



Oxygenated Hydrocarbon Compounds as Flame Retardants for Polyester Fabric

by

Jacobus Bisschoff

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Author: Jacobus Bisschoff

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Supervisor: Walter W Focke

Department: Chemical Engineering

Degree: MEng (Chemical)

Synopsis

Synthetic polymers tend to be more flammable than conventional materials such as wood. To reduce the hazards of fire, flame retardants may be added. Typical systems are based on compounds based on halogens (Cl, Br), transition metals (Zn, Sb) or phosphorous and boron. Modifications involving both the physical and the chemical characteristics of char in intumescent flame retardants, might be related to chemical reactions between fillers and phosphorous compounds of the flame retardant. Fillers that modify the structure of the char tend to decrease the efficiency of the flame retardant system. It is shown that a recently developed non-halogen flame retardant system can provide flame retardancy to polyolefins at surprisingly low levels. The purpose of flame retardant treatments is to reduce the rates of burning and flame spread. With flame retarded fabrics it is usually required that they must pass some type of standard vertical flame test (e.g. UL 94V, NFPA 701, BS5867, DIN 4102, X65020-1991, etc.). Recently it was discovered that unsized polyester fabric can be flame retarded with certain organic compounds that are based on carbon, hydrogen and oxygen only. These flame retardants operate by altering characteristics such as the polymer melt viscosity and the melt surface tension.

Keywords

Flame retardants, phosphorous, halogen, inorganic, hydrocarbon, intumescent.

Sinopsis

Sintetiese polimere is meer geneig om te brand as konvensionele materiale soos byvoorbeeld hout. Om vuurbestandheid te verbeter kan vlamvertragers bygevoeg word. Hierdie vlamvertragers is gebaseer op halogene (Cl, Br), transisiemetale (Zn, Sb) of fosfor en boor verbindings. Veranderinge in beide die chemiese en fisiese karakteristieke van die beskermingslaag by opskuimingsvlamvertragers kan die gevolg wees van chemiese reaksies tussen die vuller en die fosfor verbindings van die vlamvertrager sisteem. Vullers wat die struktuur van die beskermingslaag verander, is geneig om die effektiwiteit van die vlamvertrager sisteem te benadeel. Dit word aangetoon dat 'n onlangs ontdekte nie-halogeën vlamvertrager sisteem 'n poli-olefien kan vlamvertraag deur baie klein hoeveelhede by te voeg. Die doel van vlamvertraging is om die tempo van brand en vlamverspreiding te velaag. Dit word gewoonlik van vlamvertraagde materiale verlang om aan 'n sekere vertikale brandtoets te voldoen (b.v. UL 94V, NFPA 701, BS5867, DIN 4102, X65020-1991, ens.). Daar is egter onlangs uitgevind dat ongestyfde polyester materiaal vlamvertraag kan word met sekere organiese koolwaterstowwe wat slegs suurstof, waterstof en koolstof bevat. Hierdie vlamvertragers verander die eienskappe van die materiaal soos byvoorbeeld die gesmelte polimeer viskositeit en die oppervlakspanning van die gesmelte materiaal,

Sleutelwoorde

Vlamvertragers, fosfor, halogeën, anorganies, koolwaterstof, opskuiming.

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Table of Contents

SYNOPSIS	II
KEYWORDS	III
ACKNOWLEDGEMENTS.....	III
TABLE OF CONTENTS.....	IV
LIST OF TABLES	VII
LIST OF FIGURES.....	VIII
1. INTRODUCTION	10
1.1 HISTORICAL REVIEW	10
1.2 HALOGENATED FLAME RETARDANTS	11
1.3 INORGANIC FLAME RETARDANTS	12
1.4 PHOSPHOROUS FLAME RETARDANTS	13
1.5 NEW TRENDS IN FLAME RETARDANT SYSTEMS.....	13
1.5.1 Intumescent flame retardants	14
1.6 PROBLEM STATEMENT.....	15
2. FUNDAMENTALS OF FLAMMABILITY.....	16
2.1 TERMS AND DEFINITIONS.....	16
2.2 MECHANISM OF COMBUSTION AND FLAME RETARDANCY.....	18
2.3 FLAMMABILITY TESTING.....	20
3. HALOGENATED FLAME RETARDANTS	22
3.1 MECHANISM OF HALOGEN FLAME RETARDANTS	22
3.2 BROMINATED FLAME RETARDANTS.....	23
3.2.1 Mechanism of Brominated flame retardants	25
3.3 HALOGEN SYNERGISM.....	26
4. INORGANIC FLAME RETARDANTS.....	29
4.1 ANTIMONY COMPOUNDS	29
4.1.1 Mechanism of Antimony compounds	32
4.2 BORON COMPOUNDS	33
4.2.1 Mechanism of Boron compounds	33
4.3 ALUMINIUM COMPOUNDS	34
4.3.1 Mechanism of Aluminium compounds	36
5. PHOSPHOROUS FLAME RETARDANTS.....	38
5.1 CONDENSED PHASE MECHANISMS	38
5.1.1 Charring mechanisms.....	38



