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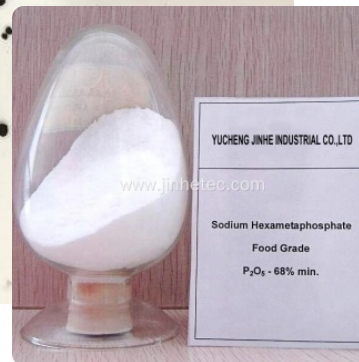
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1. What is Carbon Black?

Carbon black, also known as carbon black, is an amorphous carbon. Light, loose and very fine black powder can be imagined as pot bottom ash. It is the product of incomplete combustion or thermal decomposition of carbonaceous substances (coal, natural gas, heavy oil, fuel oil, etc.) under the condition of insufficient air.

Carbon black is the first nano material developed, applied and produced by human beings. It is listed as one of

<https://www.jinhete.com/blog/overview-of-carbon-black-industry-in-china-53773.html>

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25 basic chemical products and fine chemical products in the international chemical field. Carbon black industry is of great significance to tire industry, dyeing and chemical industry and improving the quality of civil life products.

2. What are the classifications of carbon black?

Carbon black is classified according to its manufacturing methods: contact method carbon black, furnace carbon black, new process carbon black, hot cracking carbon black, spray carbon black, and trough carbon black.

Carbon black is divided into hard carbon black and soft carbon black according to its function; The particle size of hard carbon black is less than 40nm and that of soft carbon black is more than 40nm.

Carbon black is divided into rubber carbon black, [Pigment Carbon Black](#), conductive carbon black and special carbon black. Among them, pigment carbon black can be divided into many kinds, such as carbon black for ink, carbon black for coating, carbon black for [Color Masterbatch](#), etc

Carbon black is classified into super wear-resistant carbon black, medium super wear-resistant carbon black, super wear-resistant carbon black, fine particle furnace black, quick pressing furnace black, general furnace black, high elongation furnace black, semi reinforced furnace black, fine particle hot cracking carbon black, medium particle hot cracking carbon black, easy mixing tank black and miscible tank black according to its service performance.

Types of white carbon black: white carbon black mainly refers to synthetic silica, which is not a product with carbon black. White carbon black is divided into gas-phase white carbon black and precipitated white carbon black.

According to its conductivity and manufacturing method, conductive carbon black can be divided into: conductive tank black (CC), conductive furnace carbon black (CF), superconducting furnace carbon black (SCF), special conductive furnace carbon black (XCF), etc. Acetylene carbon black (ACEF) is also a carbon black with good conductivity.

Carbon black is classified according to ASTM standard. China began to use American ASTM 1765-81 classification and naming in the 1980s. The nomenclature consists of four digits. The first symbol is n or s, representing the vulcanization rate. Where n represents the normal vulcanization rate; S indicates slow vulcanization speed. The N or s symbol is followed by three numbers, and the first number represents the average particle size range of carbon black; The second and third digits have no clear meaning and represent the differences between different brands in each series.

3. What are the uses of carbon black

3.1 carbon black

Carbon black is an indispensable chemical raw material. Carbon black has a great application in our daily life. It has its shadow in automobile tires, inks, coatings, batteries and other raw materials around us. Carbon black is usually divided into pigment carbon black, rubber carbon black, conductive carbon black and special carbon black.

Application fields of carbon black:

rubber

Carbon black is an important reinforcing agent in rubber products. It can improve the wear performance of tires and improve the tensile strength and tear strength of rubber. About 75% of the carbon black used in rubber is used to make tires, and the rest is used to make rubber hoses, tapes, etc.

printing ink

Carbon black is mainly used in black pigment, and pigment carbon black is mainly used in ink, because the blackness and hue of pigment carbon black are much stronger than ordinary carbon black.

Plastic

Carbon black is mainly used in plastics to prevent ultraviolet aging and conduct electricity.

In addition, carbon black also plays an important role in synthetic leather, coatings, batteries, printing and dyeing, gunpowder, etc.

