glasses shall be provided to employees experiencing eye irritation during exposure.

NIOSH; Criteria Document: Carbon Black p.5 (1978) DHEW Pub. NIOSH 78-204

► **Hazardous Substances Data Bank (HSDB)**

Wear appropriate eye protection to prevent eye contact.

NIOSH. NIOSH Pocket Guide to Chemical Hazards & Other Databases CD-ROM. Department of Health & Human Services, Centers for Disease Prevention & Control. National Institute for Occupational Safety & Health. DHHS (NIOSH) Publication No. 2005-151 (2005)

► **Hazardous Substances Data Bank (HSDB)**

Respirator Recommendations: Up to 17.5 mg/cu m

Assigned Protection Factor (APF)	Respirator Recommendation
APF = 5	Any quarter-mask respirator.

NIOSH. NIOSH Pocket Guide to Chemical Hazards & Other Databases CD-ROM. Department of Health & Human Services, Centers for Disease Prevention & Control. National Institute for Occupational Safety & Health. DHHS (NIOSH) Publication No. 2005-151 (2005)

► **Hazardous Substances Data Bank (HSDB)**

Respirator Recommendations: Up to 35 mg/cu m

Assigned Protection Factor (APF)	Respirator Recommendation
APF = 10	Any particulate respirator equipped with an N95, R95, or P95 filter (including N95, R95, and P95 filtering facepieces) except quarter-mask respirators. The following filters may also be used: N99, R99, P99, N100, R100, P100.

APF = 10

Any supplied-air respirator.

NIOSH. NIOSH Pocket Guide to Chemical Hazards & Other Databases CD-ROM. Department of Health & Human Services, Centers for Disease Prevention & Control. National Institute for Occupational Safety & Health. DHHS (NIOSH) Publication No. 2005-151 (2005)

► [Hazardous Substances Data Bank \(HSDB\)](#)

For more Personal Protective Equipment (PPE) (Complete) data for CARBON BLACK (12 total), please visit the [HSDB record page](#).

► [Hazardous Substances Data Bank \(HSDB\)](#)

(See personal protection and sanitation codes)

Skin: No recommendation

Eyes: Prevent eye contact - Wear appropriate eye protection to prevent eye contact.

Wash skin: Daily - The worker should wash daily at the end of each work shift, and prior to eating, drinking, smoking, etc.

Remove: No recommendation

Change: No recommendation

► [The National Institute for Occupational Safety and Health \(NIOSH\)](#)

8.7.10 Respirator Recommendations



NIOSH/OSHA

Up to 17.5 mg/m³ :

(APF = 5) Any quarter-mask respirator.

[Click here](#) for information on selection of N, R, or P filters.

Up to 35 mg/m³ :

(APF = 10) Any particulate respirator equipped with an N95, R95, or P95 filter (including N95, R95, and P95 filtering facepieces) except quarter-mask respirators. The following filters may also be used: N99, R99, P99, N100, R100, P100.

[Click here](#) for information on selection of N, R, or P filters.

(APF = 10) Any supplied-air respirator

Up to 87.5 mg/m³ :

(APF = 25) Any supplied-air respirator operated in a continuous-flow mode

(APF = 25) Any powered, air-purifying respirator with a high-efficiency particulate filter.

Up to 175 mg/m³ :

(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter.

[Click here](#) for information on selection of N, R, or P filters.

(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter

(APF = 50) Any self-contained breathing apparatus with a full facepiece

(APF = 50) Any supplied-air respirator with a full facepiece

Up to 1750 mg/m³ :

(APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions:

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:

(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter.

[Click here](#) for information on selection of N, R, or P filters.

Any appropriate escape-type, self-contained breathing apparatus

In presence of polycyclic aromatic hydrocarbons:

NIOSH

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:

(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter.

[Click here](#) for information on selection of N, R, or P filters.

Any appropriate escape-type, self-contained breathing apparatus

Important additional information about respirator selection

► [The National Institute for Occupational Safety and Health \(NIOSH\)](#)

8.8 Stability and Reactivity



8.8.1 Air and Water Reactions



Combustible solid that may contain flammable hydrocarbons. (NIOSH, 2024)

► [CAMEO Chemicals](#)

8.8.2 Reactive Group



Hydrocarbons, Aliphatic Saturated

Reducing Agents, Weak

► [CAMEO Chemicals](#)

8.8.3 Reactivity Profile



CARBON BLACK is incompatible with the following: Strong oxidizers such as chlorates, bromates & nitrates. (NIOSH, 2024)

Saturated aliphatic hydrocarbons, which may be contained in CARBON BLACK, may be incompatible with strong oxidizing agents like nitric acid. Charring of the hydrocarbon may occur followed by ignition of unreacted hydrocarbon and other nearby combustibles. In other settings, aliphatic saturated hydrocarbons are mostly unreactive. They are not affected by aqueous solutions of acids, alkalis, most oxidizing agents, and most reducing agents.

► [CAMEO Chemicals](#)

8.8.4 Hazardous Reactivities and Incompatibilities



Strong oxidizers such as chlorates, bromates, and nitrates.

NIOSH. NIOSH Pocket Guide to Chemical Hazards & Other Databases CD-ROM. Department of Health & Human Services, Centers for Disease Prevention & Control. National Institute for Occupational Safety & Health. DHHS (NIOSH) Publication No. 2005-151 (2005)

► [Hazardous Substances Data Bank \(HSDB\)](#)

8.9 Transport Information



8.9.1 Shipping Name / Number DOT/UN/NA/IMO



UN 1361; Carbon, animal or vegetable origin; carbon black

► [Hazardous Substances Data Bank \(HSDB\)](#)

NA 1361; Charcoal screenings, made from 'pinon' wood; charcoal, shell; charcoal, wood, ground crushed, granulated, or pulverized; charcoal brisquettes or briquets; charcoal, wood, lump

► [Hazardous Substances Data Bank \(HSDB\)](#)

IMO 4.2; Carbon, animal or vegetable origin; carbon black

► [Hazardous Substances Data Bank \(HSDB\)](#)

8.9.2 Shipment Methods and Regulations



No person may /transport,/ offer or accept a hazardous material for transportation in commerce unless that person is registered in conformance ... and the hazardous material is properly classed, described, packaged, marked, labeled, and in condition for shipment as required or authorized by ... /the hazardous materials regulations (49 CFR 171-177)./

49 CFR 171.2 (7/1/96)

► [Hazardous Substances Data Bank \(HSDB\)](#)

The International Air Transport Association (IATA) Dangerous Goods Regulations are published by the IATA Dangerous Goods Board pursuant to IATA Resolutions 618 and 619 and constitute a manual of industry carrier regulations to be followed by all IATA Member airlines when transporting hazardous materials.

IATA. Dangerous Goods Regulations. 38th ed. Montreal, Canada and Geneva, Switzerland: International Air Transport Association, Dangerous Goods Board, January, 1997., p. 117

► [Hazardous Substances Data Bank \(HSDB\)](#)

The International Maritime Dangerous Goods Code lays down basic principles for transporting hazardous chemicals. Detailed recommendations for individual substances and a number of recommendations for good practice are included in the classes dealing with such substances. A general index of technical names has also been compiled. This index should always be consulted when attempting to locate the appropriate procedures to be used when shipping any substance or article.

