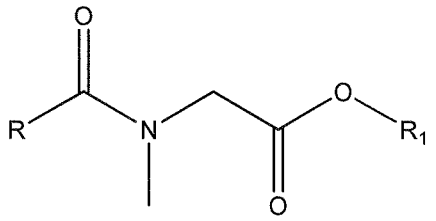
WHAT IS CLAIMED IS:

1. ~~A lubricating~~ An engine oil composition comprising a major amount of base oil having at least 90% saturates and being selected from the group consisting of a Group II and Group III base oil, or a base oil selected from the group consisting of Group IV and Group V base oil, and mixtures thereof, and

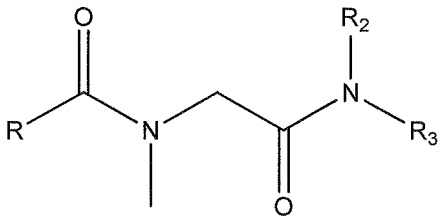
a minor amount of an additive package, wherein the additive package comprises one or more friction modifier components selected from the group consisting of:

(A) one or more compounds of the formulae I and II:



(I)

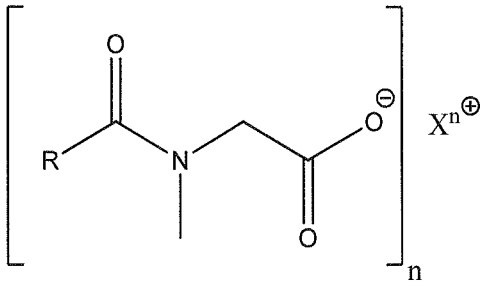
wherein R is a linear or branched, saturated, unsaturated, or partially saturated hydrocarbyl group having about 8 to about 22 carbon atoms and R_1 is a hydrocarbyl having from about 1 to about 8 carbon atoms or a C_1-C_8 hydrocarbyl group containing one or more heteroatoms;



(II)

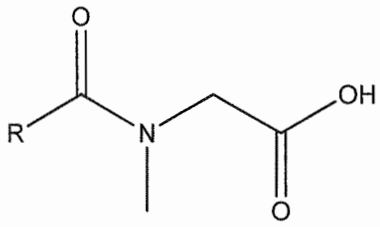
wherein R is a linear or branched, saturated, unsaturated, or partially saturated hydrocarbyl group having about 8 to about 22 carbon atoms and R_2 and R_3 are independently selected from the group consisting of hydrogen, C_1-C_{18} hydrocarbyl groups, and C_1-C_{18} hydrocarbyl groups containing one or more heteroatoms;

(B) two or more compounds independently selected from the group consisting of compounds of the formulae III and IV:



(III)

wherein R is a linear or branched, saturated, unsaturated, or partially saturated hydrocarbyl group having about 8 to about 22 carbon atoms; and X is an alkali metal, alkaline earth metal, or ammonium cation and n is the valence of cation X;



(IV)

wherein R is a linear or branched, saturated, unsaturated, or partially saturated hydrocarbyl group having about 8 to about 22 carbon atoms; and

(C) at least one compound of the formulae III and IV in combination with at least one compound of the formulae I and II;

wherein the engine oil composition is adapted for use as an engine oil, the engine oil composition has a phosphorus content of 50-1000 ppm and the engine oil composition comprises 0.1-2.0 wt. % of the one or more friction modifier components (A)-(C), based on the total weight of the engine oil composition.

2. The ~~lubricating~~ engine oil composition of claim 1, wherein the one or more friction modifier components are esters of the formula I.

3. The ~~lubricating~~ engine oil composition of claim 1, wherein the one or more friction modifier components are amides of the formula II.

4. The ~~lubricating~~ engine oil composition of claim 1, wherein the friction modifier component comprises at least one salt of the formula III.

5. The ~~lubricating~~ engine oil composition of claim 1, wherein the additive package comprises at least two different compounds independently selected from the group consisting of compounds of the formulae I-IV.

