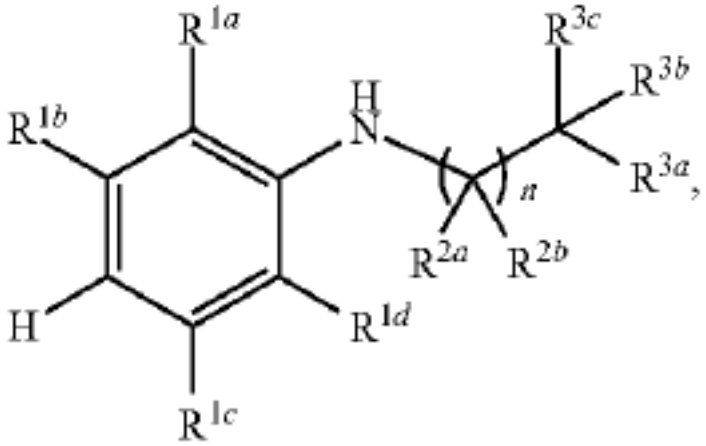
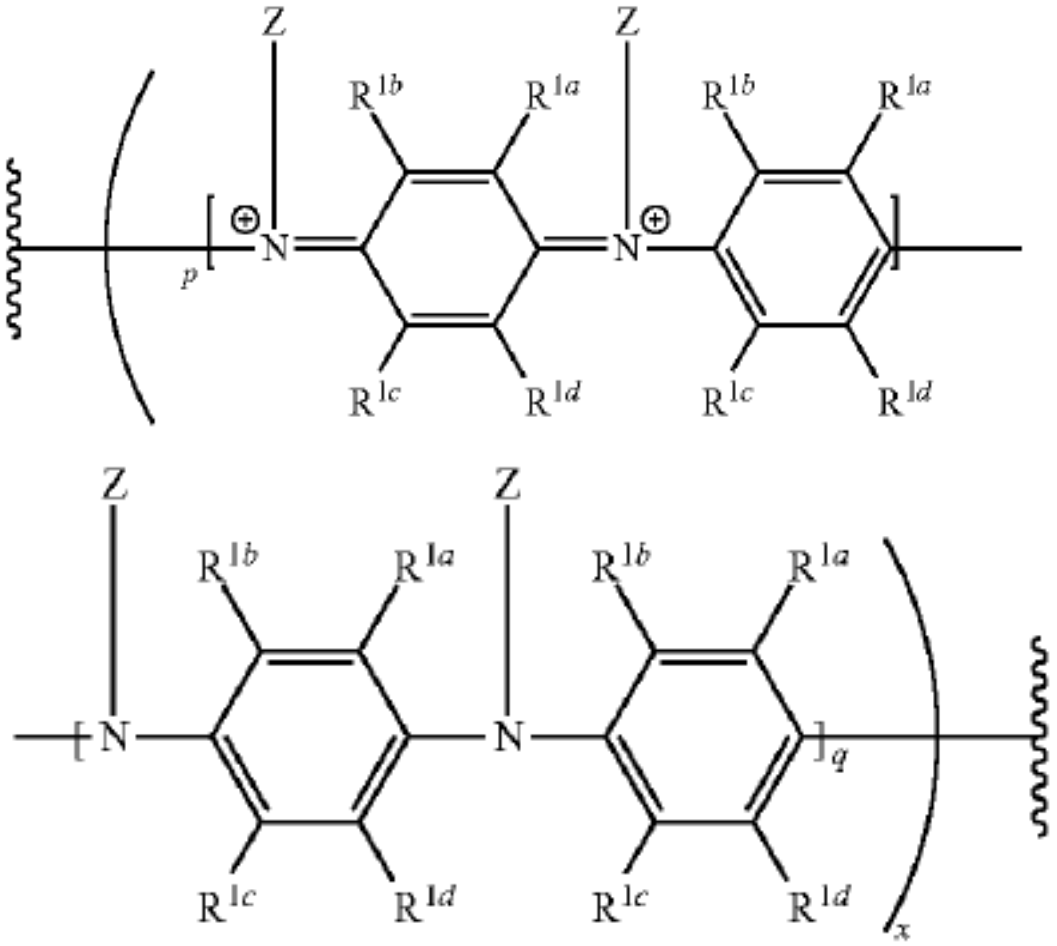
CLAIMS

