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INFLUENCE OF STABILIZERS ON THE SUSTAINTENDING OF CELLULOSE POLYMER SYSTEMS

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ABSTRACT

This article provides information on the formation of polymer systems, dispersion of cellulose, the effect of stabilizers on the stability of polymer systems and polymer stabilizers. Polymer systems obtained with the help of stabilizers and their fields of application are considered. The stability of polymeric materials is related to their susceptibility to chemical exchange. Of the natural polymers, cellulose is one of the polymers used for many purposes in many industries. Of the synthetic polymers, polyvinyl chloride is one of the most widely used.

KEYWORDS: *Polymer, Cellulose, Destruction, Exploitation, Stabilizer, Photo stabilizer, intermission stabilizers, Heat stabilizers, Lubricants, Induction time.*

INTRODUCTION

The stability of polymeric materials is related to their susceptibility to chemical exchange. Of the natural polymers, cellulose is one of the polymers used for many purposes in many industries. Of the synthetic polymers, polyvinyl chloride is one of the most widely used. The instability of polyvinyl chloride is complicated by its decomposition under the action of HCl and decomposition of polyvinyl chloride due to the destruction of the polymer, which is reflected in bonds in single and linked double C = C bonds in macromolecules.

At present, in the field of cellulose chemistry, the creation of scientific foundations for dispersing cellulose and obtaining powder and microcrystalline modifications is and remains an urgent problem. These questions are solved by researching new methods for modifying cellulose and its derivatives [1].

In recent years, aqueous gels of microcrystalline cellulose have been widely used in the pharmaceutical, cosmetic and food industries to obtain creams and suspensions [2].

The instability of polymer products manifests itself in a counter process, which is observed as a result of a number of chemical and physical processes that eventually lead to irreversible changes in the characteristics of one or several polymers [3]. As a result, the physicochemical characteristics and color of the polymer composition change (yellow, carrot, brown and even black).

Technically, the weakening of the color is more important than the reduction of the dehydrochlorination of the polymer.

Stabilization is a set of measures aimed at preventing and reducing polymer degradation. Substances that are added to improve the stability of the polymer, i.e. to increase the resistance of its properties to various physicochemical and biochemical influences, they are called stabilizers [4].

Polyvinyl chloride $(-CH_2-CH-Cl-)_n$ is one of the most widely produced polymeric materials in the world. It ranks second after polyethylene in terms of productivity. In everyday life and in the national economy, various materials are obtained from it and used for various purposes.

To increase the stability of the polymer, chemical stabilizers are used that increase the physicomechanical and biological resistance of the polymer composition to chemical influences.

To increase the stability of a macromolecule, stabilizers must meet the following requirements:

1. Stop dehydrochlorination and oxidation reactions.

2. Prevent cross linking of macromolecules and stop chain breakage.

3. Loss of the carbonallyl group.

4. Eliminate or reduce the effect of chemical agents (O2; HCl; MeClp).

To improve the processing of the polymer composition, the stabilizer should have the following properties:

1. Must mix well with polymer and other components at processing temperature and working conditions.

2. The viscosity of the mixture must be optimal.

3. Reduce mechanical destruction of macromolecules and

Must have lubricating properties to reduce the adhesion of the composition to turbulence;

4. Must not smell.

From the point of view of using the obtained material, the stabilizer should impart the following properties to the polymer:

1. Resistance to atmospheric and thermal influences.

2. Resistance to physical effects (UV, X, R and other rays).

3. Resistance to bacteria and aggressive environments.

4. Do not change color.

In addition, the stabilizer must be inexpensive and non-toxic. It is very difficult for one chemical substance to combine all the complex properties of the complex. However, when a substance with a multifunctional group is processed, it is very difficult to give more than one property. Therefore, in practice, energy stabilizing stabilizers are used. If stabilizers are not chosen correctly, synergy can be replaced by anthropogenesis.

Currently, stabilizers are divided into two main classes. Metallic and organic steelisers. They, in turn, depending on their chemical structure and protection, are divided into the following groups:

1. Chemical Stabilizers - Reduce oxidation degradation by heat.

2. Photostabilizers - prevent the decomposition of PVC under the influence of light.

3. Antarctic stabilizers - protect the polymer from degradation by X-rays.

4. Mechanochemical stabilizers - prevent degradation of the polymer by mechanical force.

5. Biochemical stabilizers - prevent polymer degradation under the influence of living organisms.

Metallic Chemical Stabilizers: Chemical compounds of this group are complex stabilizers that mainly bind low molecular weight compounds released from the polymer during degradation. Mainly bind low molecular weight compounds released from the polymer during degradation. For example, they bind HCl, which is mainly formed during the decomposition of polyvinyl chloride. When processing PVC, at least one of the metal-containing chemical stabilizers must be used.