IMDG; International Maritime Dangerous Goods Code; International Maritime Organization p.4081 (1988)

► [Hazardous Substances Data Bank \(HSDB\)](#)

PRECAUTIONS FOR "CARCINOGENS": Procurement ... of unduly large amt ... should be avoided. To avoid spilling, carcinogens should be transported in securely sealed glass bottles or ampoules, which should themselves be placed inside strong screw-cap or snap-top container that will not open when dropped & will resist attack from the carcinogen. Both bottle & the outside container should be appropriately labelled. ... National post offices, railway companies, road haulage companies & airlines have regulations governing transport of hazardous materials. These authorities should be consulted before ... material is shipped.
/Chemical Carcinogens/

Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory: Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 13

► [Hazardous Substances Data Bank \(HSDB\)](#)

PRECAUTIONS FOR "CARCINOGENS": When no regulations exist, the following procedure must be adopted. The carcinogen should be enclosed in a securely sealed, watertight container (primary container), which should be enclosed in a second, unbreakable, leakproof container that will withstand chem attack from the carcinogen (secondary container). The space between primary & secondary container should be filled with absorbent material, which would withstand chem attack from the carcinogen & is sufficient to absorb the entire contents of the primary container in the event of breakage or leakage. Each secondary container should then be enclosed in a strong outer box. The space between the secondary container & the outer box should be filled with an appropriate quantity of shock-absorbent material. Sender should use fastest & most secure form of transport & notify recipient of its departure. If parcel is not received when expected, carrier should be informed so that immediate effort can be made to find it. Traffic schedules should be consulted to avoid ... arrival on weekend or holiday ... /Chemical Carcinogens/

Montesano, R., H. Bartsch, E.Boyland, G. Della Porta, L. Fishbein, R. A. Griesemer, A.B. Swan, L. Tomatis, and W. Davis (eds.). Handling Chemical Carcinogens in the Laboratory: Problems of Safety. IARC Scientific Publications No. 33. Lyon, France: International Agency for Research on Cancer, 1979., p. 13

► [Hazardous Substances Data Bank \(HSDB\)](#)

8.10 Regulatory Information



The Australian Inventory of Industrial Chemicals

Chemical: Carbon black

► [Australian Industrial Chemicals Introduction Scheme \(AICIS\)](#)

REACH Registered Substance

Status: Active Update: 11-05-2023 <https://echa.europa.eu/registration-dossier/-/registered-dossier/16056>

Status: Cease Manufacture Update: 06-05-2018 <https://echa.europa.eu/registration-dossier/-/registered-dossier/24448>

► [European Chemicals Agency \(ECHA\)](#)

New Zealand EPA Inventory of Chemical Status

Carbon black: HSNO Approval: HSR002801 Approved with controls

► [New Zealand Environmental Protection Authority \(EPA\)](#)

8.10.1 FIFRA Requirements



Residues of carbon black are exempted from the requirement of a tolerance when used in accordance with good agricultural practice as inert (or occasionally active) ingredients in pesticide formulations applied to animals. Use: colorant/pigment in animal tags. Limit: none.

40 CFR 180.930 (USEPA); U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of March 3, 2009: <https://www.ecfr.gov>

► [Hazardous Substances Data Bank \(HSDB\)](#)

8.10.2 FDA Requirements



Carbon black, channel process is an indirect food additive for use only as a component of adhesives.

21 CFR 175.105 (USFDA); U.S. National Archives and Records Administration's Electronic Code of Federal Regulations. Available from, as of March 3, 2009: <https://www.ecfr.gov>

► [Hazardous Substances Data Bank \(HSDB\)](#)

8.11 Other Safety Information



Chemical Assessment

IMAP assessments - Carbon black: Human health tier II assessment

► [Australian Industrial Chemicals Introduction Scheme \(AICIS\)](#)

8.11.1 Toxic Combustion Products



Toxic vapors and gases (eg carbon monoxide) may be released in a fire involving carbon black.

Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981.

► [Hazardous Substances Data Bank \(HSDB\)](#)

8.11.2 Special Reports



Boyland E; The Toxicology of Soot; NATO Conf Ser 6 7 (Soot Combust Syst Its Toxic Prop 13-24 (1983). A review and discussion with 19 references on the toxicology of soot, particularly with respect to carbon black.

► [Hazardous Substances Data Bank \(HSDB\)](#)

Silva S et al; Carbon Black Pollution: Environmental Effects and Related Health Problems. Ann Fac Agrar (University Cattol Sacro Cuore) 22 (1): 131-41 (1982). Environmental effects and related health problems assoc with carbon black pollution are reviewed.

► [Hazardous Substances Data Bank \(HSDB\)](#)

NIOSH; Criteria Document: Carbon Black (1978) DHEW Pub. NIOSH 78-204

► [Hazardous Substances Data Bank \(HSDB\)](#)

European Commission, ESIS; IUCLID Dataset, Carbon Black (1333-86-4) (2000 CD-ROM edition).[Available from, as of March, 10 2009: <http://esis.jrc.ec.europa.eu/>]

► [Hazardous Substances Data Bank \(HSDB\)](#)

9 Toxicity

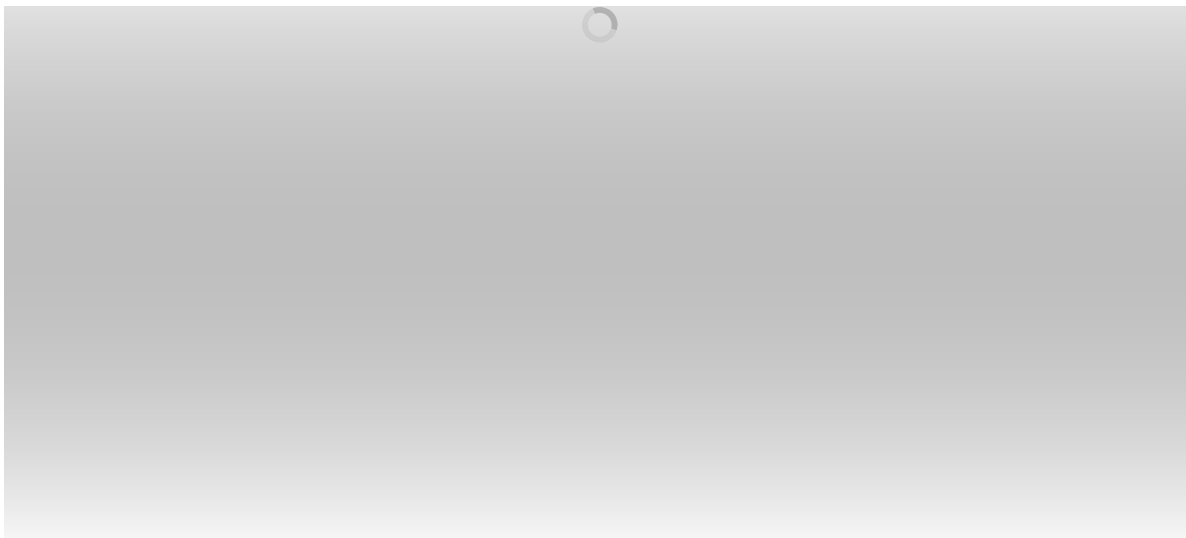


9.1 Toxicological Information



9.1.1 NIOSH Toxicity Data





► The National Institute for Occupational Safety and Health (NIOSH)

9.1.2 Evidence for Carcinogenicity



Evaluation: There is inadequate evidence in humans for the carcinogenicity of carbon black. There is sufficient evidence in experimental animals for the carcinogenicity of carbon black. There is sufficient evidence in experimental animals for the carcinogenicity of carbon black extracts. Overall evaluation: Carbon black is possibly carcinogenic to humans (Group 2B)

IARC. Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Humans. Geneva: World Health Organization, International Agency for Research on Cancer, 1972-PRESENT. (Multivolume work). Available at: <https://monographs.iarc.fr/ENG/Classification/index.php>, p. 65 247 (1996)

► Hazardous Substances Data Bank (HSDB)

A4; Not classifiable as a human carcinogen.