1. A filtration membrane comprising

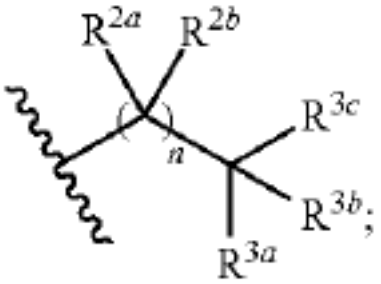


a polymer comprising a structure represented by formula I:

Formula I



wherein each Z is independently selected from hydrogen and



wherein n is an integer selected from 1, 2, and 3;

wherein p is independently 0, 0.5, or 1;

wherein q is independently 0, 0.5, or 1;

wherein, for each x, p+q=1;

wherein each of R^{1a}, R^{1b}, R^{1c}, and R^{1d} is independently selected from hydrogen, halogen, --CN, --SR^{20}, --OR^{21}, --$NR^{22a}R^{22b}$, --$NR^{22a}R^{22b}H^+$, --SO_2R^{23}, --(C==O)R^{24}, and C1-C3 alkyl substituted with 0, 1, 2, or 3 groups selected from halogen, --CN, --SR^{20}, --OR^{21}, --$NR^{22a}R^{22b}$, --SO_2R^{23}, and --(C==O)R^{24};

wherein each of R^{2a} and R^{2b} is independently selected from hydrogen, halogen, --CN, --SR^{30}, --OR^{31}, --$NR^{32a}R^{32b}$, --$NR^{32a}R^{32b}H^+$, --SO_2R^{33}, --(C==O)R^{34}, and C1-C3 alkyl substituted with 0, 1, 2, or 3 groups selected from halogen, --CN, --SR^{30}, --OR^{31}, --$NR^{32a}R^{32b}$, --SO_2R^{33}, and --(C==O)R^{34};

wherein each of R^{3a}, R^{3b}, and R^{3c} is independently selected from hydrogen, halogen, --CN, --SR^{40}, --OR^{41}, --$NR^{42a}R^{42b}H^+$, --$NR^{42a}R^{42b}H^+$, --SO_2R^{43}, and --(C==O)R^{44};

wherein each of R^{20}, R^{21}, R^{22a}, R^{22b}, R^{30}, R^{31}, R^{32a}, R^{32b}, R^{40}, R^{41}, R^{42a}, and R^{42b}, when present, is independently selected from hydrogen, C1-C3 alkyl, C1-C3 monohaloalkyl, and C1-C3 polyhaloalkyl;

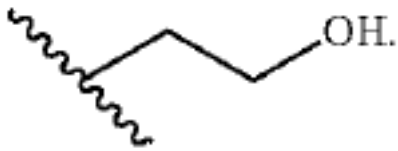
wherein each of R^{23} and R^{24}, when present, is independently selected from --O^-, --OR^{25}, C1-C3 alkyl, C1-C3 monohaloalkyl, C1-C3 polyhaloalkyl, and --$NR^{26a}R^{26b}$;

wherein each of R^{25}, R^{26a}, and R^{26b}, when present, is independently selected from hydrogen, C1-C3 alkyl, C1-C3 monohaloalkyl, and C1-C3 polyhaloalkyl;

wherein each of R^{33} and R^{34}, when present, is independently selected from --O^-, --OR^{35}, C1-C3 alkyl, C1-C3 monohaloalkyl, C1-C3 polyhaloalkyl, and --$NR^{36a}R^{36b}$;

wherein each of R^{35}, R^{36a}, and R^{36b}, when present, is independently selected from hydrogen, C1-C3 alkyl, C1-C3 monohaloalkyl, and C1-C3 polyhaloalkyl;

wherein each of R^{43} and R^{44}, when present, is independently selected from --O^-, --OR^{45}, C1-C3 alkyl, C1-C3 monohaloalkyl, C1-C3 polyhaloalkyl, and --$NR^{46a}R^{46b}$;
wherein each of R^{45}, R^{46a}, and R^{46b}, when present, is selected from hydrogen, C1-C3 alkyl, C1-C3 monohaloalkyl, and C1-C3 polyhaloalkyl; and
wherein at least one Z is a structure represented by a formula:



2. The membrane of claim 1, wherein the membrane further comprises a support structure.

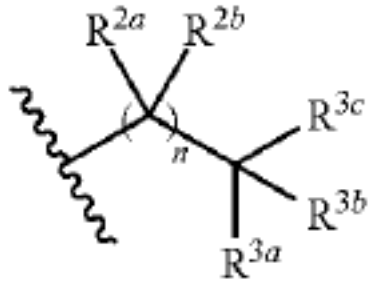
3. The membrane of claim 1, wherein the membrane further comprises a second polymer selected from polysulfone, sulfonated polysulfone, polyethersulfone, sulfonated polyethersulfone, polyaniline, polyaniline co-polymers, polyacrylonitrile, polyurethane, cellulose acetate, polyvinylidene fluoride, polytetrafluoroethylene, polyvinyl fluoride, polyvinylidene fluoride, polytrifluoroethylene, polyperfluoroalkyl vinyl ether, polyhexafluoropropylene, cellulose acetate, polyurethane, cellulose acetate, and polyurethane, or a mixture thereof.