3.2 white carbon black



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Iron oxide yellow,
composite iron green, iron
oxide black, iron oxide
orange, ultramarine, iron
oxide blue, iron oxide
pigment

White carbon black is modified silica. White carbon black is the general term of white powder X-ray amorphous silica and silicate products, mainly refers to precipitated silica, fumed silica and ultrafine silica gel, also includes powdered synthesis of aluminum silicate and silicate.

In fact, white carbon black and carbon black are two completely different substances. The reason why they are named white carbon black is mainly because they have great similarity with carbon black in reinforcing function. The main component of white carbon black is silica, but it is also different from ordinary silica. White carbon black is activated silica after physical and chemical modification.

Silica is more widely used. Its chemical molecular formula is SiO_2 , which is named because it is similar to carbon black and white. Taking advantage of its reinforcement, dispersibility, five poisons, tasteless, porous, thickening and other characteristics, it is mainly used as filling and reinforcing agent in rubber and plastic products, as carrier for adding drugs and nutrients in feed processing and drug processing, as well as in salt processing, pepper flour processing. It can be used in toothpaste to increase friction, etc. The specific application fields are as follows:

3.2.1 tire industry

The use of white carbon black in tire tread rubber, especially the combination of high dispersion precipitation white carbon black and coupling agent, can simultaneously improve tire life (improve wear resistance) and safety (improve wet skid resistance) and reduce fuel consumption (reduce rolling resistance). In addition, the application of precipitated silica in tire carcass and belt layer can improve the adhesion between rubber and steel cord; Replacing carbon black with white carbon black in tire sidewall rubber can greatly improve the durability, flexion resistance and impact resistance of the compound.

3.2.2 rubber shoes and other rubber products

Silica has high black-and-white degree and fine particles. The vulcanizate made of silica has high transparency and can improve the comprehensive physical properties of the compound. Therefore, as the main reinforcing filler, silica is widely used in the production of rubber shoes, especially in transparent and translucent sole adhesives.

In the production of tape, in order to improve its wear resistance, a large amount of white carbon black is added. At the same time, silanol on the surface of white carbon black plays a role in improving the wetting degree of rubber and fabric, which is conducive to the diffusion and penetration of rubber. In addition to the above products, silica is also used in rubber rollers, rubber hoses, rubber plates, wires and cables, rubber parts in household appliances and sporting goods.

5.1 main production mode of carbon black at present

The carbon black industry has a history of about 100 years. The specific process can be summarized as follows:

- (1) . The initial stage of carbon black industry: natural gas is used as raw material, and the main production method is tank method. The equipment volume is huge and the output is low.
- (2) In the 1940s, furnace process carbon black, including oil furnace process and gas furnace process. This production method reduces the volume of equipment and increases the output, but the quality is not as good as that of tank carbon black.
- (3) . In the 1950s, China first began to produce tank carbon black in Fushun and Sichuan, and furnace carbon black in the 1960s. From the 1980s to 1990s, Tianjin carbon black factory introduced 15000 tons of carbon black hard wire from the mainland of the United States in 1985. Later, Tianjin carbon black plant, Fushun Chemical Plant and carbon black Research Institute absorbed and transformed the introduced production line.

5.2 at present, the mainstream production method of carbon black is furnace method.

Characteristics of furnace carbon black: furnace carbon black has high elongation, low heat generation, high elasticity and good aging resistance. It is mostly used in various rubber products for carcass buffer rubber and cord fabric rubber. It is mainly used in tire cloth layer, lower layer of tread, sidewall and inner tube. Furnace method is also divided into oil furnace method and gas furnace method. The production process of oil furnace method carbon black: under controlled conditions, coal tar, scallion oil, anticorrosive oil, ethylene tar and other liquid hydrocarbon raw materials are sprayed into a special reaction furnace, and a kind of carbon black is generated by incomplete combustion and cracking in an appropriate amount of air. After being generated, the carbon black is suspended in the flue gas, and the finished product is prepared by cooling, collecting, refining and granulation. Production process of carbon black by gas furnace method: under controlled conditions, gaseous hydrocarbon raw materials such as natural gas and oilfield gas are sprayed into a special reaction furnace and partially burned and cracked in an appropriate amount of air. After being generated, the carbon black is suspended in the flue gas, and the finished product is prepared by cooling, collecting, refining and

October 21, 2024



The price of carbon black has significantly increased since October!
September 26, 2024



granulation.