6. The ~~lubricating~~ engine oil composition of claim 2, wherein R_1 is hydrocarbyl group having from about 1 to about 8 carbon atoms.

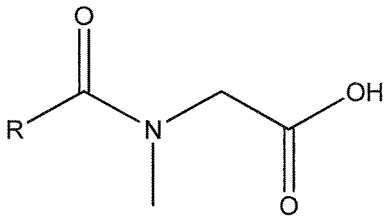
7. The ~~lubricating~~ engine oil composition of claim 2, wherein R_1 is a hydrocarbyl group containing a C_1-C_8 hydrocarbyl group containing one or more heteroatoms.

8. The ~~lubricating~~ engine oil composition of claim 3, wherein R_2 and R_3 are independently selected from hydrogen, C_1-C_{18} hydrocarbyl groups, and C_1-C_{18} hydrocarbyl groups containing one or more heteroatoms.

9. The ~~lubricating~~ engine oil composition of claim 4, wherein the one or more friction modifier components of the formula III are salts of one or more cations selected from sodium, lithium, potassium, calcium, magnesium, and ammonium cations.

10. ~~A lubricating~~ An engine oil composition comprising a major amount of base oil and a minor amount of an additive package, wherein the additive package comprises one or more amide reaction products of:

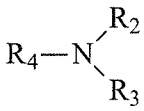
one or more compounds of the formula IV:



(IV)

wherein R is a linear or branched, saturated, unsaturated, or partially saturated hydrocarbyl group having about 8 to about 22 carbon atoms, and

one or more amines of the formula V:



(V)

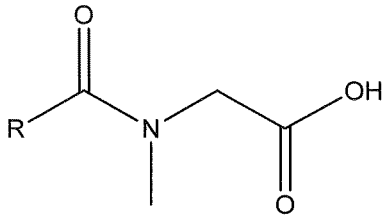
wherein R_2, R_3, and R_4 are independently selected from the group consisting of hydrogen, C_1-C_{18} hydrocarbyl groups, and hydrocarbons containing C_1-C_{18} hydrocarbyl groups and one or more heteroatoms,

wherein the engine oil composition is adapted for use as an engine oil, the engine oil composition has a phosphorus content of 50-1000ppm, and the engine oil composition comprises 0.1-2.0 wt. % of the amide reaction products, based on the total weight of the engine oil composition.

11. The ~~lubricating~~ engine oil composition of claim 10, wherein R_2, R_3, and R_4 are independently selected from the group consisting of hydrogen, C_3-C_{12} hydrocarbyl groups, and hydrocarbons containing C_3-C_{12} hydrocarbyl groups and one or more heteroatoms.

12. ~~A lubricating~~ An engine oil composition comprising a major amount of a base oil having at least 90% saturates and being selected from a Group II and Group III base oil, or a base oil selected from the group consisting of a Group IV and Group V base oil, and mixtures thereof, and

a minor amount of an additive package, wherein the additive package comprises one or more a reaction products of one or more alcohols with one or more compounds of the Formula IV



(IV)

wherein R is a linear or branched, saturated, unsaturated, or partially saturated hydrocarbyl group having about 8 to about 22 carbon atoms,

wherein the engine oil composition is adapted for use as an engine oil, the engine oil composition has a phosphorus content of 50-1000ppm, and the engine oil composition comprises 0.1-2.0 wt. % of the one or more alcohols with one or more compounds of the formula IV, based on the total weight of the engine oil composition.

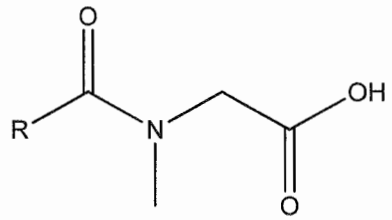
13. The ~~lubricating~~ engine oil composition of claim 12, wherein the one or more alcohols contain a hydrocarbyl group having from about 1 to about 8 carbon atoms.

14. The ~~lubricating~~ engine oil composition of claim 12, wherein the one or more alcohols contain a hydrocarbyl group having from about 1 to about 8 carbon atoms and one or more heteroatoms.

