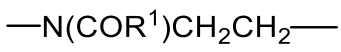
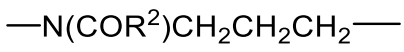
CLAIMS

1. A lubricating composition comprising a major amount of an oil of lubricating viscosity and 0.01 to 25 percent by mass, based on the mass of the composition of an oil-soluble copolymer comprising units (a) and units (b):



(a)



(b)

wherein the polymer carries an inorganic or organic nucleophilic polymerisation terminating group (t), and an initiator group (i) connected to the N atom of a repeat unit (a) or (b), the initiator group (i) being effective to initiate the polymerisation of linear, branched or cyclic hydrocarbyl moieties; and

wherein R^1 and R^2 are the same or different and comprise a single or a mixture of linear, branched hydrocarbyl groups having 1-50 carbon atoms, some or all having 12-50 carbon atoms.

2. A lubricating composition according to claim 1, wherein units (a) comprise from 1 to 99 mol% of the copolymer and units (b) comprise from 1 to 99 mol% of the copolymer.

3. A lubricating composition according to claim 1 or claim 2, wherein the copolymer comprises 50 mol% of units (a) and 50 mol% of units (b).

4. A lubricating composition according to any preceding claim, wherein the copolymer is a statistical copolymer or a random copolymer.

5. A lubricating composition according to any of claims 1 to 3, wherein the copolymer is an alternating copolymer, a periodic copolymer or a block copolymer.

6. A lubricating composition according to any preceding claim, wherein the copolymer has a linear architecture.

7. A lubricating composition according to any of claims 1 to 5, wherein the copolymer has a branched or star architecture.

8. A lubricating composition according to any preceding claim, wherein R^1 and R^2 are the same or different and contain 1 to 36 carbon atoms, provided that some or all of the groups R^1 or R^2 have 12 to 36 carbon atoms.

9. A lubricating composition according to any preceding claim, wherein the copolymer has a number average molecular weight (Mn) of 2,000-500,000 g/mol, as measured by Gel Permeation Chromatography with reference to linear narrow poly(methylmethacrylate) standards in the range of 550 to 600,000 g/mol.

10. A lubricating composition according to any preceding claim, wherein one of groups R^1 and R^2 comprise unsaturated hydrocarbyl groups having between 8 and 20 carbon atoms, preferably between 15 and 20 carbon atoms, the other of groups R^1 and R^2 is saturated.

11. A lubricating composition according to any of claims 1 to 9, wherein both of groups R^1 and R^2 comprise unsaturated hydrocarbyl groups having between 16 and 20 carbon atoms, preferably between 15 and 20 carbon atoms.

12. A lubricating composition according to any preceding claim, wherein at least 5% of the total number of either or both of the groups R^1 and R^2 in the polymer comprise unsaturated hydrocarbyl groups having between 8 and 20 carbon atoms, preferably between 15 and 20 carbon atoms.

13. A lubricating composition according to any preceding claim, wherein at least 5% of the total number of either or both of the groups R^1 and R^2 in the polymer comprise unsaturated hydrocarbyl groups having 17 carbon atoms.

14. A lubricating composition according to any preceding claim, wherein at least 50% of the total number of either or both of the groups R^1 and R^2 in the polymer comprise singly, doubly or triply-unsaturated C_{17} alkenyl groups or any mixture thereof.

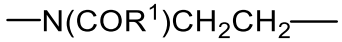
15. A lubricating composition according to any preceding claim, wherein either or both of groups R^1 and R^2 are obtained from natural fatty acids such as tall oil fatty acid and rape-seed oil fatty acid.

16. A lubricating composition according to any preceding claim, comprising one or more co-additives, different from the oil-soluble copolymer, selected from one or more phosphorus-containing compounds; oxidation inhibitors or anti-oxidants; dispersants; metal-containing detergents; anti-wear agents; friction modifiers; and viscosity modifiers.

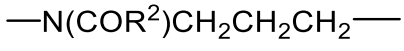
17. A lubricating composition according to any preceding claim, comprising at least 60% by mass, for example 70% by mass or more of an oil of lubricating viscosity.

18. A method of lubricating the crankcase of an internal combustion engine comprising operating the engine and lubricating the crankcase with a lubricating composition of any preceding claim.

19. The use of an oil-soluble copolymer comprising units (a) and units (b):



(a)



(b)

wherein the polymer carries an inorganic or organic nucleophilic polymerisation terminating group (t), and an initiator group (i) connected to the N

atom of a repeat unit (a) or (b), the initiator group (i) being effective to initiate the polymerisation of linear, branched or cyclic hydrocarbyl moieties; and

wherein R^1 and R^2 are the same or different and comprise a single or a mixture of linear, branched hydrocarbyl groups having 1-50 carbon atoms, some or all having 12-50 carbon atoms, in a lubricant for an internal combustion engine to provide the lubricant, in operation of the engine, with friction reducing properties.