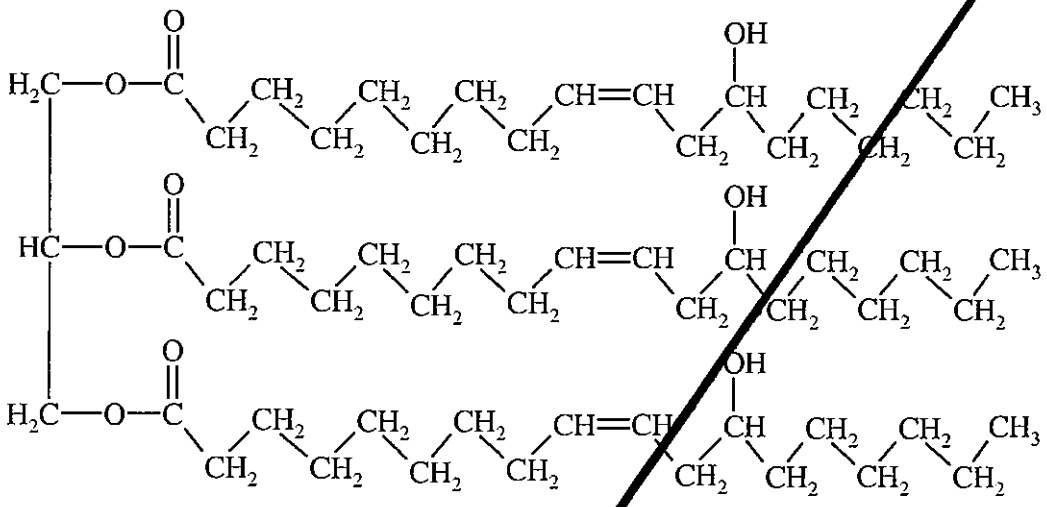
CLAIMS

What is claimed is:

1. A graft polyol comprising:

A) a natural oil comprising at least 50% by weight of a natural oil polyol represented by formula (I);



(I); and

B) particles dispersed in said natural oil A) and comprising the reaction product of;

i) a macromer polyol,

ii) a polymerizable monomer,

iii) a chain transfer agent, and

iv) a free radical initiator;

wherein said macromer polyol i) and said polymerizable monomer ii) react in the presence of said natural oil A).

2. A graft polyol as set forth in claim 1 having a solids content of at least 25% by weight of said graft polyol, alternatively a solids content of from 30% to 65% by weight of said graft polyol.

3. A graft polyol as set forth in claim 1 or 2, having a viscosity of less than 30,000 cP measured at 25°C, alternatively a viscosity of less than 20,000 cP measured at 25°C, alternatively a viscosity of less than 10,000 cP measured at 25°C.

4. A graft polyol as set forth in any one of the preceding claims, wherein said macromer polyol comprises;

i) the reaction product of a sorbitol initiated polyol and an ethylenically unsaturated compound, in the presence of a catalyst, or

ii) a fumarate.

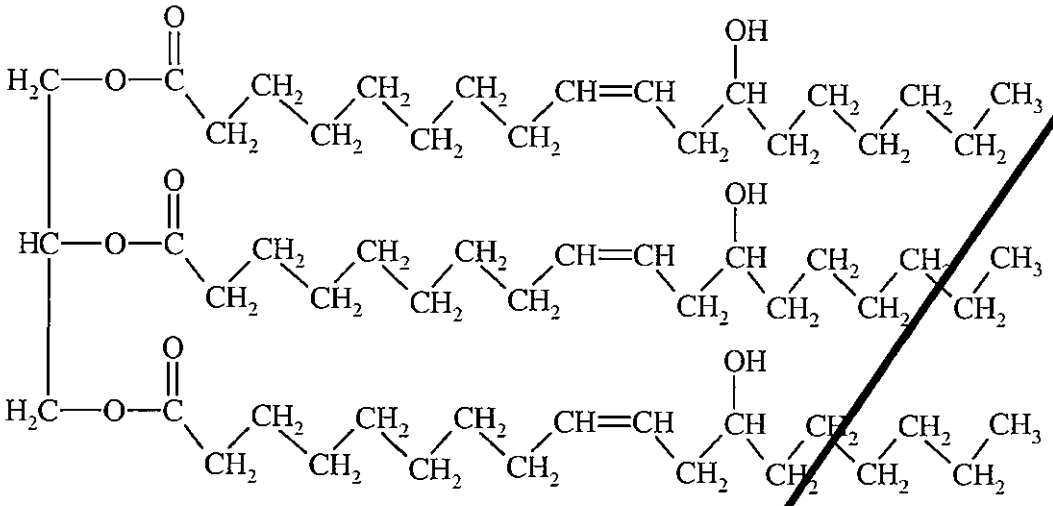
5. A graft polyol as set forth in claim 4 wherein said macromer polyol comprises the reaction product i) and the ethylenically unsaturated compound is further defined as α,α-dimethyl-meta-isopropenylbenzyl isocyanate.