American Conference of Governmental Industrial Hygienists TLVs and BEIs. Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices. Cincinnati, OH, 2008, p. 17

► Hazardous Substances Data Bank (HSDB)

There is inadequate evidence in humans for the carcinogenicity of carbon black. There is sufficient evidence in experimental animals for the carcinogenicity of carbon black. There is sufficient evidence in experimental animals for the carcinogenicity of carbon black extracts. Overall evaluation Carbon black is possibly carcinogenic to humans (Group 2B).

IARC; Carbon Black (Group 2B)/Prepublication copy from Monograph 93 posted February 27, 2006. Available at <https://monographs.iarc.fr/ENG/Meetings/93-carbonblack.pdf> on March 10, 2009

► [Hazardous Substances Data Bank \(HSDB\)](#)

9.1.3 Carcinogen Classification



IARC Carcinogenic Agent	Carbon black
IARC Carcinogenic Classes	Group 2B: Possibly carcinogenic to humans
IARC Monographs	<p>Volume Sup 7: Overall Evaluations of Carcinogenicity: An Updating of IARC Monographs Volumes 1 to 42, 1987; 440 pages; ISBN 92-832-1411-0 (out of print)</p> <p>Volume 65: (1996) Printing Processes and Printing Inks, Carbon Black and Some Nitro Compounds</p> <p>Volume 93: (2010) Carbon Black, Titanium Dioxide, and Talc</p>

► [International Agency for Research on Cancer \(IARC\)](#)

9.1.4 Exposure Routes



The substance can be absorbed into the body by inhalation.

► [ILO-WHO International Chemical Safety Cards \(ICSCs\)](#)

inhalation, skin and/or eye contact

► [The National Institute for Occupational Safety and Health \(NIOSH\)](#)

9.1.5 Symptoms



Inhalation Exposure

Cough.

► [ILO-WHO International Chemical Safety Cards \(ICSCs\)](#)

Eye Exposure

Redness.

► [ILO-WHO International Chemical Safety Cards \(ICSCs\)](#)

Cough; irritation eyes; in presence of polycyclic aromatic hydrocarbons: [potential occupational carcinogen]

- ▶ [The National Institute for Occupational Safety and Health \(NIOSH\)](#)

9.1.6 Target Organs



respiratory system, eyes

- ▶ [The National Institute for Occupational Safety and Health \(NIOSH\)](#)

9.1.7 Cancer Sites



[lymphatic cancer (in presence of PAHs)]

- ▶ [The National Institute for Occupational Safety and Health \(NIOSH\)](#)

9.1.8 Adverse Effects



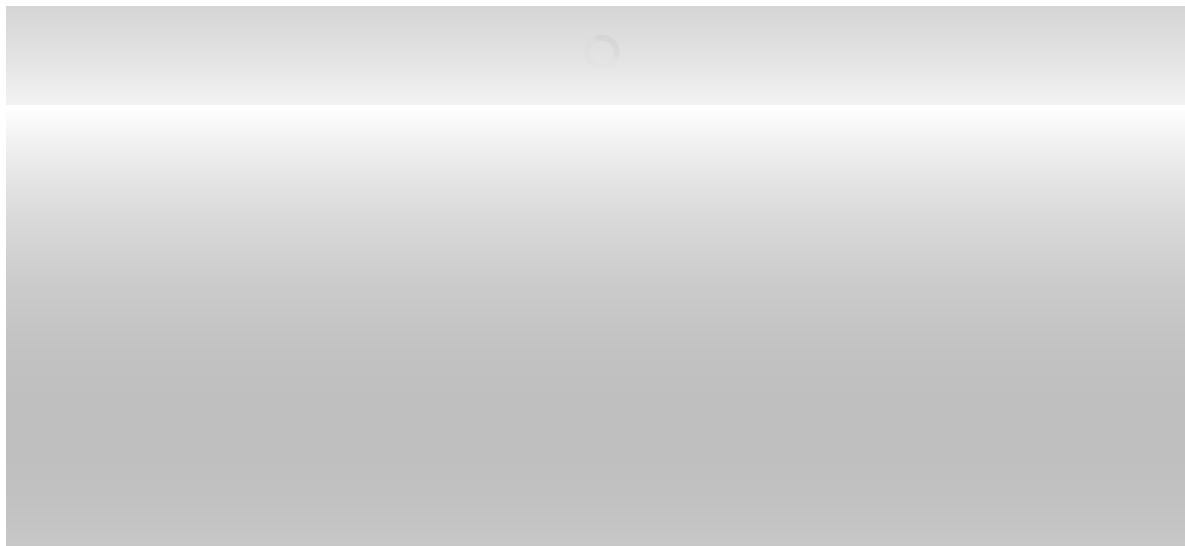
Chronic Bronchitis - Chronic bronchitis is persistent coughing and production of phlegm for at least 3 months out of the year for at least two successive years. (American Thoracic Society).

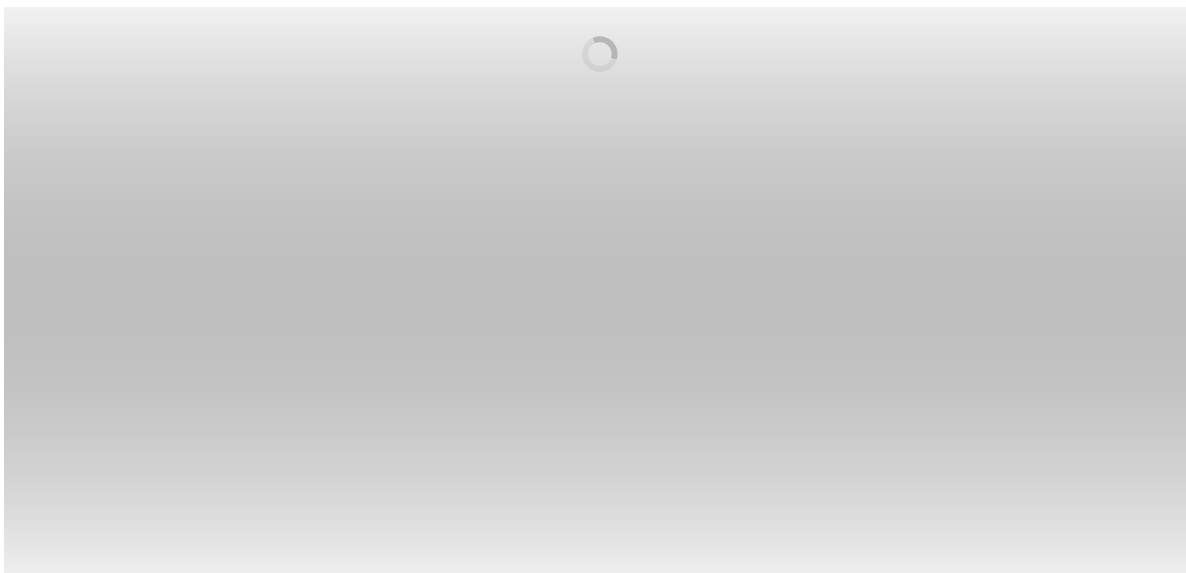
IARC Carcinogen - Class 3: Chemicals are not classifiable by the International Agency for Research on Cancer.

