ORIGINAL

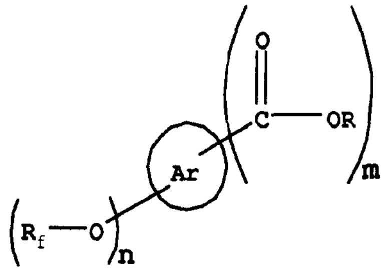
PROCESS FOR THE SYNTHESIS OF FLUORINATED ETHERS OF AROMATIC ACIDS

Abstract of the Invention

New fluorinated ethers of aromatic acids and diesters are disclosed. These compositions can be applied to, e.g., fibers, yarns, carpets, garments, films, molded parts, paper and cardboard, stone, and tile to impart soil, water and oil resistance. By incorporating the fluorinated ethers of aromatic acids, or diesters thereof, into polymer backbones, more lasting soil, water and oil resistance, as well as improved flame retardance, can be achieved.

We Claim:

1. A compound as represented by the structure of the following Formula I:



I

wherein:

Ar is a C_6~C_{20} monocyclic or polycyclic aromatic nucleus,

n and m are each independently a nonzero value,

n+m is less than or equal to 8,

R_f is a fluorinated alkyl, alkaryl, aralkyl or aryl group, optionally containing one or more ether linkages -O- ; and

R is H or a branched or linear $C_{1\text{ to }10}$ alkyl group.

2. A compound according to Claim 1 wherein R_f is selected from the group consisting of:

$CF_3(CF_2)_a(CH_2)_b$ -, wherein a = an integer from 0 to 15 and b = 1, 3 or 4;

$HCF_2(CF_2)_c(CH_2)_d$ - wherein c = an integer from 0 to 15 and d = 1, 3, or 4;

$CF_3CF_2CF_2OCFHCF_2(OCH_2CH_2)_e$ - and $CF_3CF_2CF_2OCF_2CF_2(OCH_2CH_2)_e$ -, wherein e = an integer from 1 to 12;

$(CF_3)_2CH$- ,

$(CF_3CF_2CFH)(F)(CF_3)C$- ,

$(CF_3CF_2CFH)(F)(CF_3)CCH_2$- ,

$(CF_3)_2(H)C(CF_3CF_2)(F)C$ - ,

$(CF_3)_2(H)C(CF_3CF_2)(F)CCH_2$- ,

pentafluorophenyl,

$CF_3(CF_2)_f(CH_2)_2$ - wherein f = an integer from 0 to 15,

$HCF_2(CF_2)_g(CH_2)_h$ - wherein g = an integer from 0 to about 15 and h = 0 or 2,

$CF_3CF_2CF_2OCFHCF_2$ -,

$CF_3CF_2CF_2OCF_2CF_2$ -,

$CF_3CF_2(CH_2CH_2CF_2CF_2)_iCH_2CH_2$ -,

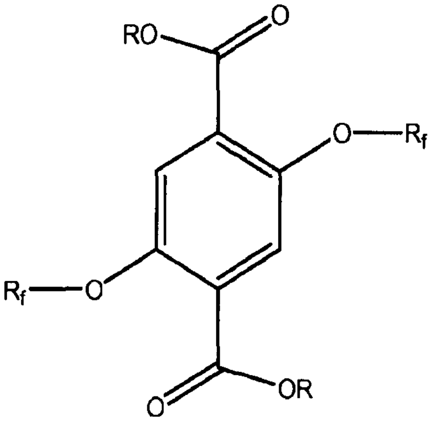
$CF_3CF_2CF_2CF_2(CH_2CH_2CF_2CF_2)_iCH_2CH_2$ -,

$CF_3CF_2(CH_2CF_2)_iCH_2CH_2$ -,

$CF_3CF_2CF_2CF_2(CH_2CF_2)_iCH_2CH_2$ -, wherein i = an integer from 1 to 6, and

CF_3CFHCF_2-.

3. A compound as represented by the structure of the following Formula II:



II

wherein R_f is a fluorinated alkyl, alkaryl, aralkyl or aryl group, optionally containing one or more ether linkages -O- ; and R is H or a branched or linear $C_{1 \text{ to } 10}$ alkyl group.