5.1.2 Coating mechanisms	40
5.1.3 Melt viscosity	41
5.1.4 Free radicals	41
5.1.5 Effects of fillers	42
5.2 VAPOUR PHASE MECHANISMS.....	42
5.2.1 Chemical methods.....	43
5.2.2 Physical methods	43
5.3 PHOSPHOROUS FLAME RETARDANT SYNERGISM.....	44
5.3.1 Halogen synergism.....	44
5.3.2 Antimony synergism	44
6. INTUMESCENT FLAME RETARDANTS	46
6.1 CONDENSED PHASE CHARRING.....	46
6.1.1 Chemical mechanism of intumescence	46
6.1.2 Physical model of intumescence	47
6.2 MINERAL FILLER SYNERGISM	51
6.3 OTHER INTUMESCENT SYSTEMS	52
7. EXPERIMENTAL	53
7.1 FLAME RETARDANT TREATMENT	53
7.1.1 Pre-treatment	53
7.1.2 Impregnation	53
7.1.3 Post treatment	54
7.2 EVALUATION OF FIRE PERFORMANCE	54
7.2.1 The bottom edge ignition test	54
7.2.2 The Puddle flame retardancy test.....	54
7.2.3 The Face ignition flame retardancy test.....	54
7.2.4 Polymer dripping test.....	56
7.3 DIFFERENTIAL SCANNING CALORIMETRY AND DIFFERENTIAL THERMAL ANALYSIS	59
7.4 THERMOGRAVIMETRIC ANALYSIS	60
7.5 RHEOMETRY.....	61
8. RESULTS AND DISCUSSION.....	62
8.1 THE BOTTOM EDGE IGNITION TEST	62
8.2 THE PUDDLE FLAME RETARDANCY TEST	66
8.3 THE FACE IGNITION FLAMMABILITY TEST	67
8.4 POLYMER DRIPPING TEST.....	72
8.5 DIFFERENTIAL SCANNING CALORIMETRY AND DIFFERENTIAL THERMAL ANALYSIS	73
8.6 THERMOGRAVIMETRIC ANALYSIS	75
8.7 RHEOMETRY.....	76
9. PROPOSED FLAME RETARDANCY MODEL	79
10. CONCLUSIONS AND RECOMMENDATIONS	82
11. REFERENCES.....	85
12. APPENDIX	88



12.1 CHEMICAL AND PHYSICAL PROPERTIES OF FLAME RETARDANTS	89
12.2 RESULTS FROM FLAMMABILITY TESTS.....	97
12.3 TEST STANDARD BS 5867: PART 2: 1980	98

LIST OF TABLES

Table 1: Consumption of flame retardants for plastics in 1972 (United States (Green, 1997))	11
Table 2: Total world consumption of halogen flame retardants in 1972	12
Table 3: Flame retardant consumption in the United States (Toulal, 1993)	13
Table 4: Consumption of flame retardants in the United States	14
Table 5: Flammability tests for polymers (Pellagony, 1997)	15
Table 6: General effects of halogen compounds for flame retardancy (Holligrew, 1993)	16
Table 7: Physical properties of commercial bromine compounds (Toulal, 1993)	17
Table 8: Typical properties of common 4-phthalyl derivatives, 1,2,4-triazole and oxadiazole derivatives (Toulal, 1993)	18
Table 9: Typical comparison of commercial octadecyl bromide (Toulal, 1993)	19
Table 10: Typical physical properties of commercial octadecyl bromide (Toulal, 1993)	20
Table 11: Chemicals used to test for flame retardancy	21
Table 12: Results obtained from the Puddle Test	22
Table 13: Results of the Face Ignition Test for Pure Polyester Fibres	27
Table 14: Average results from the Face Ignition Tests	28
Table 15: Results obtained from the polymer dripping tests	29



