

THE PRESENT SITUATION AND DEVELOPING DIRECTION OF THE BROMIDE FLAME RETARDANTS IN CHINA

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Abstract: The merits and demerits of the bromide flame retardants, and the present situation and developing direction of the bromide flame retardants in my country were introduced..

Key words: bromine; flame retardants; bromide flame retardant

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1 Foreword

Flame retardants is a the type can obstruct the high polymer material combustion and repress the output function of harmful air of smoke and poisons to help effectively, the tallest Performance Price Ratio flame retardant should be currently bromide flame retardant(BFR). Bromide flame retardants (BFR) is currently in the world the yield is biggest and consumes the quantity biggest, one of the tallest organic flame retardants in the efficiency flame retardants.

In recent years, along with synthesize the quick development of the material, synthesize the plastics, rubber, fiber to be apply in more and more in the each section of the national economy and the production life of the peoples, but at the same time, a fire that high polymer to is ignite is increase .Therefore, bromide flame retardant(BFR) and the importance of the material flame retardants have already leave no room for doubt. Since our country the production condition of the bromide flame retardant currently to see, was from the species and quantities regardless, all compared to have the bigger development in early years, was an our country to join the WTO on the other hand, export the product to request to the function flame retardants strictly, especially the plastics of the electronics product, requesting to attain up

the international standard of flame retardants; On the other hand, 《 Fire Prevention Regulations 》 got to carry through the implement in the domestic, accompany with public security official's department especially 《the burnable function request and markings of the flame in the public place products 》 the establishment of the standard, will further urge the production of bromide flame retardants (BFR) can fast fierce development.

2 The characteristics of bromide flame retardants (BFR)

2.1 The advantage of bromide flame retardants (BFR)

Bromide flame retardants (BFR) is the retard efficiency high, apply extensively, heat-proof good, the water solution stability is excellent, can satisfy the variety high polymer the usage request that the thing processes the craft and the product flame retardants , and the raw material source is ample, the manufacturing craft is mature, the price is cheap. Is bromide flame retardants (BFR) that comes together the type particularly is also to have the special advantage. Bromide flame retardants that comes together is an additive of the high polymer, with high polymer to have the good compatibility, have the hot stability of excellent light, mobility good, the craft adaptability is good; Burn can't produce a injurious halogenide, not poisonous, include its terminal application product, scope of

world inside did not forbid the laws; Model to the thin wall and complicated ware more easily, be advantageous to shorten to model the period, the exaltation produces the effect; Can carry on the recovery and repetition usages; Can attain the flame retardant standard of UL94, V-0 class. Moreover, Through controlling polyreaction can control effectively the molecular weight of low polymer, the formation has the dissimilarity to the soften temperature low polymer, adapting the need of different material^[1]

2.2 The weakness of bromide flame retardants (BFR)

High polymer adding bromide flame retardants produce more smoke, poisonous air and the causticity air, lower the light stability of the basic material, some bromide flame retardants to an easy exudation. The next in order, bromide flame retardants (BFR) generally with the oxidize stibium make the combustion of the material living the amount of smoke higher. Bromide flame retardant(BFR) has many weakness, but because bromide flame retardants is the tallest Performance Price Ratio to occupy the prominent position in the realm flame retardants. At a lot of applied realms, return hard find out the substitute of bromide flame retardant(BFR)^[1].

3 the present situation of the bromide flame retardants in my country

Currently the production of the bromide flame retardants is to take Shandong, Jiangsu as the center, the main product contain Pentabromophenyl ether (DBDPO)、raBromoBisphenol A、Tetrabromobisphenol A (TBBA)、1,2,5,6,9,10-Hexabromocyclododecane (HBCD) etc., the production present situation of each product is that.^[2]

3.1 Pentabromophenyl ether (DBDPO)

The output and use of Pentabromophenyl ether (DBDPO) are biggest in the yield of the bromide flame retardants, productions of DBDPO increas quickly in the our country, to be close to 25,000 tons volume of production this year. Because export the quantity and will not take place the obvious variety, therefore, Pentabromophenyl ether (DBDPO) will face to the situation of oversupply. Currently the quantity of Pentabromophenyl ether (DBDPO) of our country with the import product to compare, the margin lies in:(1) the more bromine content leave in the product;(2)

The content of iron is high;(3)The long-term storage stability is worse. Therefore still need the improvement and raise in the craft technique, production control...etc., after further working well the product processing, then can on the quantity with import the product to match.