ACGIH Carcinogen - Confirmed Animal.

- ▶ [Haz-Map, Information on Hazardous Chemicals and Occupational Diseases](#)

9.1.9 Acute Effects



[▶ ChemIDplus](#)[▶ ChemIDplus](#)

9.1.10 Interactions



It was concluded that carbon black distributed throughout the lung tissue provided a greater contact surface area for the adsorbed carcinogen benzopyrene and facilitated the increased desorption and resorption of the carcinogen. Justification for this conclusion was based on the observation that tumor production occurred only in the groups of rats that received benzopyrene adsorbed on carbon blacks. Although this may be a valid conclusion, carbon black also might have acted as an irritant promoter in the groups that received benzopyrene adsorbed on carbon black.

Shabad LM et al; Gig Tr Prof Zabol 16: 9-12 (1972) as cited in NIOSH; Criteria Document: Carbon Black p.31 (1978) DHEW Pub. NIOSH 78-204

[▶ Hazardous Substances Data Bank \(HSDB\)](#)

It was noted that some of the 3,4-benzopyrene in ... acetone solution acted as a free carcinogen /when 240 mice were painted with 3,4-benzopyrene adsorbed onto carbon black/, because this solvent eluted 10-23% of the adsorbed compd from carbon black. Dry powders of adsorbed and unadsorbed carcinogens were also tested, and it was found that, after 24 mo, none of the mice rubbed with either dry adsorbed carcinogen or dry carbon black developed any tumors. Twelve percent of the mice treated with dry unadsorbed carcinogen developed

tumors. It was concluded that the carbon blacks tested did effectively block the carcinogenicity of 3,4-benzopyrene, although in differing degrees.

Von Haam F et al; Proc Soc Exp Biol Med 98: 95-8 (1958) as cited in NIOSH; Criteria Document: Carbon Black p.33 (1978) DHEW Pub. NIOSH 78-204

► [Hazardous Substances Data Bank \(HSDB\)](#)

... The interaction effects of a single intratracheal instillation of ultrafine carbon black (CB) particles and staphylococcal lipoteichoic acid (LTA) on early pulmonary inflammation in male BALB/c mice /were studied/. ... The cellular profile, cytokine and chemokine levels in the bronchoalveolar lavage (BAL) fluid, and expression of chemokine and toll-like receptor (TLR) mRNAs in lungs /were measured/. LTA produced a dose-related increase in early pulmonary inflammation, which was characterized by (1) influx of polymorphonuclear neutrophils (PMNs) and (2) induction of interleukin (IL)-6, tumor necrosis factor (TNF)-alpha, macrophage inflammatory protein (MIP)-1alpha/CCL3, but no effect on monocyte chemoattractant protein (MCP)-1/CCL2 at 24 hr after instillation. Levels of some proinflammatory indicators and TLR2-mRNA expression were significantly increased by 14 nm or 95 nm CB (125 ug) and low-dose LTA (10 ug) treatment compared to CB or LTA alone at 4 hr after instillation. Notably, PMN levels and production of IL-6 and CCL2 in the 14 nm CB + LTA were significantly higher than that of 95 nm CB + LTA at 4 hr after instillation. However, at 24 hr after instillation, only PMN levels were significantly higher in the 14 nm CB + LTA than 95 nm CB + LTA but not the cytokines and chemokines. These data show additive as well as synergistic interaction effects of 14 nm or 95 nm ultrafine CB particles and LTA. /It was suggested/ that early pulmonary inflammatory responses in male BALB/c mice may be induced in a size-specific manner of the CB particles used...

[PMID:16387335](#)

Yamamoto S et al; Toxicol Appl Pharmacol 213 (3): 256-66 (2006)

► [Hazardous Substances Data Bank \(HSDB\)](#)

... Respiratory syncytial virus (RSV) is the major cause of bronchiolitis and pneumonia in infants and may lead to the development of asthma in childhood. To determine whether particle exposure modulates the immune response to RSV, eight-week-old female BALB/c mice received an intratracheal (it) instillation of either 40 ug ultrafine carbon black (CB) particles or vehicle. The following day, mice were intratracheally instilled with either 106 pfu RSV or uninfected media. End points were examined 1, 2, 4, 7, and 10 days during RSV infection. Compared with RSV alone, tumor necrosis factor-alpha (TNF-alpha) protein was reduced in the bronchoalveolar lavage fluid (BALF) on days 1 and 2 of infection; there was also a reduction in BALF lymphocyte numbers on day 4, which correlated with reductions in both IFN-gamma-inducible protein (IP-10), lymphotactin, and IFN-gamma mRNAs in the lungs of RSV + CB mice. Multiprobe ribonuclease protection assays of RSV + CB lung tissue showed no changes in the

RSV-associated chemokines regulated upon activation, normal T cell expressed and secreted (RANTES), eotaxin, monocyte chemoattractant protein (MCP-1), macrophage inflammatory protein (MIP)-1 alpha or MIP-1 beta. Viral titers in RSV + CB mice were lower than RSV on days 2-4 of infection. By day 7 of infection, however, neutrophil numbers, proinflammatory cytokine mRNA expression, and protein levels of TNF-alpha and the Th2 cytokine interleukin (IL)-13 were increased in the lungs of RSV + CB mice, indicating an exacerbation of infection. These data indicate that preexposure to ultrafine particles induces an inflammatory milieu promoting allergic immune responses rather than IFNgamma production necessary for microbial defense.

[PMID:12660365](#)

Lambert AL et al; Toxicol Sci 72 (2): 331-8 (2003)

► [Hazardous Substances Data Bank \(HSDB\)](#)

Male Wistar rats were treated by ozone or carbon black (CB) alone as well as in combination. Intratracheal instillation with various amounts of CB was followed either by an acute 7-day or subchronic 2-month ozone exposure (0.5 ppm). Two functional parameters were investigated in alveolar macrophages from bronchoalveolar lavagates, the phagocytotic capacity and the chemotactic migration capability. In the phagocytosis assay, the percentage of phagocytizing macrophages decreased significantly in the CB-exposed groups whereas the ozone groups remained close to or at the control level after 7 days and 2 months of exposure, respectively. The number of ingested particles per macrophage and the formation of superoxide anion radicals were not changed after a 7-day exposure to ozone compared to the control group but were increased after a 2-month ozone exposure. However, a reduction was found in the CB groups. A stimulating effect of ozone was observed in the combined groups. Chemotactic migration was generally retarded in the CB-treated groups. From the results it can be concluded that ozone is able to stimulate the phagocytotic and chemotactic activity of alveolar macrophages whereas CB impairs these functions.