15. ~~A lubricating~~An engine oil composition comprising a major amount of a base oil having at least 90% saturates and being selected from a Group II and Group III base oil, or a base oil selected from the group consisting of a Group IV and Group V base oil, and mixtures thereof, and

a minor amount of an additive package, wherein the additive package comprises one or more amide or ester reaction products of:

one or more compounds of the formula IV:



(IV)

wherein R is a linear or branched, saturated, unsaturated, or partially saturated hydrocarbyl group having about 8 to about 22 carbon atoms, and

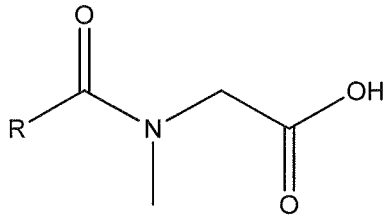
one or more amine alcohol(s);

wherein the engine oil composition is adapted for use as an engine oil, the engine oil composition has a phosphorus content of 50-1000 ppm, and the engine oil composition comprises 0.1-2.0 wt. % of the one or more amide or ester reaction products, based on the total weight of the engine oil composition.

16. The ~~lubricating~~ engine oil composition as claimed in claim 15, wherein said amine alcohols are selected from ethanolamine, diethanolamine, aminoethyl ethanolamine, tris-hydroxymethyl amino-methane (THAM), and mixtures thereof.

17. ~~A lubricating~~An engine oil composition comprising a major amount of a base oil having at least 90% saturates and being selected from a Group II and Group III base oil, or a base oil selected from the group consisting of a Group IV and Group V base oil, and mixtures thereof, and

a minor amount of an additive package, wherein the additive package comprises (A) a salt reaction product of one or more compounds of the formula IV:

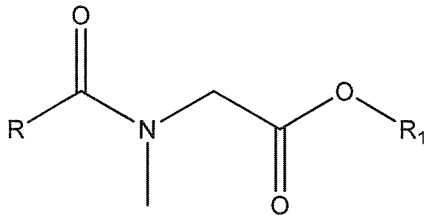


(IV)

wherein R is a linear or branched, saturated, unsaturated, or partially saturated hydrocarbyl group having about 8 to about 22 carbon atoms, and

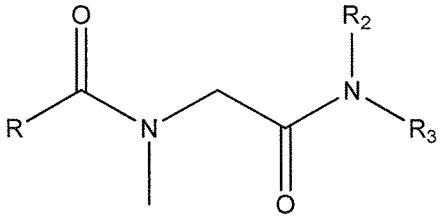
one or more of an alkali metal hydroxide, and alkaline earth metal hydroxide, an alkali metal oxide, an alkaline earth metal hydroxide, ammonia, or an amine; and

(B) at least one compound of the formulae I-IV different from the one or more compounds of component (A):



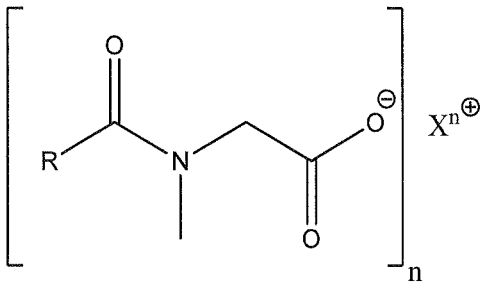
(I)

wherein R is a linear or branched, saturated, unsaturated, or partially saturated hydrocarbyl group having about 8 to about 22 carbon atoms and R_1 is a hydrocarbyl having from about 1 to about 8 carbon atoms or a C_1-C_8 hydrocarbyl group containing one or more heteroatoms;



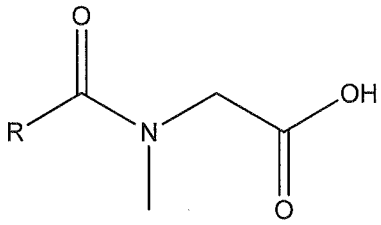
(II)

wherein R is a linear or branched, saturated, unsaturated, or partially saturated hydrocarbyl group having about 8 to about 22 carbon atoms and R_2 and R_3 are independently selected from hydrogen, C_1-C_{18} hydrocarbyl groups, and C_1-C_{18} hydrocarbyl groups containing one or more heteroatoms;



