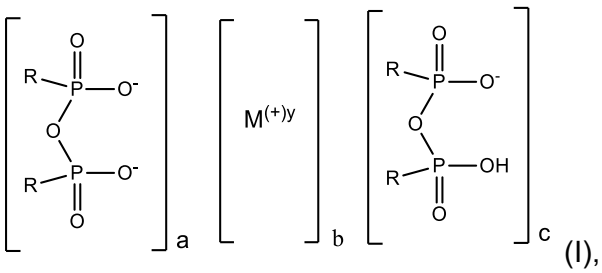
CLAIMS

1. A flame retardant and stabilizer additive composition, for thermoplastic polymers, comprising

(A) at least one phosphorus-containing flame retardant of empirical formula (I):



(I),

wherein R is H, an alkyl, aryl, alkylaryl, or arylalkyl group, M is a metal and y is 2 or 3, such that $M^{(+)y}$ is a metal cation where (+)y represents the charge formally assigned to the cation, a, b, and c represent the ratio of the components to which they correspond relative to one another in the compound, and satisfy the charge-balance equation 2(a)+c=b(y), and c is not zero, and

(B) at least one epoxide compound having at least two epoxide groups.

2. The flame retardant and stabilizer additive composition of claim 1, wherein in the empirical formula (I), a is 0, 1 or 2, b is from 1 to 4 and c is 1 or 2.

3. The flame retardant and stabilizer additive composition of claim 1, wherein y is 3, a is 1, b is 1 and c is 1.

4. The flame retardant and stabilizer additive composition of claim 3, wherein M is chosen from Al, Ga, Sb, Fe, Co, B, and Bi, preferably Al or Fe.

5. The flame retardant and stabilizer additive composition of any one of claims 1-4, wherein in the empirical formula (I) R is H, C_{1-12} alkyl, C_{6-10} aryl, C_{7-18} alkylaryl, or C_{7-18} arylalkyl, wherein the alkyl, aryl, alkylaryl, or arylalkyl are unsubstituted or are substituted by halogen, hydroxyl, amino, C_{1-4} alkylamino, di-C_{1-4} alkylamino, C_{1-4} alkoxy, carboxy or C_{2-5} alkoxycarbonyl, preferably unsubstituted C_{1-12} alkyl, C_6 aryl, C_{7-10} alkylaryl, or C_{7-10} arylalkyl, more preferably unsubstituted C_{1-6} alkyl, most preferably methyl, ethyl, propyl, isopropyl, butyl, and t-butyl.

6. The flame retardant and stabilizer additive composition according to any one of claims 1-5, wherein M is Al, y is 3, a is 1, b is 1 and c is 1.

7. The flame retardant and stabilizer additive composition of claim 6, wherein R is H or C_{1-6} alkyl, preferably methyl or ethyl.

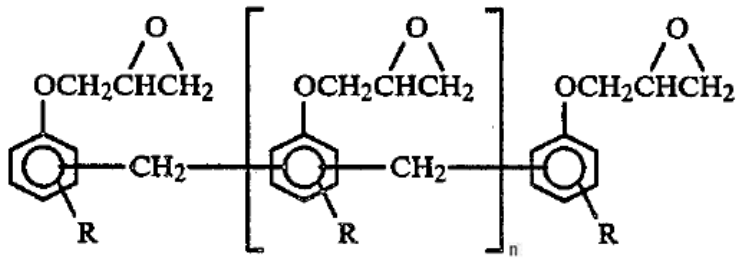
8. The flame retardant and stabilizer additive composition of claim 1 further comprising (C) at least one flame retardant synergist and/or additional flame retardant.

9. The flame retardant and stabilizer additive composition of claim 8, wherein component (C) comprises a nitrogen-containing flame retardant synergist, preferably chosen from melamine, melam, melem, melon, melamine cyanurate, dimelamine phosphate, dimelamine pyrophosphate, melamine phosphate, melamine pyrophosphate, melamine polyphosphate, melam polyphosphate, melon polyphosphate, melem polyphosphate, and mixed polysalts thereof.

10. The flame retardant and stabilizer additive composition of claim 1, wherein the at least one epoxide compound is a polyglycidyl or poly(beta-methylglycidyl) ether, more preferably a phenolic novolac polyglycidyl ether.