[PMID:7580109](#)

Creutzenberg O et al; Exper Toxicol Pathol 47 (2-3) L 202-6 (1995)

► [Hazardous Substances Data Bank \(HSDB\)](#)

9.1.11 Antidote and Emergency Treatment



/SRP:/ Immediate first aid: Ensure that adequate decontamination has been carried out. If patient is not breathing, start artificial respiration, preferably with a demand valve resuscitator, bag-valve-mask device, or pocket mask, as trained. Perform CPR if necessary. Immediately flush contaminated eyes with gently flowing water. Do not induce vomiting. If vomiting occurs, lean patient forward or place on the left side (head-down position, if possible) to maintain an

open airway and prevent aspiration. Keep patient quiet and maintain normal body temperature. Obtain medical attention. /Poisons A and B/

Currance, P.L. Clements, B., Bronstein, A.C. (Eds.); Emergency Care For Hazardous Materials Exposure. 3Rd edition, Elsevier Mosby, St. Louis, MO 2005, p. 160

► [Hazardous Substances Data Bank \(HSDB\)](#)

/SRP:/ Basic treatment: Establish a patent airway (oropharyngeal or nasopharyngeal airway, if needed). Suction if necessary. Watch for signs of respiratory insufficiency and assist ventilations if needed. Administer oxygen by nonrebreather mask at 10 to 15 L/min. Monitor for pulmonary edema and treat if necessary Monitor for shock and treat if necessary Anticipate seizures and treat if necessary For eye contamination, flush eyes immediately with water. Irrigate each eye continuously with 0.9% saline (NS) during transport Do not use emetics. For ingestion, rinse mouth and administer 5 mL/kg up to 200 mL of water for dilution if the patient can swallow, has a strong gag reflex, and does not drool Cover skin burns with dry sterile dressings after decontamination /Poisons A and B/

Currance, P.L. Clements, B., Bronstein, A.C. (Eds.); Emergency Care For Hazardous Materials Exposure. 3Rd edition, Elsevier Mosby, St. Louis, MO 2005, p. 160

► [Hazardous Substances Data Bank \(HSDB\)](#)

/SRP:/ Advanced treatment: Consider orotracheal or nasotracheal intubation for airway control in the patient who is unconscious, has severe pulmonary edema, or is in severe respiratory distress. Positive-pressure ventilation techniques with a bag valve mask device may be beneficial. Consider drug therapy for pulmonary edema Consider administering a beta agonist such as albuterol for severe bronchospasm Monitor cardiac rhythm and treat arrhythmias as necessary Start IV administration of D5W /SRP: "To keep open", minimal flow rate/. Use 0.9% saline (NS) or lactated Ringer's if signs of hypovolemia are present. For hypotension with signs of hypovolemia, administer fluid cautiously. Watch for signs of fluid overload Treat seizures with diazepam or lorazepam Use proparacaine hydrochloride to assist eye irrigation /Poisons A and B/

Currance, P.L. Clements, B., Bronstein, A.C. (Eds.); Emergency Care For Hazardous Materials Exposure. 3Rd edition, Elsevier Mosby, St. Louis, MO 2005, p. 160-1

► [Hazardous Substances Data Bank \(HSDB\)](#)

9.1.12 Medical Surveillance



Preplacement or initial examinations shall include at least: 1) Comprehensive medical histories with special emphasis directed towards identifying existing disorders of the respiratory system, heart, and skin; comprehensive work histories to determine previous occupational exposure to

potential respiratory and skin irritants and pulmonary carcinogens; and smoking and tobacco histories. 2) Physical examination with special attention to the upper and lower respiratory tract, heart, skin, and mucous membranes of the oral cavity. Skin and oral examinations should be specially directed to any preneoplastic and neoplastic lesions. 3) Specific clinical tests, including at least a 35 x 42 cm posteroanterior and lateral chest roentgenogram and pulmonary function tests including forced vital capacity (FVC), forced expiratory volume in 1 sec (FEV₁), electrocardiograms (ECGs) and sputum cytology. 4) A judgement of the employee's ability to use positive and negative pressure respirators. Periodic examinations shall be made at least annually. Roentgenographic examinations shall be made available for workers occupationally exposed to carbon black containing > 0.1% polycyclic aromatic hydrocarbons annually and for workers occupationally exposed to carbon black containing less than 0.1% polycyclic aromatic hydrocarbons every 3 yr. These examinations shall include at least: 1) Interim medical and work histories; 2) Physical exam and clinical tests as described above.

NIOSH; Criteria Document: Carbon Black p.2 (1978) DHEW Pub. NIOSH 78-204

► [Hazardous Substances Data Bank \(HSDB\)](#)

Periodic examinations: Chest X-rays should be taken annually if the carbon black contains more than 0.1% cyclohexanone extractable material, or every 3 yr if the carbon black contains 0.1% cyclohexane extractable material or less, and pulmonary function tests, ECGs and examination of the skin and oral cavities of workers will help detect any occupationally related illness that might otherwise go undetected because of either delayed toxic effects or the subtlety of the changes. Special medical attention should be given to workers exposed to carbon black containing more than 0.1% cyclohexane extractable material, because of the possibility of neoplasms of the skin, oral mucosa, or respiratory tract.

NIOSH; Criteria Document: Carbon Black p.68 (1978) DHEW Pub. NIOSH 78-204

► [Hazardous Substances Data Bank \(HSDB\)](#)

Carbon black production facility employees (1755) participated in the third round of the industry-wide medical surveillance testing. They were employed in 22 North American plants. Spirometry and a systematically administered questionnaire were included in the year 2000 round of the industry-wide medical surveillance program. Industrial hygiene data from an industry-wide survey in 2000-2001, as well as all available exposure assessment data collected since 1979, were integrated with process questionnaires and exposure rating questionnaires completed by plant personnel. Analyses included multiple linear regression and categorical data analyses. Multiple regression analyses showed statistically significant, consistent relationships between cumulative exposure and small reductions in forced expiratory volume in 1 second (FEV₁) but not with other spirometry parameters. The estimated slopes were -2 mL FEV₁ per mg-year/cu m of cumulative total dust exposure and -0.7 mL FEV₁ per mg-year/cu m

of cumulative exposure for the inhalable fraction. In addition, heavy cumulative exposures were associated with a small increase in chronic bronchitis in nonsmokers. Recent exposures, typically much lower than in the past, were not demonstrated to be associated with these effects. Consistent with good occupational hygiene practice for any contaminant, workplace exposures to carbon black should be controlled to lowest practical levels.