List of Tables

Table 1: Consumption of flame retardants for plastics in 1972 for the United States (Green, 1997).....	11
Table 2: Total world consumption of halogen flame retardants (Pettigrew, 1993).	12
Table 3: Flame retardant consumption in the United States (kT/y) (Green, 1997).	13
Table 4: Consumption of flame retardants in the United States	14
Table 5: Flammability tests for polymers (Pettigrew, 1993).	20
Table 6: General effectiveness of halogen compounds for flame retardancy (Pettigrew, 1993).	25
Table 7: Physical properties of commercial antimony trioxide (Touval, 1993).	30
Table 8: Typical properties of commercial grades of antimony pentoxide and sodium antimonate (Touval, 1993).	31
Table 9: Typical composition of commercial alumina trihydrate (Touval, 1993).	35
Table 10: Typical physical properties of commercial alumina trihydrate (Touval, 1993).	36
Table 11: Chemicals used to test for flame retardancy	55
Table 12 : Results obtained from the Puddle Test	66
Table 13 : Results of the Face Ignition Test for Pure Polyester fabric.	67
Table 14: Average results from the Face Ignition Tests.....	68
Table 15 : Results obtained from the polymer dripping tests.	72

List of Figures

Figure 1: The Fire Triangle (Gilman & Kashiwagi, 1997).	19
Figure 2: Schematic diagram of the formation of char during intumescence (Gilman & Kashiwagi, 1997).	48
Figure 3: Schematic diagram of the different layers during the burning process (Gilman & Kashiwagi, 1997).	50
Figure 4: Experimental set-up for sample evaluation.	56
Figure 5: Sample being lowered into flame.	57
Figure 6: Display of the balance during operation.	58
Figure 7: Computer screen showing the software in action.	58
Figure 8: Self extinguishing times versus add-on of Pentaerythritol and Dipentaerythritol treated polyester fabric.	63
Figure 9: Self extinguishing times versus add-on of Phloroglucinol and Inositol treated polyester fabric.	64
Figure 10: Self extinguishing times versus add-on of 2-Furoic acid, Epikote 1001 and Benzophenone treated polyester fabric.	64
Figure 11: Self extinguishing times versus add-on of Benzyl phenyl ketone, Maltol and Benzoic acid treated polyester fabric.	65
Figure 12: Self extinguishing times versus add-on of Benzoyl benzoate and Diethylphthalate treated polyester fabric.	66
Figure 13: Untreated Polyester fabric samples after the Face Ignition test was applied.	68
Figure 14: Polyester samples treated with Pentaerythritol.	69
Figure 15: Polyester samples treated with Dipentaerythritol.	70
Figure 16: Polyester samples treated with Phloroglucinol.	71
Figure 17: Polyester samples treated with Isophthalic acid.	71

Figure 18: Typical drip test result for Pentaerythritol.....	72
Figure 19: DSC curve of PES and treated PES samples. Endothermic up, scan-rate of 10°C/min in oxygen atmosphere.....	73
Figure 20: DTA curve of PES and treated PES samples. Endothermic down, scan-rate of 10°C/min in nitrogen atmosphere.....	74
Figure 21: TGA results for PES and treated PES samples.....	75
Figure 22: Loss modulus from parallel plate rheometry of PES and PES treated samples.....	76
Figure 23: Storage modulus parallel plate rheometry of PES and PES treated samples.....	77
Figure 24: Viscosity response parallel plate rheometry of PES and PES treated samples.....	78
Figure 25: Schematic diagram for the model of elongational viscosity.....	81

1.1 Historical review

Each year 29 000 tonnes and 4300 deaths are caused by fires in the United States alone, and \$1 billion cost to the global economy has been estimated as a result (Gann, 1993). Something has to be done to reduce the loss of life and damage caused by fire.

By 1372, the major groups of flame-retarded polymers used were the unsaturated polyesters, PVC and cellulose fibres for the upholstery