3.2 TetraBromoBisphenol A or (2,3-Dibromopropyl)ether

TetraBromoBisphenol A are a kind of additive bromide flame retardants, occupying the important position in a market of the flame retardants. In our country TetraBromoBisphenol A is equal with foreign product basically, but the outside shape of the products should be improve, the foreign product has already changed from traditional powder form to the globosity, near two years have already also researched to TetraBromoBisphenol A of a globosity, win the market approbation.

3.3 1,2,5,6,9,10-Hexabromocyclododecane (HBCD)

HBCD are a kind of high bromide content aliphatic bromide flame retardants, it is the smallest affect to the polymer function, guaranteed the good function of the polymer, the result flame retardants of that product is higher to the bromide aromatic flame retardants, the hot stability is higher to the bromide aliphatic flame retardants. HBCD's hot stabilities affect the usage result in the process of the flame retardant prodcut. But HBCD of heat-proof can keep the stable structure in the high polymer, and burn will not produce too many smokes. In addition, a path of HBCD should distribute within the scope of more stable, this also is HBCD to need to be improve in our country.

3.4 Tetrabromobisphenol A (TBBA)

TBBA are a kind of the reaction bromide flame retardants, is also a main species of reaction flame retardants in our country. Currently the product ability is in 30,000 tons or so. But the quantity of TBBA in our country compare the foreign product slightly bad, the quantity and function of product taking it as the raw material to make into are more bad, restrict the development and produce of TBBA derivative of the heat-proof, process and the health safety high, such as the TBBA-PC polymers is no to produce domestic. Therefore our country should further strengthen the technique reformation, the product quantity that raises TBBA to satisfy the demand of the market.

3.5 1,2-Bis(pentabromophenyl) ethane

(DBDPE)

DBDPE are substitutes of DBDPO, DBDPE produce first in the Albemarle Corporation, and the craft already gradually perfect. In our country, DBDPE already experiment with the industry at the end of 2002 years successfully, have already throw in to produce now but the production is not high. DBDPE are in accordance with the molecular weights of DBDPO, and contain the amount of bromine equally, so the function flame retardants basically, however the heat-proof, bear-light and the characteristics of difficult exudation of DBDPE is better than DBDPO, it is most valuable that its plastics can recover the usage, this is many bromide flame retardant(BFR) not have the characteristics. In addition, its usage will not produce harmful halogenide of the comment is in succession generation. Therefore, DBDPE is welcome to the flame retardants factory in our country. The current price compares DBDPE high 3000 of DBDPO ether. DBDPE with its good function, have the competition ability very much in a market of the flame retardants, is a kind of flame retardants that has the extensive applied foreground.

3.6 Bromide Epoxy resin

The successful research of bromide epoxy resin, the technique flame retardants of hot-solid resin have the best choice. Before the bromine content of Bromide Epoxy resin that produce in our country is low, the molecular weight is small. As the material to insulates and infuse, use for the profession of covering copper coin. The bromide epoxy resin is the high bromine content, the great molecular weight, and is a kind of white or near white powder, have the aging function of higher, hot stability, and did not spray the frost phenomenon(have no the exudation), purple outside stability higher and have no causticity.

According to the demand of different customer, it can synthesize for the product of the molecular weight dissimilarity(molecular weight is 6000 or so, 10000 or so, 20000 or so, 30000 or so), according to the molecular weight of the hing polymer, choice the bromide epoxy resin, can attain the best result flame retardants and good comprehensive functions. Currently, that product have be produced in our country, forcing the foreign of the same kind product to adjust under the sale price of China.

