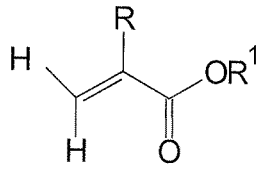
Claims

1. A lubricant for a transmission system comprising polyalkyl(meth)acrylates, characterized in that the lubricant comprises at least 30% by weight of polyalkyl(meth)acrylate based on the total weight of lubricant, and

the polyalkyl(meth)acrylate comprising-

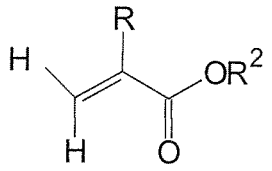
a) 0 to 25% by weight of repeat units derived from (meth)acrylates of the formula (I)



(I)

in which R is hydrogen or methyl and R^1 is an alkyl radical having 1 to 5 carbon atoms,

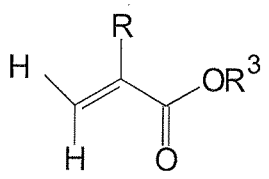
b) 50 to 100% by weight of repeat units derived from (meth)acrylates of the formula (II)



(II)

in which R is hydrogen or methyl and R^2 is an alkyl radical having 6 to 15 carbon atoms, wherein the repeat units of the formula (II) are a mixture of linear and branched radicals where 5 to 80% of the R^2 radicals are branched, based on the weight of the repeat units of the formula (II), and

c) 0 to 50% by weight of repeat units derived from (meth)acrylates of the formula (III)



(III)

in which R is hydrogen or methyl and R^3 is an alkyl radical having 16 to 40 carbon atoms,

has a weight-average molecular weight in the range from 3000 to 25 000 g/mol and a polydispersity in the range from 1.1 to 2.5.

2. The lubricant ~~as claimed in~~according to claim 1, characterized in that the lubricant comprises a polyalphaolefin (PAO) having a kinematic viscosity KV_{100} in the range from 3 to 10 mm²/s, measured at 100°C according to ASTM D 445.

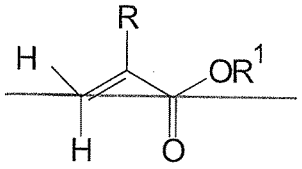
3. The lubricant ~~as claimed in~~according to claim 1 or 2, characterized in that the lubricant comprises at least one pour point improver and at least one group III mineral oil having a kinematic viscosity KV_{100} in the range from 3 to 10 mm²/s, measured at 100°C according to ASTM D 445.

~~4. The lubricant as claimed in at least one of the preceding claims, characterized in that the polyalkyl(meth)acrylate has a weight-average molecular weight in the range from 3000 to 25 000 g/mol.~~

45. The lubricant ~~as claimed in at least one~~according to any one of the preceding claims, characterized in that the lubricant has a kinematic viscosity KV_{100} of at least 30 mm^2/s, measured at 100°C according to ASTM D 445.

~~6. The lubricant as claimed in at least one of the preceding claims, characterized in that the polyalkyl(meth)acrylate comprises~~

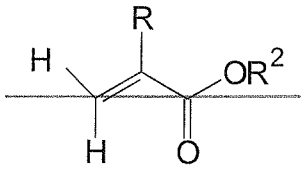
~~a) 0 to 25% by weight of repeat units derived from (meth)acrylates of the formula (I)~~



~~(I)~~

~~in which R is hydrogen or methyl and R^1 is an alkyl radical having 1 to 5 carbon atoms,~~

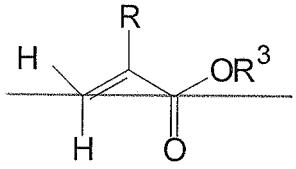
~~b) 50 to 100% by weight of repeat units derived from (meth)acrylates of the formula (II)~~



~~(II)~~

~~in which R is hydrogen or methyl and R^2 is an alkyl radical having 6 to 15 carbon atoms, and~~

~~c) 0 to 50% by weight of repeat units derived from (meth)acrylates of the formula (III)~~



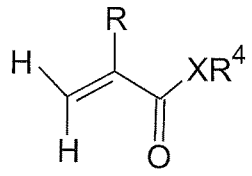
~~(III)~~

~~in which R is hydrogen or methyl and R^3 is an alkyl radical having 16 to 40 carbon atoms.~~

57. The lubricant ~~as claimed in claim 6~~according to any one of the preceding claims, characterized in that the proportion of repeat units derived from (meth)acrylates of the formula (II) is at least 70% by weight.

