August 2019

PRODUCT STEWARDSHIP SUMMARY: CARBON BLACK

Overview

This Product Stewardship Summary provides a general overview of Cabot Corporation's carbon black grades, which include all BLACK PEARLS®, ELFTEX®, MOGUL®, MONARCH®, REGAL®, SPHERON®, STERLING®, VULCAN®, CSX™, CRX™, IRX™, FCX®, SHOBLACK®, DL®, PROPEL®, LITX®, and PBX® carbon black grades. Carbon black is used in tires, rubber and plastic products, printing inks and coatings. Approximately 90% of carbon black is used in rubber applications, 9% as a pigment, and the remaining 1% as an essential ingredient in hundreds of diverse applications.

Chemical Identity

Carbon black (CAS # 1333-86-4) is virtually pure elemental carbon that is in the form of aciniform (grape-like) aggregates. Carbon black is produced by subjecting heavy residual oil feedstock to extremely high temperatures in a carefully controlled combustion process. Depending on the manufacturing process, carbon blacks are categorized as furnace black, lampblack, acetylene black, channel black, gas black or thermal black. Carbon black is different from soot or black carbon, which are common terms applied to unwanted carbonaceous by-products resulting from the incomplete combustion of carbon-containing materials, such as oil, fuel oils, gasoline and coal. Most types of carbon black contain greater than 97% elemental carbon, whereas typically less than 60% of the total particle mass of soot or black carbon is composed of elemental carbon. Carbon black is also different from diamond and graphite, which are crystalline carbons; in contrast, carbon black is an amorphous carbon.

Physical and Chemical Properties

Carbon black is insoluble in water and organic solvents. Its vapor pressure is negligible. Carbon black is composed of fused primary particles called aggregates. The aggregates may consist of a few or hundreds of primary particles. The aggregates, in turn, can form more loosely associated agglomerates. To facilitate the ease of shipment and handling and to reduce dust creation, the agglomerates are often mixed with binders to form pellets. Carbon black pellets generally fall between 0.1 and 1.0 millimeters in size.

Uses

Traditionally, Cabot's carbon black has been used as a reinforcing agent in tires. Today, carbon black is also used in other industrial rubber products, like belts, hoses and gaskets. In addition to rubber products, Cabot's carbon black is used as a pigmenting, UV stabilizing and conductive agent in a variety of common and specialty products, including plastics (such as conductive packaging, films, fibers, moldings, pipes and semi-conductive cables), toners and printing inks, and coating applications. Carbon black produced by the high purity furnace black method has been approved by the U.S. Food & Drug Administration (FDA) for use as colorant for polymers in contact with food. Specific carbon black grades are approved for indirect food contact use within the European Union.

Health Effects

Carbon black has been the subject of extensive scientific health studies during the past several decades. Carbon black is classified by the International Agency for Research on Cancer (IARC) as a Group 2B carcinogen (possibly carcinogenic to humans) based on “sufficient evidence” in animals and “inadequate evidence” in humans (IARC, 2010). This classification is based on lung tumors observed in long-term inhalation studies in rats, but not in other animal species, such as mice and hamsters. Various studies suggest that the phenomenon of carcinogenicity in the rat lung is species-specific, resulting from persistent overloading of the rat lung with poorly soluble particles (ILSI, 2000). Conversely, mortality studies of carbon black manufacturing workers do not show an association between carbon black exposure and elevated lung cancer rates, or any other type of cancer. Worker studies indicate, however, that regular exposure to carbon black and other poorly soluble particles may play a role in declining lung capacity as measured by lung function tests; and may cause bronchitis symptoms after many years of exposure to carbon black.

Carbon black is not a chemical irritant, but may cause mechanical irritation of the throat, eyes and skin. It is not a skin sensitizer. Carbon black is not considered to be mutagenic.

Environmental Effects

Based on its physical/chemical properties (insolubility, no vapor pressure), carbon black released into the environment will be distributed mainly in soil or sediments. Elemental carbon is widely distributed in nature and is an essential element in the components of all living organisms. Since carbon black is not soluble in water, it is not possible to carry out many standard ecotoxicity tests for this substance. However, tests using carbon black suspensions or filtrates indicate that it has low toxicity to aquatic and terrestrial organisms in the environment. Since carbon black is an inert solid, it does not have adverse biodegradability and is not bioaccumulative.

Exposure Potential

Carbon black is used in a wide variety of consumer products, such as tires, various rubber products, surface coatings, inks and in toners. In all of these products the carbon black is bound into a matrix. Thus, it has been concluded by IARC and other organizations that consumer exposures to carbon black in the use of these products is negligible (IARC, 2010).

Potential exposure to carbon black could occur in the workplace. However, workplace exposures are appropriately managed with engineering controls and personal protective equipment. As there are many different occupational exposure limits for carbon black, in its facilities globally, Cabot Corporation manages to the occupational exposure limit recommended by the American Conference of Governmental Industrial Hygienists (ACGIH) of 3 mg/m^3 inhalable (ACGIH, 2011). This value is the most stringent occupational exposure limit for the countries in which Cabot operates.

Risk Management

Risk is measured as a function of both hazard and exposure. If the hazard and/or exposure are low, the potential for risk is low. IARC’s listing of carbon black as a Group 2B carcinogen is based on laboratory rat studies only; studies on carbon black production workers have not shown a link between carbon black exposure and cancer. Studies indicate that carbon black has low hazard for both humans and the environment. Carbon black exposure to workers is controlled through engineering controls and

personal protective equipment. Consumer exposure to carbon black is negligible. Therefore, carbon black is considered to pose a low risk to humans and the environment.

Cabot Corporation Contacts

We appreciate your interest in carbon black. If you need additional information, please feel free to contact Cabot's Product Support and Toxicology Group at regulatory.inquiries@cabotcorp.com

Disclaimer

This Product Stewardship Summary is intended to provide the general public with an overview of this chemical substance. It is not intended to provide emergency response, medical or treatment information. In-depth safety and health information can be found on the current Safety Data Sheet (SDS) for the product.

References

ACGIH. 2011. Carbon Black: TLV® Chemical Substances 7th Edition Documentation. Publication #7DOC-106. ACGIH®, 1330 Kemper Meadow Drive, Cincinnati, OH 45240-1634.

IARC. 2010. IARC Monographs on the Evaluation of Carcinogenic Risks to Humans. Volume 93 - Carbon Black, Titanium Dioxide, and Talc. World Health Organization, International Agency for Research on Cancer, Lyons, France. [http://monographs.iarc.fr/ENG/Monographs/vol93/mono93-1.pdf]

ILSI (2000). ILSI Report. The relevance of the rat lung response to particle overload for human risk assessment: A workshop consensus report. ILSI Sponsored Workshop, March, 1998. Inhal Toxicol 12, 1-17.

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