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phate (FMC PB370); bis(2,3-dibromopropyl ether) of bisphenol A (PE68); decabromodiphenyl oxide (DBDPO); ethylene bis-tetrabromophthalimide (SATEX BT-93); ethylene bis-dibromonorbomanedi-carboximide (SATEX BN451). Other formulations may contain Sb_2O_3 in addition to the brominated flame retardants. Other formulations may contain phosphorous based flame retardants such as ethylene diamine diphosphate (EDAP).

Test plaques are tested under UL-94 Vertical burn conditions. A minimum of three replicates are tested. The average time in seconds for the test sample to extinguish after a first and second insult flame is removed is reported. The instant compounds enhance the flame retardancy of a halogenated or phosphate flame retardant tested alone.

EXAMPLE 118

Light Stability in Flame Retardant ABS Molding Applications

Molding grade ABS is dry blended with test additives and then melt compounded into pellets. In addition to the instant compounds, selected flame retardants are also included. The flame retardants are tris(3-bromo-2,2-bis(bromomethyl)propyl] phosphate, decabromodiphenyl oxide, ethylene bis(tetrabromophthalimide) and ethylene bis(dibromonorbomanedicarboximide). The pelletized fully formulated resin is then injection molded into test specimens using a BOY 50M laboratory model injection molder. Other formulations may contain antimony trioxide (Sb_2O_3) in addition to the brominated flame retardants. Other formulation may contain phosphorus based flame retardants such as ethylenediamine diphosphate (EDAP).

Test plaques are mounted in metal frame and exposed in an Atlas Ci65 Xenon Arc Weather-O-meter with intermittent light/dark cycles and water spray following the ASTM G26 test procedure. Specimens are tested at periodic intervals for changes in tensile properties and for changes in color. The longer it takes for the loss in properties to occur and the less the color change as measured by ΔE , the more effective is the stabilizer system.

The test samples containing the instant compounds exhibit good retention of tensile properties and minimal color change during the accelerated weathering.

EXAMPLE 119

Light Stability in Flame Retardant HIPS Molding Applications

Molding grade high impact polystyrene is dry blended with test additives and then melt compounded into pellets. In addition to the instant compounds, selected flame retardants are also included. The flame retardants are tris[3-bromo-2,2-bis(bromomethyl)propyl] phosphate, decabromodiphenyl oxide, ethylene bis(tetrabromophthalimide) and ethylene bis(dibromonorbomanedicarboximide). The pelletized fully formulated resin is then injection molded into test specimens using a BOY 50M laboratory model injection molder. Other formulations may contain antimony trioxide (Sb_2O_3) in addition to the brominated flame retardants. Other formulation may contain phosphorus based flame retardants such as ethylenediamine diphosphate (EDAP).

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Test plaques are mounted in metal frame and exposed in an Atlas Ci65 Xenon Arc Weather-O-meter with intermittent light/dark cycles and water spray following the ASTM G26 test procedure. Specimens are tested at periodic intervals for changes in tensile properties and for changes in color. The longer it takes for the loss in properties to occur and the less the color change as measured by ΔE , the more effective is the stabilizer system.

The test samples containing the instant compounds exhibit good retention of tensile properties and minimal color change during the accelerated weathering.

EXAMPLE 120

Stabilization of High Solids Acid-catalyzed Thermoset Acrylic Resin Enamel

A high solids (50% by weight) thermoset acrylic resin enamel, catalyzed by 0.8% by weight of dodecylbenzenesulfonic acid, based on the film-forming resin is stabilized by the addition of various instant compounds. The high solids thermoset acrylic resin enamel formulation (Acryloid AT 400 from Rohm and Haas) is based on hydroxyethyl methacrylate, methyl methacrylate, styrene, butyl acrylate and butyl methacrylate and a melamine curing agent.

Pieces of steel sheeting 4"×12" (9.16 cm×30.48 cm), coated with a primer based on polyester/epoxy resin, are then coated with a TiO_2 -pigmented base coat based on a binder of 70% of monomers such as hydroxyethyl acrylate, styrene, acrylonitrile, butyl acrylate and acrylic acid with 30% of a melamine resin and an acid catalyst and finally with a clear finishing enamel. The base coat is sprayed onto the sheet to a thickness of about 0.8 mil (0.0203 mm) and air dried for three minutes. The clear finishing enamel is then sprayed onto the sheet to a thickness of about 2.0 mil. After 15 minutes air-drying, the coated sheets are baked for 30 minutes at 121° C.

The stabilizers under test are added to the thermoset acrylic resin finishing enamel in a concentration of 1% by weight before the enamel is coated onto the base coat.

The coated sheets, after storage for three weeks in an air-conditioned room (23° C./50% relative humidity), are subjected to weathering for 2000 hours according to SAE J1920 in a Xenon arc Weather-O-meter. In this apparatus, samples are subjected to weathering in repeated cycles of 180 minutes. The effectiveness of the stabilization is measured by the retention of 20° gloss after weathering.

The sheets stabilized by the instant compounds exhibit good retention of 200 gloss after weathering under extreme weather conditions.

EXAMPLE 121

The samples prepared in Example 120 are also evaluated on the basis of Knoop Hardness (ASTM D-147468) on baked and overbaked samples; on the distinction of image (DOI); on Hunter Associates Apparatus; on 20° gloss (ASTM D-523-80); and on cracking based on visual observation.

The samples stabilized by the instant compounds exhibit a pattern of greater retention of 20° gloss and DOI, and a longer absence of severe cracking after exposure.