The first representative of metal-containing chemical stabilizers is lead-containing compounds. Lead compounds are relatively inexpensive and retain good HCl, which is used in the manufacture of insulation materials, due to the formation of insoluble chlorides. Without the presence of compounds containing lead, the secretion of HCl is increased from the very beginning. When lead compounds are added as stabilizers, they retain HCl primarily at the expense of lead oxide. The anionic part of these compounds serves to increase their stabilizing properties: for example, if we use lead phosphide, it also traps HCl and increases its resistance to weather and light. Phthalate plasticizer mixes well with PVC. Steroids are lubricated.

Lead stabilizers are rarely used due to their toxicity. In order to reduce the toxicity of lead-containing steroids during processing of PVC, attempts are made to granulate them and treat the top with fatty acids and their salts. Another disadvantage of lead stabilizers is the formation of black spots in the presence of sulfur-containing compounds.

Lead stabilizers are divided into three groups:

1. Simple stabilizers.

2. Stabilizers with a lubricating effect.

3. Complexstabilizers.

6. Lead Silicate - Reacts well with tribasic lead sulfate.

Simple stabilizers:

1. Quadruple - a good (heat stabilizing) stabilizer that does not have a lubricating effect.

2. Tri-base - also a good heat stabilizer without lubricating effect.

3. Dibasic 2RO - PbHSO4 - heat stabilizer does not possess antioxidant and light stabilizing properties.

4. Dibasic phthalate - mixes well with PVC. Most phthalate plasticizers are used in PVC.

5. Basic (white lead) - has weak stabilizing properties.

6. Lead Silicate - Reacts well with tribasic lead sulfate.

Lubricating Stabilizers:

Lead Steriate $Pb(OOC_{17}H_{35})_2$- this heat stabilizer has lubricating properties.

Complex Stabilizers:

Lead and Calcium Steriate: Pb $(OOC_{17}H_{35})_2$andCa $(OOC_{17}H_{35})_2$

The stabilization mechanism influencing the stability of polymers is as follows: the effectiveness of lead salts under statistical conditions with a stabilizer amount of 3-5% is as follows: lead stearate - dibasic; lead phthalate is dibasic, lead sulfate is dibasic, lead phosphide is three basic. The performance of a lead stabilizer under dynamic conditions is slightly different than under statistical conditions.

The main reason for the difference in dynamic and statistical conditions is that lead stabilizers not only trap HCl, but also stabilize the anion. Another reason the stabilizer is more effective under dynamic conditions is that it can react with stearic acid to lubricate PVC during processing to form lead stearate:

$$PbO + 2C_{17}H_{35}COOH \rightarrow Pb(OOC_{17}H_{35})_2 + H_2O$$

Therefore, RO is more effective under dynamic conditions; another reason for the effective stabilization of lead stearate is that lead sterate interacts with the labile group of polyvinyl chloride to increase the stability of macromolecules.

In addition to increasing the efficiency of the stabilizers used to determine the thermostatics of polyvinyl chloride, it also provides high thermal stability of the resulting polymer composition. The thermal stability of polyvinyl chloride is determined by the induction period. The induction period is the time from the start of heating of the system to the start of hot compression. During this time, the stabilizer installed in the system is fully used to trap the HCl released as a result of the destruction of the polymer composition.

Several methods can be used to determine the thermal stability of polyvinyl chloride:

1. The induction period can be determined using the “Cango-red” indicator.

2. Determination of thermal and thermal oxidizing dehydrochloramine.

This method involves determining the amount of HCl evolved in a nitrogen-oxygen stream or in a vacuum.

CONCLUSION

In conclusion, we can say that stabilizers are chemicals used to increase the stability of the polymer and increase the resistance of the system to physical, mechanical, biological and chemical influences. This requires the correct selection of stabilizers in accordance with the purpose. The influence of the selected stabilizer on the composition and concentration of the polymer is developed individually for each system.

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