(III)

wherein R is a linear or branched, saturated, unsaturated, or partially saturated hydrocarbyl group having about 8 to about 22 carbon atoms; and X is an alkali metal, alkaline earth metal or ammonium cation and n is the valence of cation X; and



(IV)

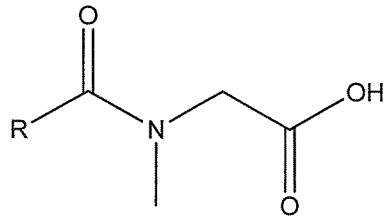
wherein R is a linear or branched, saturated, unsaturated, or partially saturated hydrocarbyl group having about 8 to about 22 carbon atoms.

wherein the engine oil composition is adapted for use as an engine oil, the engine oil composition has a phosphorus content of 50-1000 ppm, and the engine oil composition comprises 0.1-2.0 wt. % of a combination of the one or more reaction products (A) and the at least one compound (B), based on the total weight of the engine oil composition.

18. ~~A lubricating~~An engine oil composition comprising a major amount of a base oil having at least 90% saturates and being selected from a Group II and Group III base oil, or a base oil selected from the group consisting of a Group IV and Group V base oil, and mixtures thereof, and

a minor amount of an additive package, wherein the additive package comprises

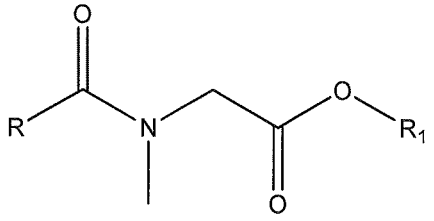
(A) one or more compounds of the formula IV:



(IV)

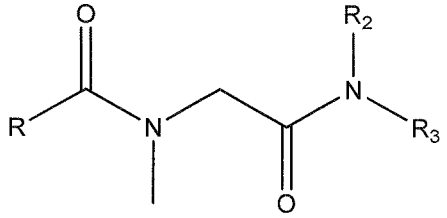
wherein R is a linear or branched, saturated, unsaturated, or partially saturated hydrocarbyl group having about 8 to about 22 carbon atoms; and

(B) at least one compound of the formulae I-IV different from the one or more compounds of component (A):



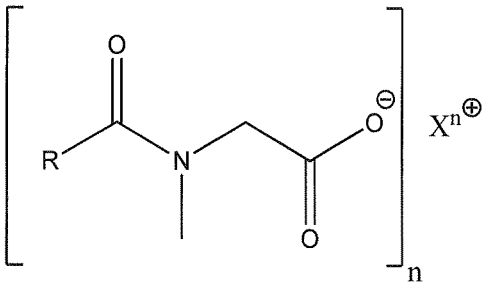
(I)

wherein R is a linear or branched, saturated, unsaturated, or partially saturated hydrocarbyl group having about 8 to about 22 carbon atoms and R_1 is a hydrocarbyl having from about 1 to about 8 carbon atoms or a C_1-C_8 hydrocarbyl group containing one or more heteroatoms;



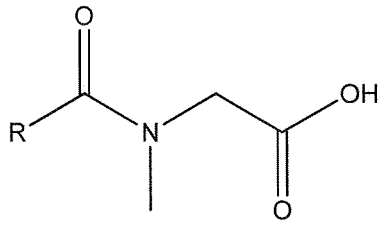
(II)

wherein R is a linear or branched, saturated, unsaturated, or partially saturated hydrocarbyl group having about 8 to about 22 carbon atoms and R_2 and R_3 are independently selected from the group consisting of hydrogen, C_1-C_{18} hydrocarbyl groups, and C_1-C_{18} hydrocarbyl groups containing one or more heteroatoms;