Comparative characteristics of gas furnace carbon black and oil furnace carbon black: oil furnace carbon black has large output, low cost, many varieties, low energy consumption and high yield. It is the most important carbon black production method.

5.3 carbon black granulation

Carbon black finished products are very fine powder, which is inconvenient for packaging, transportation and processing. Therefore, most of the carbon black products sold on the market need to process the powder into granules, except for a few pigment carbon black for dyeing. At present, there are two granulation processes, one is dry granulation, the other is wet granulation. Dry granulation is to continuously pass carbon black through a rotating cylinder to make powdered carbon black become spherical particles due to its physical cohesion. Dry granulation has simple equipment and low granulation cost, but the particle strength is low, and the carbon black particles are easy to be broken in the process of bulk transportation.

Wet granulation is to mix carbon black with a certain proportion of granulation water, mix, wet and stir in the stirred wet granulator, and then dry after granulation to become granular carbon black products. This method has good particle fastness and can be transported in bulk.

6. Influencing factors of carbon black price

The price of carbon black is mainly affected by the price of upstream raw materials and the supply and demand of carbon black market. At present, the upstream raw materials in China are mainly coal tar. The price of coal tar has a decisive impact on the production cost of carbon black, followed by the price of oil. In terms of supply and demand, it is mainly affected by the demand of domestic tire industry.

3.2.3 plastic modification and products

In the plastic industry, the use of white carbon black has light transmission and small particle size, which can make the plastic more dense. Not only improve its transparency, strength and toughness, but also improve waterproof, anti-aging properties, hardness and smoothness.

3.2.4 silicone rubber

The application of silicone rubber began with the emergence of white carbon black. Silicone rubber has high heat resistance, excellent cold resistance, ozone resistance, aging resistance and atmospheric aging resistance, as well as excellent electrical insulation. Due to the above characteristics, silicone rubber is widely used in aerospace, electronic industry and other industries. The price of fumed silica is high. Using precipitated silica with relatively low price instead of fumed silica can be used in the production of low-grade silicone rubber.

3.2.5 pharmaceutical industry

White carbon black has physiological inertia, high absorption, dispersion and thickening, and is widely used in pharmaceutical preparations. For example, quasi biotin E powder now uses white carbon black as carrier, toothpaste and other additives.

3.2.6 pesticide industry

The main function of white carbon black in the pesticide industry is as a carrier to improve fluidity and prevent caking. At present, white carbon black is mainly used in all kinds of wettable powders.

3.2.7 application in ink

White carbon black mainly plays a thickening role in the ink and is used to control the flow of printing ink. It is also used to control the flow of printer ink so that it can not flow or hang arbitrarily, so as to obtain clear printing.

3.2.8 in the pigment and dye industry

Silica can overcome the shortcomings of poor light resistance, heat resistance, solvent resistance and migration resistance of [Organic Pigments](#) (dyes) although they have bright colors and strong coloring power. By adding nano silica to surface modification of organic pigments, not only the aging resistance of pigments was greatly improved, but also the brightness, hue and saturation were increased to a certain extent, which greatly broadened the grading and application scope of organic pigments.

Carbon black is a rubber reinforcing filler and the second rubber raw material after raw rubber. At the same time, carbon black can be used as colorant, UV shielding agent, antistatic agent or conductive agent. It is widely used in many industries such as plastics, chemical fiber, ink, coating, electronic components, leather chemical industry and dry battery. As a high-purity carbon material, carbon black can also be used in metallurgy and carbon material industries.