[PMID:12625230](#)

Harber P et al; J Occup Environ Med 45 (2): 144-55 (2003)

► [Hazardous Substances Data Bank \(HSDB\)](#)

... Longitudinal analyses were carried out on data from workers in the European carbon black manufacturing industry who provided three full-size chest radiographs sequentially between 1987-1995. All chest radiographs were independently read by three experienced readers according to the International Labour Organisation (ILO) classification. After exclusion of participants with previous lung diseases or injuries, females, unreadable chest radiographs and from factories with a low participation rate, data from 675 workers were available for the longitudinal analyses. An association was observed between cumulative carbon black exposure and new cases of chest radiograph abnormalities (ILO category $\geq 1/0$) and progression in small opacities. These associations were mainly related to changes in chest radiographs from workers at one factory. A large percentage of workers with chest radiograph abnormalities reversed to normal chest films; however, after adjusting for other factors, this was not associated with levels of exposure to carbon black dust. In conclusion, the results show that exposure to carbon black is associated with increased risk of chest radiographic abnormalities, which may be reversible after reduction or cessation of exposure.

[PMID:12212976](#)

van Tongeren MJA et al; Eur Resp J 20 (2): 417-25 (2002)

► [Hazardous Substances Data Bank \(HSDB\)](#)

For more Medical Surveillance (Complete) data for CARBON BLACK (8 total), please visit the [HSDB record page](#).

► [Hazardous Substances Data Bank \(HSDB\)](#)

9.1.13 Human Toxicity Excerpts



/HUMAN EXPOSURE STUDIES/ Non-cancer respiratory effects in carbon black workers that have been reported include cough, sputum production, bronchitis, chest radiographic opacities (eg, pneumoconiosis) and decrements in lung function.

IARC; Carbon Black (Group 2B)/Prepublication copy from Monograph 93 posted February 27, 2006.

Available at <https://monographs.iarc.fr/ENG/Meetings/93-carbonblack.pdf> on March 10, 2009

► [Hazardous Substances Data Bank \(HSDB\)](#)

/SIGNS AND SYMPTOMS/ Carbon black used as pigment in ... liq eye liners & mascara, has produced black pigmentation of palpebral conjunctiva at the upper tarsal border after regular application ... /for @ least 2 yr./ ... Although there is lymphocytic infiltration & pigment is taken up by macrophages, deposits cause essentially no symptoms.

Grant, W.M. Toxicology of the Eye. 3rd ed. Springfield, IL: Charles C. Thomas Publisher, 1986., p. 178

► [Hazardous Substances Data Bank \(HSDB\)](#)

/SIGNS AND SYMPTOMS/ Long-term (chronic): Inhalation of carbon black can cause cough, phlegm, tiredness, chest pain, and headache. Dermal, mucosal, or inhalation exposure can cause irritation.

Mackison, F. W., R. S. Stricoff, and L. J. Partridge, Jr. (eds.). NIOSH/OSHA - Occupational Health Guidelines for Chemical Hazards. DHHS(NIOSH) Publication No. 81-123 (3 VOLS). Washington, DC: U.S. Government Printing Office, Jan. 1981.

► [Hazardous Substances Data Bank \(HSDB\)](#)

/SIGNS AND SYMPTOMS/ ... Most reports describe the effect of carbon black on the lung of human's certain changes which are typical for pneumoconiosis and changes that are suspected to become pneumoconiosis in the future. There were many studies describing carbon black pneumoconiosis from 1951 to 1994. This disease, therefore, has been considered as an occupational disease of workers exposed to carbon black in its production and usage.

[PMID:8829263](#)

Szozda R; J UOEH 18 (3): 223-8 (1996)

► [Hazardous Substances Data Bank \(HSDB\)](#)

For more Human Toxicity Excerpts (Complete) data for CARBON BLACK (49 total), please visit the [HSDB record page](#).

► [Hazardous Substances Data Bank \(HSDB\)](#)

9.1.14 Non-Human Toxicity Excerpts



/LABORATORY ANIMALS: Acute Exposure/ Ultrafine carbon black (ufCB) 14 nm in diameter and fine carbon black (CB) 260 nm in diameter were instilled intratracheally in rats at mass of 125 ug, and the bronchoalveolar lavage (BAL) profile at 6 hr was assessed. UfCB generated a 50% neutrophil alveolitis 6 hr after intratracheal instillation compared to CB, which showed similar activity to the phosphate-buffered saline (PBS) vehicle control. UfCB instillation also produced

a marked increase in lactate dehydrogenase (LDH) levels in BAL fluid, which was associated with increased epithelial permeability measured as total protein. In contrast, CB had much less of an effect in increasing BAL protein. Although both particle types caused a decrease in glutathione (GSH) in lung tissue compared to control, the greatest depletion was seen in ufCB-treated animals. To investigate time response, bronchoalveolar lavage was carried out at 6 hr, 24 hr, and 7 days after a single 125-ug instillation of ufCB. Neutrophil influx was relatively persistent and was still maintained 7 days later. Tumor necrosis factor (TNF) production by BAL leukocytes increased gradually postinstillation, whereas nitric oxide production became significantly higher at 24 h after instillation and remained at raised levels up to 7 days. Higher doses of CB caused more inflammation than the ufCB. Thus, in the instillation model, a localized dose of particle over a certain level causes the particle mass to dominate the response, rather than the surface area. In contrast to the effect of CB, which showed a dose-related increasing inflammatory response, ufCB at the highest dose caused less of a neutrophil influx than at the lower dose. Six hours after intratracheal instillation, the threshold dose for neutrophil influx occurred at 50 ug. Calculation of surface area of particles instilled suggested that this was likely to be an overload-inducing dose of particles, as gauged from recent experiments with inhaled particles. In summary, this study provides evidence in a rat instillation model that ufCB has greater ability than CB to produce lung inflammation and oxidant stress at a relatively low dose of 125 ug. At high doses, however, BAL is not a reliable indicator of pulmonary response, since the overall response seems to scale to mass or volume of instilled particulate without an influence of surface area.

[PMID:10477444](#)

Li XY et al; *Inhal Toxicol* 11 (8): 709-31 (1999)

► [Hazardous Substances Data Bank \(HSDB\)](#)

/LABORATORY ANIMALS: Acute Exposure/ Daily exposure to particulate matter (PM) is known to adversely affect cardiac function and is also known to be exaggerated with senescence. This study tests the hypothesis that cardiac function is uniquely altered by PM exposure in senescent mice. A mechanism for PM-induced cardiac effects is also postulated by examining the activity of nitric oxide synthase (NOS) and the generation of reactive oxygen species (ROS) in heart tissue. Echocardiography is performed in awake 18- and 28-mo-old mice at baseline and immediately following 3-hr exposures to either filtered air or carbon black (CB; approximately 400 ug/cu m) on 4 days. At 28 mo, left ventricular diameter at end-systole and end-diastole is significantly ($P < 0.05$) elevated, and fractional shortening is significantly reduced ($49 \pm 3\%$ vs. $56 \pm 3\%$) with CB exposure. In vivo hemodynamic measurements at 28 mo also demonstrate significant ($P < 0.05$) reductions in ejection fraction and increases in right ventricular and pulmonary vascular pressures following CB exposure. Functional changes at 28 mo are associated with increased ROS production as suggested by enhanced luminol activity. This elevated ROS production with aging and CB exposure is attributable to NOS uncoupling. Measurements of natriuretic peptide (atrial and brain) transcription and matrix

metalloproteinase (MMP2 and MMP9) activity in heart tissue are significantly ($P < 0.05$) amplified with senescence and exposure to CB, pointing to increased cardiac stress and remodeling. These results demonstrate that acute PM exposure reduces cardiac contractility in senescent mice, and this decline in function is associated with increased ROS production linked to NOS uncoupling.