11. The flame retardant and stabilizer additive composition of claim 10, wherein the epoxide compound is derived from a phenolic novolac, preferably chosen from cresol novolacs, bisphenol A novolacs, and bisphenol F novolacs.

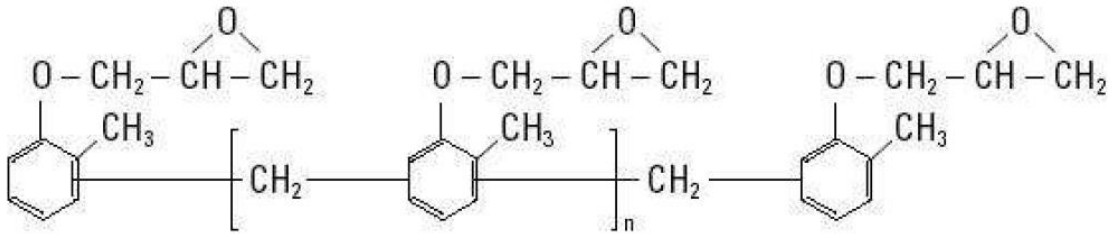
12. The flame retardant and stabilizer additive composition of claim 10, wherein the epoxide compound is a phenolic novolac polyglycidyl ether of the formula (III):



(III)

where R in formula (III) is independently chosen from the group consisting of hydrogen, halogen, alkyl, alkoxy, aryl, alkylaryl and aralkyl, preferably C_1-C_4 alkyl, and n is 0 to 1000.

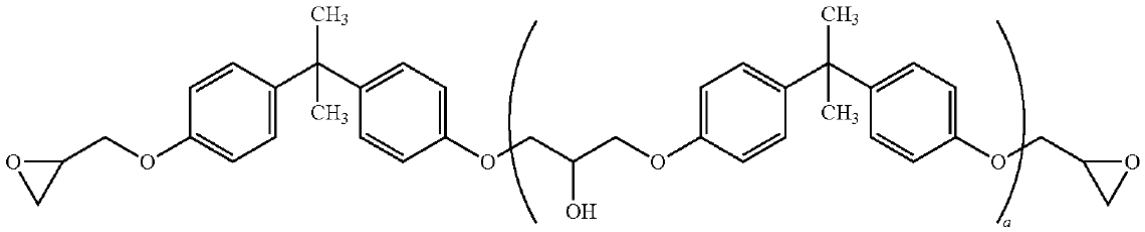
13. The flame retardant and stabilizer additive composition of claim 10, wherein the epoxide compound is a polyglycidyl ether of cresol novolac of the formula (IV):



(IV)

where n is from 0 to 100 and represents the average number.

14. The flame retardant and stabilizer additive composition of claim 10, wherein the epoxide compound is an oligomeric reaction product of bisphenol A with epichlorohydrin of formula (V):



(V)

where a is from 0 to 100 and represents the average number.

15. The flame retardant and stabilizer additive composition of claim 1, further comprising (D) one or more other stabilizers, preferably chosen from zinc borate, zinc stannate, zinc molybdate complex, zinc molybdate/magnesium hydroxide complex, zinc molybdate/magnesium silicate complex, calcium molybdate/zinc complex, and zinc phosphate complex, polysiloxane, montmorillonite, kaolinite, halloysite, and hydrotalcite.

16. A flame retardant thermoplastic composition comprising at least one thermoplastic polymer and the flame retardant and stabilizer additive composition according to any one of claims 1-15.

17. The flame retardant thermoplastic composition of claim 16, wherein the at least one thermoplastic polymer is chosen from the group consisting of polyesters and polyamides, preferably a polyamide chosen from the group consisting of polyamide-4,6, polyamide-6, polyamide-6,6, polyamide-6,10, polyamide-6,12, polyamide-11, polyamide-12, polyamide-4,T, polyamide-MXD,6, polyamide-12,T, polyamide-10,T, polyamide-9,T, polyamide-6,T/6,6, polyamide-6,T/D,T, polyamide-6,6/6,T/6,I, polyamide-6/6,T, polyamide-6,T/6,I, and mixtures thereof.

18. The flame retardant thermoplastic composition of claim 16, further comprising at least one inorganic filler, preferably comprising glass fiber.