68. The lubricant ~~as claimed in at least one of~~according to any one of the preceding claims, characterized in that the polyalkyl(meth)acrylate has repeat units derived from dispersing monomers.

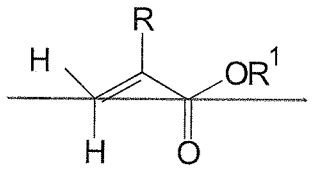
7. The lubricant according to claim 6, characterized in that the dispersing monomers are selected from heterocyclic vinyl compounds and/or ethylenically unsaturated polar ester or amide compounds of the formula (IV)



in which R is hydrogen or methyl, X is oxygen, sulfur or an amino group of the formula -NH- or $-NR^a-$, in which R^a is an alkyl radical having 1 to 10 and preferably 1 to 4 carbon atoms, R^4 is a radical which comprises 2 to 50 carbon atoms and has at least one heteroatom, preferably at least two heteroatoms.

~~9. A polyalkyl(meth)acrylate for use in lubricants, comprising~~

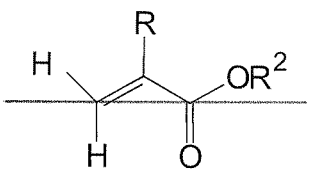
~~a) 0 to 25% by weight of repeat units derived from (meth)acrylates of the formula (I)~~



~~(I)~~

~~in which R is hydrogen or methyl and R^1 is an alkyl radical having 1 to 5 carbon atoms,~~

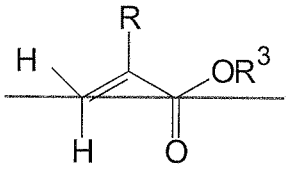
~~b) 50 to 100% by weight of repeat units derived from (meth)acrylates of the formula (II)~~



~~(II)~~

~~in which R is hydrogen or methyl and R^2 is an alkyl radical having 6 to 15 carbon atoms, and~~

~~e) 0 to 50% by weight of repeat units derived from (meth)acrylates of the formula (III)~~



~~(III)~~

~~in which R is hydrogen or methyl and R^3 is an alkyl radical having 16 to 40 carbon atoms, characterized in that the polyalkyl(meth)acrylate has a weight-average molecular weight in the range from 3000 to 25 000 g/mol and~~

~~a polydispersity in the range from 1.1 to 2.5, and~~

~~the repeat units of the formula (II) are a mixture of linear and branched radicals where 5 to 80% of the R^2~~

~~radicals are branched, based on the weight of the repeat units of the formula (II).~~

8~~10~~. ~~A~~ The lubricant as claimed in any one of the preceding claims~~polyalkyl(meth)acrylate as claimed in claim 9~~, ~~characterized in that~~wherein the repeat units of the formula (II) are a mixture of linear and branched radicals where 10 to 65% of the R^2 radicals are branched, based on the weight of the repeat units of the formula (II).

9~~11~~. ~~A polyalkyl(meth)acrylate as claimed in claim 9 or 10~~The lubricant according to any one of the preceding claims, characterized in that the polyalkyl(meth)acrylate has a weight-average molecular weight in the range from 5000 to 15 000 g/mol.

10~~12~~. ~~A polyalkyl(meth)acrylate as claimed in at least one of claims 9 to 11~~The lubricant according to any one of the preceding claims, characterized in that the polyalkyl(meth)acrylate has a polydispersity in the range from 1.4 to 1.9.

11~~13~~. ~~A polyalkyl(meth)acrylate as claimed in at least~~The lubricant according to any one of ~~claims 9 to 12~~ the preceding claims, characterized in that the repeat units of the formula (II) are a mixture of linear and branched radicals where the proportion by weight of the branched R^2 radicals having 9 to 11 carbon atoms is higher than the proportion by weight of the linear R^2 radicals having 9 to 11 carbon atoms.