4. The membrane of claim 1, wherein the membrane further comprises polysulfone.

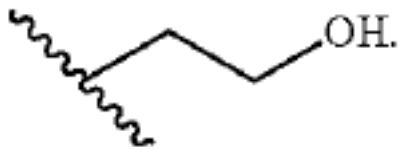
5. The membrane of claim 1, wherein the polymer is present in an amount from about 0.1 wt % to about 35 wt %.

6. The filtration membrane of claim 1, wherein each of R^{1a}, R^{1b}, R^{1c}, and R^{1d} is hydrogen.

7. The filtration membrane of claim 1, wherein each Z is a structure represented by a formula:

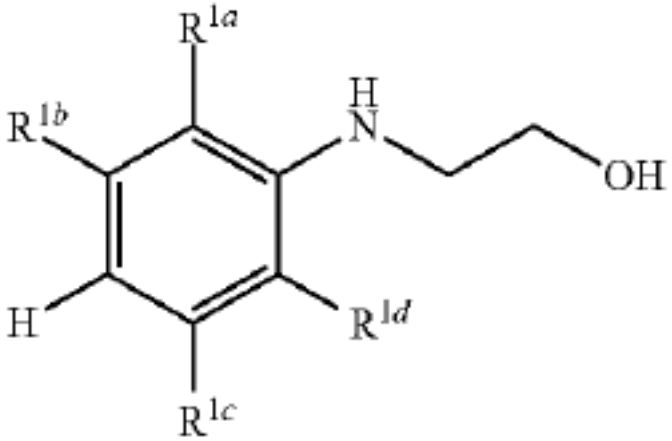


and at least one Z is a structure represented by a formula



8. A filtration membrane comprising a polymer formed by polymerizing a compound having a structure represented by formula II:

Formula II



wherein each of R^{1a}, R^{1b}, R^{1c}, and R^{1d} is independently selected from hydrogen, halogen, --CN, --SR^{20}, --OR^{21}, --$NR^{22a}R^{22b}$, --$NR^{22a}R^{22b}H^+$, --SO_2R^{23}, --(C==O)R^{24}, and C1-C3 alkyl substituted with 0, 1, 2, or 3 groups selected from halogen, --CN, --SR^{20}, --OR^{21}, --$NR^{22a}R^{22b}$, --SO_2R^{23}, and --(C==O)R^{24};

wherein each of R^{20}, R^{21}, R^{22a} and R^{22b}, when present, is independently selected from hydrogen, C1-C3 alkyl, C1-C3 monohaloalkyl, and C1-C3 polyhaloalkyl;

wherein each of R^{23} and R^{24}, when present, is independently selected from --O^-, --OR^{25}, C1-C3 alkyl, C1-C3 monohaloalkyl, C1-C3 polyhaloalkyl, and --$NR^{26a}R^{26b}$; and

wherein each of R^{25}, R^{26a}, and R^{26b}, when present, is independently selected from hydrogen, C1-C3 alkyl, C1-C3 monohaloalkyl, and C1-C3 polyhaloalkyl.

9. The membrane of claim 8, wherein the membrane further comprises a support structure.

10. The membrane of claim 8, wherein the membrane further comprises a second polymer selected from polysulfone, sulfonated polysulfone, polyethersulfone, sulfonated polyethersulfone, polyaniline, polyaniline co-polymers, polyacrylonitrile, polyurethane, cellulose acetate, polyvinylidene fluoride, polytetrafluoroethylene, polyvinyl fluoride, polyvinylidene fluoride, polytrifluoroethylene, polyperfluoroalkyl vinyl ether, polyhexafluoropropylene, cellulose acetate, polyurethane, cellulose acetate, and polyurethane, or a mixture thereof.

11. The membrane of claim 8, wherein the membrane further comprises polysulfone.

12. The membrane of claim 8, wherein the polymer is present in an amount from about 0.1 wt % to about 35 wt %.

13. The membrane of claim 8, wherein the compound is