PMID:18448608

Full text: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2494811>

Tankersley CG et al; *Am J Physiol* 295 (1): 252-63 (2008)

► **Hazardous Substances Data Bank (HSDB)**

/LABORATORY ANIMALS: Acute Exposure/ /It was/ hypothesized that heart-rate regulation during particulate matter (PM) exposure differs with senescence-dependent susceptibility owing to variation in autonomic nervous control. Heart rate (HR) and heart-rate variability (HRV) parameters were measured from 162 samples of 2-min electrocardiograph (ECG) recordings in age-matched healthy ($n = 5$) and terminally senescent ($n = 3$) AKR mice during 3-hr exposures to filtered-air (FA, day 1) and carbon black (CB, day 4; $<200 \text{ microg/m}^3$). On day 1, HR was significantly ($p < .01$) depressed during FA in terminally senescent mice. By day 4, HR was further slowed significantly ($p < .01$) due to the effects of CB exposure for 3 days. The combined effects of terminal senescence and CB exposure acted to depress HR to an average ($\pm$ SEM) 445 ± 40 bpm, or approximately 80 bpm lower compared to healthy HR responses. The change in rMSSD, an HRV parameter corresponding to relative influences of parasympathetic tone on HR, was significantly ($p < .01$) greater on day 1 and day 4 in terminally senescent mice compared to healthy mice. In contrast, the LF/HF ratio, an HRV parameter derived from spectral analysis indicating relative changes in cardiac sympathetic tone, was significantly ($p < .01$) depressed in terminally senescent mice on day 1. By day 4, significant increases in LF/HF were evident in healthy mice during CB exposure, suggesting that HR regulation was associated with an increase in sympathetic tone. Alternatively, terminally senescent mice appeared to modulate a lower HR without change in LF/HF ratio during CB exposure, suggesting an absence of sympathetic tone. In conclusion, older healthy mice increase cardiac sympathetic tone during PM exposure while terminally senescent mice show a greater PM-induced parasympathetic tone in regulating HR. The significance of the current results suggest that PM-induced HR regulatory changes may ultimately depend on the degree of physiological aging.

PMID:15204754

Tankersley CG et al; *Inhalat Toxicol* 16 (6-7): 381-90 (2004)

► **Hazardous Substances Data Bank (HSDB)**

/LABORATORY ANIMALS: Acute Exposure/ Rats were instilled with fine and ultrafine carbon black and titanium dioxide. Inflammation was quantified by bronchoalveolar lavage; the ability

of the macrophages to phagocytoses indicator fluorescent beads and to migrate towards aC5a were determined. ... Ultrafine particles induced more PMN recruitment, epithelial damage, and cytotoxicity than their fine counterparts, exposed at equal mass. Both ultrafine and fine particles significantly impaired the phagocytic ability of alveolar macrophages. Only ultrafine particle treatment significantly enhanced the sensitivity of alveolar macrophages to chemotact towards C5a. ...

[PMID:15090666](#)

Full text: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1740792>

Renwick LC et al; *Occupat Environ Med* 61 (5): 442-7 (2004)

► [Hazardous Substances Data Bank \(HSDB\)](#)

For more Non-Human Toxicity Excerpts (Complete) data for CARBON BLACK (53 total), please visit the [HSDB record page](#).

► [Hazardous Substances Data Bank \(HSDB\)](#)

9.1.15 Non-Human Toxicity Values



LD50 Rat oral /greater than/ 8000 mg/kg bw.

European Commission, *ESIS; IUCLID Dataset, Carbon Black (1333-86-4) p 71 (2000 CD-ROM edition)*.

Available from, as of March, 10 2009: <https://esis.jrc.ec.europa.eu/>

► [Hazardous Substances Data Bank \(HSDB\)](#)

9.1.16 Populations at Special Risk



... Lung diseases or conditions may influence the deposition and retention of particles such as carbon black. For instance, asthmatics had a higher total deposition of ultrafine carbon particles in the respiratory tract compared with healthy individuals. ...

IARC; *Carbon Black (Group 2B)/Prepublication copy from Monograph 93 posted February 27, 2006*.

Available at <https://monographs.iarc.fr/ENG/Meetings/93-carbonblack.pdf> on March 10, 2009

► [Hazardous Substances Data Bank \(HSDB\)](#)

9.2 Ecological Information



9.2.1 Artificial Pollution Sources



Particulate emissions from portable space heaters

Tu KW, Hinchliffe LE; Am Ind Hyg Assoc J 44 (11): 857-62 (1983)

► [Hazardous Substances Data Bank \(HSDB\)](#)

In the thermal and furnace process plants, systems of electrostatic precipitators, cyclones, and bag filters will collect over 99% of the black. The general procedure is to burn the waste gases from the furnace process after the black has been removed; the major /air/ pollutants after this has been completed are carbon and, if a sulfur containing fuel had been used, sulfur dioxide. ... In the channel process, the carbon is collected by impingement on long channel irons. Much of the carbon does not impinge in this way, however, and can escape to the atmosphere.

USEPA; Chemical Hazard Information Profile: Carbon Black p.69 (1976) EPA-560/11-80-011

► [Hazardous Substances Data Bank \(HSDB\)](#)

Sources of carbon black to the atmosphere other than from production processes mainly arise throughout maintenance procedures, leaks in plant conveying systems, or loading and unloading operations.

USEPA; Chemical Hazard Information Profile: Carbon Black p.69 (1976) EPA-560/11-80-011

► [Hazardous Substances Data Bank \(HSDB\)](#)

Since the bulk of carbon black produced is utilized as a reinforcing agent for rubber tires, the ultimate /release/ of carbon black into the environment comes through tire wear.

USEPA; Chemical Hazard Information Profile: Carbon Black p.70 (1976) EPA-560/11-80-011

► [Hazardous Substances Data Bank \(HSDB\)](#)

As automobiles passed a measuring point, the concentrations of carbon dioxide and aerosol black carbon in their dispersing exhaust plumes were recorded. After subtraction of background levels, the ratio of the increments of the species allows a calculation of the emission factor of aerosol black carbon per unit mass of fuel from each individual vehicle. These factors spanned a range of greater than two orders of magnitude, representing the emission of aerosol black carbon per gram of carbon consumed in the fuel. Their distribution showed that 20% of the vehicles accounted for 65% of the emissions. The real time measurement methodology allows for a determination of the distribution of emission factors across the actual population of sources. These results are similar to the wide range of carbon monoxide emission factors reported recently.