4. A compound according to Claim 3 wherein R_f is selected from the group consisting of:

$CF_3(CF_2)_a(CH_2)_b$ -, wherein a = an integer from 0 to 15 and b = 1, 3 or 4;

$HCF_2(CF_2)_c(CH_2)_d$ - wherein c = an integer from 0 to 15 and d = 1, 3, or 4;

$CF_3CF_2CF_2OCFHCF_2(OCH_2CH_2)_e$ - and $CF_3CF_2CF_2OCF_2CF_2(OCH_2CH_2)_e$ -, wherein e = an integer from 1 to 12;

$(CF_3)_2CH$- ,

$(CF_3CF_2CFH)(F)(CF_3)C$- ,

$(CF_3CF_2CFH)(F)(CF_3)CCH_2$- ,

$(CF_3)_2(H)C(CF_3CF_2)(F)C$ - ,

$(CF_3)_2(H)C(CF_3CF_2)(F)CCH_2$- ,

pentafluorophenyl,

$CF_3(CF_2)_f(CH_2)_2$ - wherein f = an integer from 0 to 15,

$HCF_2(CF_2)_g(CH_2)_h$ - wherein g = an integer from 0 to about 15 and h = 0 or 2,

$CF_3CF_2CF_2OCFHCF_2$ -,

$CF_3CF_2CF_2OCF_2CF_2$ -,

$CF_3CF_2(CH_2CH_2CF_2CF_2)_iCH_2CH_2$ -,

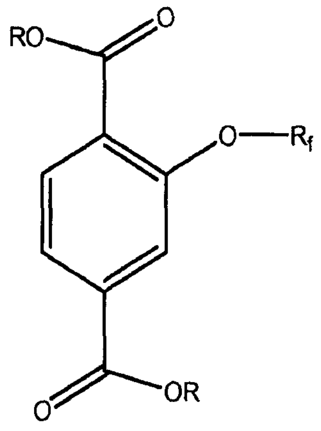
$CF_3CF_2CF_2CF_2(CH_2CH_2CF_2CF_2)_iCH_2CH_2$ -,

$CF_3CF_2(CH_2CF_2)_iCH_2CH_2$ -,

$CF_3CF_2CF_2CF_2(CH_2CF_2)_iCH_2CH_2$ -, wherein i = an integer from 1 to 6, and

CF_3CFHCF_2-.

5. A compound as represented by the structure of the following Formula III:



III

wherein R_f is a fluorinated alkyl, alkaryl, aralkyl or aryl group, optionally containing one or more ether linkages -O- ; and R is H or a branched or linear $C_{1 \text{ to } 10}$ alkyl group.

6. A compound according to Claim 5 wherein R_f is selected from the group consisting of:

$CF_3(CF_2)_a(CH_2)_b$-, wherein a = an integer from 0 to 15 and b = 1, 3 or 4;

$HCF_2(CF_2)_c(CH_2)_d$ - wherein c = an integer from 0 to 15 and d = 1, 3, or 4;

$CF_3CF_2CF_2OCFHCF_2(OCH_2CH_2)_e$ - and

$CF_3CF_2CF_2OCF_2CF_2(OCH_2CH_2)_e$ -, wherein e = an integer from 1 to 12;

$(CF_3)_2CH$- ,

$(CF_3CF_2CFH)(F)(CF_3)C$- ,

$(CF_3CF_2CFH)(F)(CF_3)CCH_2$- ,

$(CF_3)_2(H)C(CF_3CF_2)(F)C$ - ,

$(CF_3)_2(H)C(CF_3CF_2)(F)CCH_2$- ,

pentafluorophenyl,

$CF_3(CF_2)_f(CH_2)_2$ - wherein f = an integer from 0 to 15,

$HCF_2(CF_2)_g(CH_2)_h$ - wherein g = an integer from 0 to about 15 and h = 0 or 2,

$CF_3CF_2CF_2OCFHCF_2$ -,

$CF_3CF_2CF_2OCF_2CF_2$ -,

$CF_3CF_2(CH_2CH_2CF_2CF_2)_iCH_2CH_2$ -,

$CF_3CF_2CF_2CF_2(CH_2CH_2CF_2CF_2)_iCH_2CH_2$ -,

$CF_3CF_2(CH_2CF_2)_iCH_2CH_2$ -,

$CF_3CF_2CF_2CF_2(CH_2CF_2)_iCH_2CH_2$ -, wherein i = an integer from 1 to 6, and

CF_3CFHCF_2-.

7. A monomer, oligomer or polymer that comprises a compound according to Claim 1.

8. A monomer, oligomer or polymer according to Claim 7 that comprises one or more functionalities selected from the group consisting of ester functionality, ether functionality, amide functionality, imide functionality, imidazole functionality, thiazole functionality, oxazole functionality, carbonate functionality, acrylate functionality, epoxide functionality, urethane

functionality, acetal functionality, and anhydride functionality.

9. An article of manufacture that comprises a compound according to Claim 1.

10. An article of manufacture that comprises a monomer, oligomer or polymer according to Claim 8.

11. An article according to Claim 9 which is fabricataed as fiber, yarn, carpet, a garment, a film, a molded part, paper, cardboard, stone or tile.

12. An article according to Claim 10 which is fabricataed as fiber, yarn, carpet, a garment, a film, a molded part, paper, cardboard, stone or tile.

Dated this the 6th Day of March, 2012

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