4 The developing direction of the bromide

flame retardants in my country

Because bromide flame retardant(BFR) has superior function on the result flame retardants currently, though the bromide flame retardants to exist various issues to, this kind of issue want to become the consensus of the world or the restriction order of the government, still has already need for decade perhaps even few decades. But be a product, have already can become one circulation of produce and sale within decade. Therefore, the development of a new product of bromide flame retardants (BFR) is still prosperous, the development trend that has a new product of the bromide flame retardants is as follows.

4.1 Dibromoneopentyl glycol(DBNPG)

DBNPG are bromide flame retardants(BFR) that develop out first abroad at the 70's in 20 century, but in our country it is to research to manufacture a that product at 90's middle period in 20 centuries, the industrialization scale produces to still have the certain difficulty, up to now still only a little amount factory then can produce.

DBNPG is a kind of reaction flame retardant that it has the more extensive applications. because it has tripropylene glycol and acid anhydride, it can produce the resin of the different bromine content and saturation degree. It act for acid anhydride to, used to a reaction flame retardant of PU, making the resin have the chemistry causticity of bear, the heat of the minimum degree fade in color and good ray stability, its machine mechanics function is outstanding. If imply 10% in unsaturated resin, the oxygen index number of it can attain 26.4, but the oxygen index number with bromine quantity for 15% of unsaturated bromophthal resin only is 22.9; a strength and flexible strengths of unsaturated polyester with bromine quantity for 10% also can attain the level of unsaturated unhalogenide polyester^[3].

4.2 Dibromoneopentyl glycol phosphate、Dibromoneopentyl glycol phosphate acylamide

A research of the flame retardants is to make use of a different function mechanism, learn from others's strong points to offset one's own weaknesses, mutual complement, in order to strengthen the result flame retardants, and to get the improvement and build ups the machine strength、practical function and process to model of retardant material. The Hal- P and Hal - P - N flame retardants is to make use of common result of gaseous and

coacervation state, thus dibromoneopentyl glycol phosphate and dibromoneopentyl glycol phosphate acylamide have next characteristic.

(1) Have Bromine and Phosphorus or Bromine, Phosphorus and Nitrogen atoms in the molecular, rise to be in conjunction with the function of retardant aspect;

(2) If the bromine content is lower in the molecular, it born the less smoke and poison gas less with burning;

(3) The certain level of bromine content can change the function of phosphate;

Just because of such, dibromoneopentyl glycol phosphate and dibromoneopentyl glycol phosphate acylamide can be used for the polyester extensively, such as Polyester、BPS、Nylon、PVC、Polybutadiene、PP、PE and Poly acrylic acid ester etc. The foreground is vast^[3].

4.3 Bromide Polystyrene (BPS)

BPS is a species bromide flame retardants to develop quickly in the last few years, having great molecular weight、hot stability good、dispersing and mixing easily in high polymer, be easy to process, don't rise frost etc. its main application is in hot resin of PA、PBT、PET etc. BPS according to synthesize the craft is named Brominated Polystyrene (BPS) and Poly Brominated styrene (PBS) respectively, so Brominated Polystyrene (BPS) is synthesized to Polystyrene to be bromide; Poly Bromide styrene (PBS) is synthesized to protect first the styrene key, then to be bromide, to recover the styrene key again, to synthesize the bromide styrene, to polymerized again. In whole synthesize the bromide process is one the main step, the bromide process can be to use the liquid bromine under the catalyst function, also to synthesize the chlorination bromine first, then to be bromide.

BPS is the new product at the abroad of 80's of last century, enters the our country market at the 90's, starts to study at the end domestic of 90's, but hasn't been carry out the industrialization production. Currently the research unit with the produce unit just combine to carry out to industrialize the scale production with the new craft.

5 Conclusion

The profession flame retardants of China is placed in a production structure reorganization and transformations period, a part of flame retardants will withdraw the history satge, another a part of substitutes will

publish. Along with the our country national economy fast, health, stable development and law, laws and related standard of sound, the our country bromide flame retardants and bromide department retardants material industry will get the larger development.

Consult Documents

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