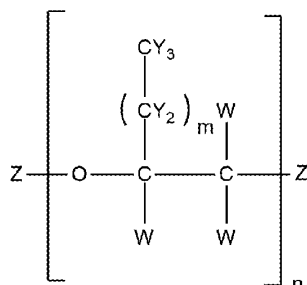


Claims

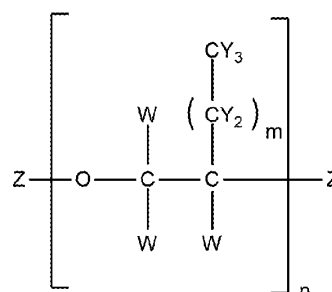
1. A compound according to formula (Ia) or formula (Ib);

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Formula (Ia)



Formula (Ib)

wherein

- 15 each W is independently selected from the group consisting of H, F, Cl, Br, I and $(\text{CY}_2)_m\text{CY}_3$;

each Y is independently selected from the group consisting of F, Cl, Br and I;

each Z is independently selected from the group consisting of H, OH, $(\text{CW}_2)_p\text{CW}_3$,

20 CY_3 , OCW_3 , $\text{O}(\text{CW}_2)_p\text{CW}_3$, $\text{OCW}((\text{CY}_2)_m\text{CY}_3)\text{CWCW}_2$, $(\text{CW}_2)_p\text{OH}$, polyalkylene glycol and polyolester;

n is an integer from 2 to 49;

m is an integer from 0 to 3;

p is an integer from 0 to 9;

the molecular weight average (M_w) is ≤ 5500 ; and

- 25 the polydispersity index is ≤ 1.45 .

2. A compound according to claim 1 wherein

each W is independently selected from the group consisting of H, F, Cl, Br and I;

each Y is independently selected from the group consisting of F, Cl, Br and I;

- 30 each Z is independently selected from the group consisting of H, OH, $(\text{CW}_2)_p\text{CW}_3$, CY_3 , OCW_3 , $\text{O}(\text{CW}_2)_p\text{CW}_3$, $\text{OCW}((\text{CY}_2)_m\text{CY}_3)\text{CWCW}_2$, polyalkylene glycol and polyolester;

n is an integer from 2 to 49;

m is an integer from 0 to 3;

- 35 p is an integer from 0 to 9;

the molecular weight average (M_w) is ≤ 5500 ; and

the polydispersity index is ≤ 1.45 .

3. A compound according to claim 1 or 2 wherein the M_w is ≤ 4000 , preferably ≤ 3000 , even more preferably ≤ 2500 .
- 5 4. A compound according to any one of the preceding claims wherein the polydispersity index is about 1.40, preferably about 1.35, more preferably about 1.30, even more preferably about 1.25.
- 10 5. A compound according to any one of the preceding claims, wherein Y is F or Cl, and preferably F; and/or wherein W is H, F or Cl, and preferably H.
6. A compound according to any one of claims 1 to 4, wherein one W group is $(CY_2)_mCY_3$, two W groups are H, Y is F and m is 0.
- 15 7. A compound according to any one of claims 1 to 4, wherein one or two W groups are F, one or two W groups are H, Y is F and m is 0.
8. A compound according to claim 7, wherein one W group is F, two W groups are H, Y is F and m is 0.
- 20 9. A compound according to any one of the preceding claims, wherein Z comprises a polyalkylene glycol; optionally wherein the polyalkylene glycol is selected from the group consisting of poly(ethylene oxide) and poly(propylene oxide), and mixtures thereof.
- 25 10. A compound according to any one of the preceding claims, wherein at least one of the Z derivatives are not H or OH.
11. A compound according to any one of the preceding claims, wherein at least one of the Z derivatives comprises a fluorinated-PAG (F-PAG), preferably wherein the F-PAG is selected from the group consisting of F_3C - end capped PAGs and hydroxyl end capped PAGs.
- 30 12. A compound according to any one of the preceding claims wherein n is an integer from 2 to 25; and/or wherein m is 0; and/or wherein p is 1 to 6, and preferably 2 to 6, for example 3 to 5.
- 35

13. A compound according to any one of the preceding claims having a viscosity at 40 °C of from about 5 to about 250 cP; optionally wherein the viscosity is from about 15 to 150 cP.
- 5 14. A composition comprising at least two different compounds of formula (Ia) and/or (Ib).
15. A composition comprising one or more compounds of formula (Ia) and/or (Ib) as defined in any one of the preceding claims and a heat transfer portion.
- 10 16. A composition according to claim 14 or 15, wherein the weight percentage of the compound or compounds of formula (Ia) and/or (Ib) in the composition is 1 to 30%, preferably 1 to 10%, more preferably 1 to 5%.
- 15 17. A composition according to claim 15 or 16, wherein the heat transfer portion comprises one or more compounds selected from the group consisting of (hydro)fluoroolefins (HFOs), hydrofluorocarbons (HFCs), chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), perfluoroalkyl iodides and hydrocarbons.
- 20 18. A composition according to any one of claims 15 to 17, wherein the heat transfer portion comprises R-32, R-152a, CF₃I, R-1234ze, R-1234yf, R-1132a, R-1123, R-744, R-290 and/or R-600a.
- 25 19. A composition according to any one of claims 14 to 18, further comprising a stabiliser; optionally wherein the stabiliser is selected from diene-based compounds, phosphates, phenol compounds and epoxides, and mixtures thereof.
- 30 20. A composition according to any one of claims 15 to 19, which comprises a single liquid phase across the entire temperature range between -30°C and 70°C.
21. A method for making the compound of formula (Ia) and/or formula (Ib), according to any one of claims 1 to 13, wherein the method comprises the polymerisation of an epoxide using an initiator formed from a base and an alcohol.
- 35 22. A method according to claim 21 wherein the base is a group I or group II metal hydroxide, preferably sodium or potassium hydroxide, more preferably potassium hydroxide.

23. A method according to claim 22, wherein the alcohol is a primary alcohol, preferably ethylene glycol or trifluoroethanol.
- 5 24. A method according to any one claims 21 to 23, comprising the polymerisation of an epoxide in the absence of a solvent.
25. A method according to any one of claims 21 to 24 wherein the reaction is carried out at a temperature of from about 0 to about 130 °C, preferably from about 40 to about
10 100 °C, more preferably from about 50 to about 90 °C.
26. A method according to any one of claims 21 to 25 wherein the reaction is carried out at a pressure of from about 100 to about 1000.3 kPa, preferably about 101 kPa.
- 15 27. A method according to any one of claims 21 to 26 wherein the polymerisation is of an epoxide of any one of 3,3,3-trifluoropropene (1243zf), 2,3,3,3-tetrafluoropropene (1234yf), 1,3,3,3-tetrafluoropropene (1234ze), 1,1,1,4,4,4-hexafluoro-2-butene (1336mzz) and hexafluoroisobutylene (HFIB), preferably the epoxide of 1243zf (1,1,1-trifluoro-2,3-epoxypropane).
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28. Use of a compound or composition, as defined in any one of claims 1 to 20, in a heat transfer device, preferably wherein the heat transfer device is a refrigeration device.