4. Industrial chain of carbon black

4.1 carbon black upstream industry

The main raw materials for carbon black production are coal tar, ethylene tar and other raw oil. Coal tar is a by-product of coking; Ethylene tar is a by-product of ethylene from petroleum refining. Therefore, the upstream of carbon black industry is coal chemical industry and petrochemical industry.

According to statistics, the main components of carbon black raw oil in China are coal tar, anthracene oil and ethylene tar, accounting for 49.2%, 34.2% and 16.6% of the total raw materials respectively. Among them, coal tar and anthracene oil account for more than 80% and are the main raw oil. Therefore, the domestic carbon black industry is greatly affected by the coal chemical industry.

The impact of upstream industry on carbon black industry is mainly reflected in the price of raw oil. As anthracene oil is a downstream product of coal tar, its price mainly depends on the price of coal tar. Therefore, the price of coal tar largely determines the production cost of carbon black, and has the most obvious impact on the production of carbon black. The production and market concentration of China's coal tar industry is low, but the coal tar processing scale of a single company is expanding.

Price relationship formula between carbon black and coal tar:

Price of coal tar * 1.65 + 1000 yuan / ton = basic price of carbon black

The traditional main production areas of China's coal tar processing industry are concentrated in the north, with Hebei Province, Shanxi Province and Shandong Province accounting for 53.4%. In addition, the regional production capacity of Henan, Xinjiang, Inner Mongolia and other provinces is more than one million tons; It is worth noting that with the construction of new units in Guangxi, the southwest will also become an important production area of coal tar processing industry in the future.

Coal is mainly distributed in North China and East China, accounting for 18% of China's coal processing demand, which is mainly concentrated in North China and Shandong, accounting for 24% of China's coal processing demand.

According to market research data: from January to May 2020, the domestic coal tar deep processing capacity was 10.34 million tons, including 4.54 million tons in North China (accounting for 44%), 2.26 million tons in East China (accounting for 22%), 980,000 tons in Northwest China (accounting for 9%), 1.27 million tons in Central China (accounting for 12%), 620,000 tons in Southwest China (accounting for 6%), 530,000 tons in Northeast China (accounting for 5%) and 160,000 tons in South China (accounting for 2%).

Carbon black is the downstream product with the largest consumption of coal tar, accounting for about 26% of its total consumption.

4.2 downstream related industries of carbon black

Carbon black (except white carbon black) is mainly used as rubber reinforcing agent and filler, and its consumption accounts for about half of the rubber consumption in the whole rubber products. Rubber carbon black accounts for 94% of the total carbon black, of which about 60% is used in tire manufacturing.

At present, the overall development pattern of China's tire industry is the rapid development of the whole industry. With the structural adjustment and industrial upgrading, radial tire, as the development direction of tire industry, will gradually replace the traditional bias tire. With the continuous improvement of the radial rate of China's tire industry, a large number of high-grade and stable quality carbon black are needed. Large carbon black manufacturers with scale and technical advantages in China will benefit from the adjustment of industrial structure.

With the development of China's tire industry, the scale concentration of tire enterprises has gradually increased, which is conducive to carbon black enterprises to give full play to their marketing advantages. At present, domestic carbon black consumption is mainly concentrated in Bohai Bay and Yangtze River Delta. Enterprises will share the advantages of industrial scale and technology upgrading in the future.

In addition to rubber products, carbon black is also used as a colorant for inks, coatings and plastics and as a UV shielding agent for plastic products. It is also an important additive in many other products, such as electrodes, dry batteries, resistors, explosives, cosmetics and polishing pastes.

4.3 domestic carbon black production capacity

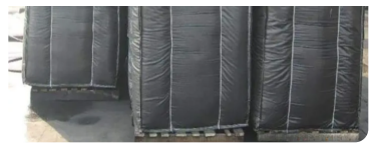
Statistics show that the growth rate of global carbon black industry market scale in the first three quarters of 2015-2020 is between - 30% - 25%, with large fluctuations. In 2015, the global market scale of carbon black industry was 69.7 billion yuan. In 2019, the market scale of the global carbon black industry reached 94.1 billion yuan, with a year-on-year increase of 2.9%.



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