

Introduction of rubber antiaging agent and its types and functions

Detail Introduction :

What is rubber anti-aging agent?

Rubber and its products in the long-term storage and use of the process, because of heat, oxygen, variable metal ions, mechanical stress, light, high-energy rays, as well as other chemical substances erosion, will gradually become sticky, hard brittle or cracked. This decrease in physical and mechanical properties and elasticity over time is called aging. With the aging process and development, the performance of rubber and its products will gradually reduce to completely lose the use value. To this end, it is necessary to add some chemical substances in rubber and its products to improve its resistance to all kinds of aging, delay or inhibit the aging process, so as to extend the storage period and service life of rubber products, this kind of substance is called antiaging agent.



Antiaging agent classification by chemical structure, can be divided into the following 5 categories

1. Amine antiaging agent (subdivided into 6 categories: aldehyde amine antiaging agent, ketone amine antiaging agent, two aryl secondary amine, phenylenediamine, diphenylaniline, alkyl aryl secondary amine)
2. Phenolic antiaging agents (divided into monophenol, bisphenol, polyphenol)
3. Heterocyclic anti-aging agent
4. Phosphite ester anti-aging agent
5. Other types of antiaging agent (long-acting antiaging agent, nickel salt, wax, thiourea, newly discovered antiaging agent)

Antiaging agent effect and representative products

1. Amine anti-aging agent

The most prominent protective effect, the most varieties. Main protective effects: thermal oxygen aging, ozone aging, catalytic oxidation of hot heavy metals and ultraviolet light and fatigue aging have significant protective effects. The protective effect of this kind of antiaging agent is incomparable to phenolic antiaging agent, far better than phenolic antiaging agent. Disadvantages: pollution, not suitable for white or light-colored rubber products. The molecular structure of the stabilizer contains amino (NH_2 , $-\text{NH}-$ and $-\text{N}-$), and some varieties can directly generate carcinogenic substance, nitrosamines, some species can also generate carcinogens produced, some varieties can also cause serious color change in rubber products, rubber products are easy to form a bloom phenomenon, at the same time have a polluting, irritating to human body in varying degrees. So this kind of product can only be used in dark or black rubber products. The main varieties are: antiaging agent D (D), antiaging agent A (A), antiaging agent DNP, antiaging agent 4010NA/IPPD, antiaging agent 4020/6PPD, antiaging agent TMQ/RD, antiaging agent BLE.

1.1 Aldehyde amine antiaging agent. It is the reaction product of aliphatic aldehyde and primary amine. It is the oldest category of antiaging agent. Aldehyde amine antiaging agent is effective against aging caused by heat, oxygen and light. There are anti-aging agents AH and AP.

1.2 Ketone amine antiaging agent. It has the best effect of anti-aging agent. There are: anti-aging agent AW, anti-aging agent BLE.

1.3 Diaryl secondary amine antiaging agent. This is one of the ancient varieties, A few days ago, diaryl secondary amine antiaging agents still ranked the first, antiaging agent D (D), antiaging agent A (A), antiaging agent DNP.

1.4 P-phenylenediamine antiaging agent. Including the most important kind of antiaging agent, but also the most promising kind of antiaging agent. There are 4010NA/IPPD, 4020/6ppD, 4010/CPPD, ODA, DPPD, 7PPD, 3100/DTPD, 445.

1.5 Diphenylamine antiaging agent. Fewer varieties, less outstanding performance in application. Diphenylamine itself is a good anti-aging agent, but it is very easy to volatilize, usually its derivatives as anti-aging agent, the main varieties are 4,4-dimethoxy diphenylamine, with outstanding performance of fatigue aging.

1.6 Alkyl aryl secondary amine antiaging agent. This kind of antiaging agent is less polluting and can be used for light-colored products, but the protection effect is poor. The main varieties are anti-aging agent BLE, anti-aging agent CMA.



Tyre



Shoes



Rubber Be



Rubber Gloves



Rubber Tape



Rubber W

2. Phenolic antiaging agents

Phenolic antioxidant protection and other stabilizer are not as good as amine stabilizer, only outstanding performance of the pollution, not change color, no pollution, no spray frost, but the protective protective effect in general, the price is expensive, little consumption, in Western Europe, antioxidant account for only 8.1% antiager, while China accounted for only 6%. Phenolic antiaging molecular structure contains phenolic base, will not produce harmful substances to human body, but non-toxic additives, can be used in the food industry and contact with rubber products (animals), but of antiaging agent has peculiar smell, poor storage safety, easy to deteriorate conditions. Representative products are antiaging agent 2246, antiaging agent BHT (264), antiaging BHA.

3. Heterocyclic anti-aging agent (sulfur type)

It has good non-discoloration and good thermal oxidation resistance. It is best to be used with other aging agents. But there is a bitter taste, slightly pollution, large amount of easy to produce spray frost at the same time to vulcanization (in addition to chloroprene rubber) has delayed effect, belongs to environmental protection products, in the rubber industry, less consumption. There are anti-aging agents: anti-aging agent MMB, anti-aging agent MBZ, anti-aging agent MMBZ.

4. Phosphite ester anti-aging agent

It has good stability and thermal oxidation resistance, as well as certain plasticity, but it has certain odor and estrogen-like sex, and is also easy to spray frost, which is greatly limited in the rubber industry. There is the anti-aging agent TNP. Phosphite hydroperoxide decomposers and free radical scavengers which play an auxiliary antioxidant role in polymer systems. They are mostly used with hindered phenols, rarely used alone.

5. Other kinds of anti-aging agents

5.1 Long-acting anti-aging agent. When rubber products are used in high temperature and high humidity environment, the antiaging agent in rubber will reduce or lose its protective effect because of volatilization. And if rubber products are used in contact with liquid medium for a long time, they will lose or lose protective efficacy because of rapid extraction. For this development of non-volatile or low volatility or non-extraction or low extraction type of antiaging agent, according to the current open products are: diphenylamine (NDPA), allyl substituted phenol (TAP) and so on.

5.2 Nickel salt antiaging agent. There are anti-aging agent NDBC, anti-aging agent NDIBC, anti-aging agent NDMC. All green powder. With good ozone resistance and thermal oxidation resistance, expensive nickel on the earth less storage, but a wide range of uses), but also a certain toxicity, deep color, easy to spray frost, not suitable for light color rubber products, in the rubber industry consumption is very few.

5.3 Wax anti-aging agents. When the amount of the rubber in excess of the solubility in rubber, vulcanizate is transferred to the surface, forming a layer of protective film, can effectively prevent static ozone aging products, paraffin wax, microcrystalline wax.

5.4 Thiourea antiaging agents. Thiourea organic thiourea derivatives were first used as vulcanizing promoters of oxygen-containing rubber in the rubber industry. With the application research, it is found that they have good anti-ozone aging properties on other rubber besides chlorine rubber. Thiourea derivatives agents have good ozone aging resistance and thermal oxidation resistance under dynamic aging conditions, and can significantly improve the service life of rubber products. This kind of product is tasteless, non-pollution, non-frosting, can be used in white or black products, belongs to the environmental harmless green variety, especially suitable for light colored products and food, medicine, health products, rubber industry has a huge market potential. Representative products are DBTU, DETU, and their derivatives.

5.5 Newly developed anti-aging agent. Lactam derivatives, non-flexion (anti-flexion)LAS(LAS-P), triazine derivatives, 6-QDI, Durazone³⁷ and other types