12~~14~~. ~~A polyalkyl(meth)acrylate as claimed in at least one of claims 9 to 13~~The lubricant according to any one of the preceding claims, characterized in that the repeat units of the formula (II) are a mixture of linear and branched radicals where the proportion by weight of the linear R^2 radicals having 12 to 15 carbon atoms is

higher than the proportion by weight of the branched R^2 radicals having 12 to 15 carbon atoms.

13~~15~~. ~~A polyalkyl(meth)acrylate as claimed in at least one of claims 9 to 14~~The lubricant according to any one of the preceding claims, characterized in that the repeat units of the formula (II) are a mixture of branched and linear radicals where the weight ratio of branched to linear R^2 radicals is in the range from 60:40 to 20:80.

14~~16~~. ~~A polyalkyl(meth)acrylate as claimed in at least one of claims 9 to 15~~The lubricant according to any one of the preceding claims, characterized in that the repeat units of the formula (II) are a mixture of R^2 radicals with a different number of carbon atoms, the proportion by weight of R^2 radicals having 12 to 15 carbon atoms being greater than the proportion by weight of R^2 radicals having 7 to 11 carbon atoms.

15~~17~~. ~~A polyalkyl(meth)acrylate as claimed in at least one of claims 9 to 16~~The lubricant according to any one of the preceding claims, characterized in that the repeat units of the formula (II) are a mixture of linear and branched radicals where at least 50% by weight of the repeat units of the formula (II) having a branched R^2 radical have a branch at the 2 position.

16~~18~~. ~~A polyalkyl(meth)acrylate as claimed in at least one of claims 9 to 17~~The lubricant according to any one of the preceding claims, characterized in that the repeat units of the formula (II) are a mixture of branched radicals, the mixture comprising repeat units with methyl branches and with ethyl branches.

17~~19~~. ~~A polyalkyl(meth)acrylate as claimed in at least one of claims 9 to 18~~The lubricant according to any one of the preceding claims, characterized in that the repeat units of the formula (II) are a mixture of branched radicals,

the mixture comprising repeat units with propyl branches and with longer-chain branches.

18. The lubricant according to any one of the preceding claims, characterized in that the transmission system is a wind power plant.

~~20. A process for preparing polyalkyl(meth)acrylates as claimed in at least one of claims 9 to 19, characterized in that a composition comprising at least one (meth)acrylate of the formula (II) is free-radically polymerized.~~

~~21. The process as claimed in claim 20, characterized in that the polymerization is effected using at least one chain transferer.~~

~~22. The process as claimed in claim 21, characterized in that the polymerization is effected using at least two chain transferers.~~

~~23. The process as claimed in claim 21 or 22, characterized in that the polymerizable composition comprises 2 to 4.5% by weight of chain transferer, based on the weight of the monomers.~~

~~24. The process as claimed in at least one of claims 20 to 23, characterized in that at least 60% by weight of the monomers are initially charged.~~

~~25. The process as claimed in at least one of claims 20 to 24, characterized in that the initiator is added in at least two steps, less initiator being added in the first step than in the subsequent steps.~~

~~26. The process as claimed in at least one of claims 20 to 25, characterized in that the proportion of solvent~~

during the polymerization is in the range from 0.5 to 10% by weight.

27. The process as claimed in at least one of claims 20 to 26, characterized in that the polymerization is performed at a temperature in the range from 0 to 30°C above the initiator temperature at which the half-life of the initiator is 30 minutes.

28. The use of polyalkyl(meth)acrylates as lubricants in transmission systems, characterized in that the polyalkyl(meth)acrylate has a weight-average molecular weight in the range from 3000 to 25 000 g/mol.

29. A wind power plant comprising at least one transmission system comprising a lubricant containing a polyalkyl(meth)acrylate, characterized in that the lubricant comprises at least 30% by weight of polyalkyl(meth)acrylate.