Hansen A DA, Rosen H; J Air Waste Manage Assoc 40 (12): 1654-7 (1990)

► [Hazardous Substances Data Bank \(HSDB\)](#)



9.2.2 Probable Routes of Human Exposure

NIOSH (NOES Survey 1981-1983) has statistically estimated that 1,728,518 workers (369,253 of these were female) were potentially exposed to carbon black in the US(1). Occupational exposure to carbon black may occur through inhalation and dermal contact with this compound at workplaces where carbon black is produced or used. Use data indicate that the general population may be exposed to carbon black via dermal contact with consumer products containing carbon black(SRC).

(1) NIOSH; NOES. National Occupational Exposure Survey conducted from 1981-1983. Estimated numbers of employees potentially exposed to specific agents by 2-digit standard industrial classification (SIC). Available at <https://www.cdc.gov/noes/> as of Mar 13, 2009.

► [Hazardous Substances Data Bank \(HSDB\)](#)

Inhalation and dermal exposure.

NIOSH; Pocket Guide to Chemical Hazards p.61 (1981) DHEW (NIOSH) Pub No. 78-210

► [Hazardous Substances Data Bank \(HSDB\)](#)

... EXPOSURE TO CARBON BLACK OCCURS AMONG ITS MANUFACTURERS & USERS, NOTABLY RUBBER & PAINT MAKERS.

Searle, C. E. (ed.). Chemical Carcinogens. ACS Monograph 173. Washington, DC: American Chemical Society, 1976., p. 318

► [Hazardous Substances Data Bank \(HSDB\)](#)

... Occupational exposure to carbon black is defined as any work involving exposure to carbon black at a concn > half the recommended environmental limit of 3.5 mg/cu m. ... Exposure to carbon black may occur during the production, processing, distribution, storage, and use of carbon black.

NIOSH; Criteria Document: Carbon Black p.1 (1978) DHEW Pub. NIOSH 78-204

► [Hazardous Substances Data Bank \(HSDB\)](#)

Most exposure to carbon black occurs in its production, particularly during pelletization, screening, bagging, hopper car loading, stacking and unloading. Exposure may also occur when equipment is cleaned, when leaks develop in the conveyor system, or when spills occur. The greatest carbon black release into the work environment was reported to occur when it was spilled before pelletization. In tire manufacture, exposure to carbon black may occur from leaks in the conveyor systems and Banbury mixers or during maintenance operations. ...

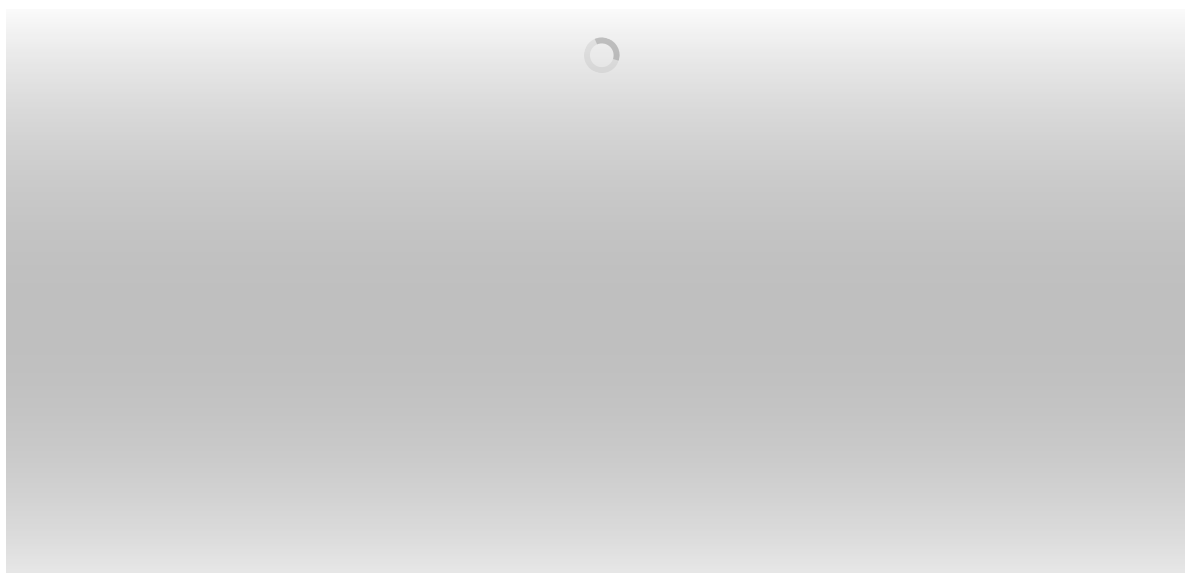
NIOSH; Criteria Document: Carbon Black p.60 (1978) DHEW Pub. NIOSH 78-204

► Hazardous Substances Data Bank (HSDB)

10 Literature



10.1 Consolidated References



► PubChem

11 Information Sources



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<https://pubchem.ncbi.nlm.nih.gov>

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Carbon black

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Carbon black

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Carbon black

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Carbon black

<https://echa.europa.eu/substance-information/-/substanceinfo/100.115.774>

Carbon black

<https://echa.europa.eu/substance-information/-/substanceinfo/100.114.008>

Carbon black

<https://echa.europa.eu/substance-information/-/substanceinfo/100.121.363>

Carbon black (EC: 215-609-9)

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<https://gsrs.ncats.nih.gov/ginas/app/beta/substances/4XYU5U00C4>

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<https://www.epa.govt.nz/industry-areas/hazardous-substances/guidance-for-importers-and-manufacturers/hazardous-substances-databases/>

15. NJDOH RTK Hazardous Substance List

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<http://nj.gov/health/eoh/rtkweb/documents/fs/0342.pdf>

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<https://www.cdc.gov/niosh-rtecs/FF588040.html>

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<https://www.cdc.gov/niosh/npg/npgd0102.html>

18. California Safe Cosmetics Program (CSCP) Product Database

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[https://pubchem.ncbi.nlm.nih.gov/compound/carbon black](https://pubchem.ncbi.nlm.nih.gov/compound/carbon%20black)

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<https://www.cdph.ca.gov/Pages/Conditions-of-Use.aspx>

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<https://cscpssearch.cdph.ca.gov/search/detailresult/1104>

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<https://www.whatsinproducts.com/contents/view/1/6>

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<https://www.whatsinproducts.com/chemicals/view/1/252/001333-86-4>

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<https://haz-map.com/About>

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<https://haz-map.com/Agents/342>

21. Hazardous Chemical Information System (HCIS), Safe Work Australia

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<http://hcis.safeworkaustralia.gov.au/HazardousChemical/Details?chemicalID=5353>

22. NITE-CMC

Carbon black - FY2009 (Revised classification)

<https://www.chem-info.nite.go.jp/chem/english/ghs/09-mhlw-2022e.html>

Carbon black - FY2006 (New/original classification)

<https://www.chem-info.nite.go.jp/chem/english/ghs/06-imcg-0692e.html>

Carbon black - FY2015 (Revised classification)

<https://www.chem-info.nite.go.jp/chem/english/ghs/15-mhlw-0083e.html>

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<https://www.nlm.nih.gov/research/umls/rxnorm/docs/termsofservice.html>

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<https://rxnav.nlm.nih.gov/id/rxnorm/2032>

25. Wikipedia

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https://en.wikipedia.org/wiki/Carbon_black