(III)

wherein R is a linear or branched, saturated, unsaturated, or partially saturated hydrocarbyl group having about 8 to about 22 carbon atoms; and X is an alkali metal, alkaline earth metal or ammonium cation and n is the valence of cation X; and



(IV)

wherein R is a linear or branched, saturated, unsaturated, or partially saturated hydrocarbyl group having about 8 to about 22 carbon atoms,

wherein the engine oil composition is adapted for use as an engine oil, the engine oil composition has a phosphorus content of 50-1000 ppm, and the engine oil composition comprises 0.1-2.0 wt. % of a combination of the one or compounds (A) and the at least one compound (B) that is different from the one or more compounds (A), based on the total weight of the engine oil composition.

19. The ~~lubricating~~ engine oil composition of any one of claims 1-18, wherein R has from about 10 to about 20 carbon atoms.

20. The ~~lubricating~~ engine oil composition of any one of claims 1-18, wherein R has from about 12 to about 18 carbon atoms.

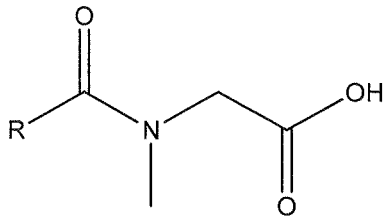
~~21. The lubricating oil of any one of claims 1-20, wherein the lubricating oil is an engine oil composition.~~

~~22.~~21. An engine oil composition comprising a major amount of a base oil having at least 90% saturates and being selected from a Group II and Group III base oil, or a base oil selected from the group consisting of a Group IV and Group V base oil, and mixtures thereof,

and

a minor amount of an additive package, wherein the additive package comprises one or more salt reaction products of:

one or more compounds of the formula IV:



(IV)

wherein R is a linear or branched, saturated, unsaturated, or partially saturated hydrocarbyl group having about 8 to about 22 carbon atoms, and

one or more of an alkali metal hydroxide, and alkaline earth metal hydroxide, an alkali metal oxide, an alkaline earth metal hydroxide, ammonia, or an amine,

wherein the engine oil composition is adapted for use as an engine oil, the engine oil composition has a phosphorus content of 50-1000 ppm, and the engine oil composition comprises 0.1-2.0 wt. % of the one or more salt reaction products, based on the total weight of the engine oil composition.

~~23.~~22. The engine ~~lubricating~~ oil composition of any one of claims 1-20 ~~or the engine oil of any one of claims 21-22~~, wherein the additive package further comprises at least one additive selected from the group consisting of antioxidants, antifoam agents, molybdenum-containing compounds, titanium-containing compounds, phosphorus-containing compounds, viscosity index improvers, pour point depressants, and diluent oils.

~~24.~~23. A method for improving thin film and boundary layer friction in an engine comprising the step of lubricating the engine with the ~~lubricating~~ engine oil composition as claimed in ~~any one of claims 1-20 or the engine oil as claimed in any one of claims 21-22~~claim 1.

~~25.~~24. The method as claimed in claim ~~24~~23, wherein the improved thin film and boundary layer friction is determined relative to a same composition in the absence of the one or more friction modifier components.

~~26.~~25. A method for improving boundary layer friction in an engine, comprising the step of lubricating the engine with the engine oil composition~~lubricating oil~~ as claimed in ~~any one of claims 1-20 or the engine oil as claimed in any one of claims 21-22~~claim 1.

~~27.~~26. The method as claimed in claim ~~26~~25, wherein the improved boundary layer friction is determined relative to a same composition in the absence of the one or more friction modifier components.

~~28.~~27. A method for improving thin film friction in an engine, comprising the step of lubricating the engine with the engine oil composition ~~lubricating oil~~ as claimed in ~~any one of claims 1-20 or the engine oil as claimed in any one of claims 21-22~~claim 1.

~~29.~~28. The method as claimed in claim ~~27~~28, wherein the improved thin film friction is determined relative to a same composition in the absence of the one or more friction modifier components.

29. The engine oil composition of any one of claims 1-22, wherein the base oil is at least one selected from the group consisting of a mineral oil, animal oil, and synthetic oil.