6. A graft polyol as set forth in any one of the preceding claims, wherein said particles have a volume weighted mean particle diameter of at least 2 μm, alternatively at least 10% of said particles have a volume weighted mean particle diameter of at least 10 μm, alternatively said particles have a volume weighted mean particle diameter of at least 2 μm and at least 10% of said particles have a volume weighted mean particle diameter of at least 10 μm.

7. A graft polyol as set forth in any one of the preceding claims, wherein said chain transfer agent is further defined as a thiol.

8. A graft polyol comprising:

A) a natural oil comprising at least 50% by weight of a natural oil polyol represented by the formula (I);



(I); and

B) particles dispersed in said natural oil A) and comprising the reaction product of;

i) a macromer polyol comprising the reaction product of a sorbitol initiated polyol and α,α-dimethyl-meta-isopropenylbenzyl isocyanate, in the presence of a catalyst,

ii) a polymerizable monomer,

iii) a chain transfer agent comprising a thiol, and

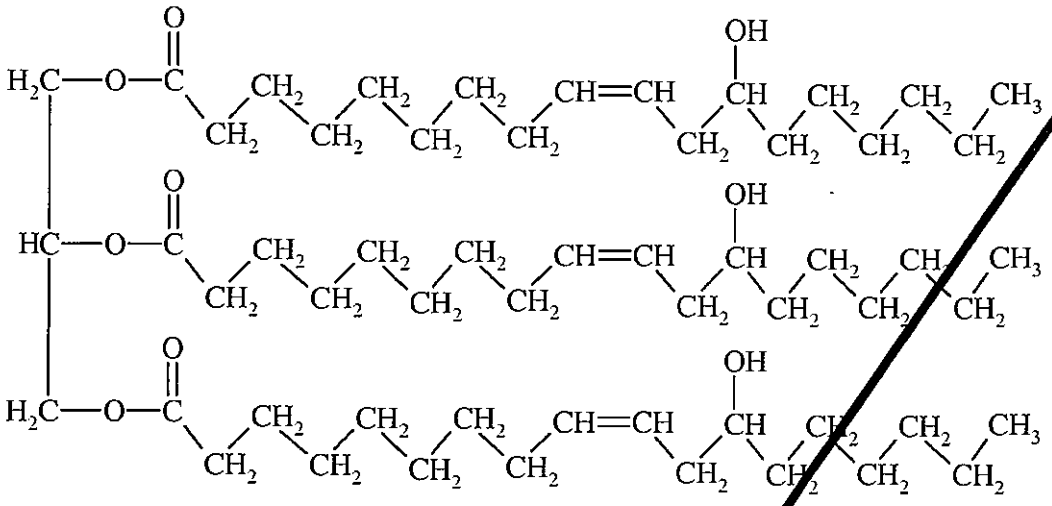
iv) a free radical initiator;

wherein said macromer polyol i) and said polymerizable monomer ii) react in the presence of said natural oil A); and

wherein said graft polyol has a solids content of from 30% to 65% by weight and a viscosity of less than 10,000 cP measured at 25°C, wherein said particles have a volume weighted mean diameter of at least 0.4 μm, and wherein at least 10% of said particles have a volume weighted mean particle diameter of at least 0.9 μm.

9. A method of forming a graft polyol, said method comprising the steps of:

providing A) a natural oil comprising at least 50% by weight of a natural oil polyol represented by the formula (I);



(I);

providing each of a macromer polyol, a chain transfer agent, a free radical initiator, and a polymerizable monomer;

combining the natural oil A), the macromer polyol, the chain transfer agent, the free radical initiator, and the polymerizable monomer; and

reacting the polymerizable monomer, the macromer polyol, and the free radical initiator to form B) particles dispersed in the natural oil A).

10. A method as set forth in claim 9 wherein the step of combining is further defined as combining a first portion of the natural oil with the macromer polyol prior to combining a remaining portion of the natural oil, the chain transfer agent, the free radical initiator, and the polymerizable monomer.

11. A method as set forth in claim 9 or 10, wherein the graft polyol has a solids content of at least 25% by weight of the graft polyol, alternatively a solids content of from 30% to 65% by weight of the graft polyol.

12. A method as set forth in any one of claims 9 through 11, wherein the graft polyol has a viscosity of less than 30,000 cP measured at 25°C, alternatively a viscosity of less than 20,000 cP measured at 25°C, alternatively a viscosity of less than 10,000 cP measured at 25°C.

13. A method as set forth in any one of claims 9 through 12, wherein the macromer polyol comprises;

i) the reaction product of a sorbitol initiated polyol and an ethylenically unsaturated compound, in the presence of a catalyst, or

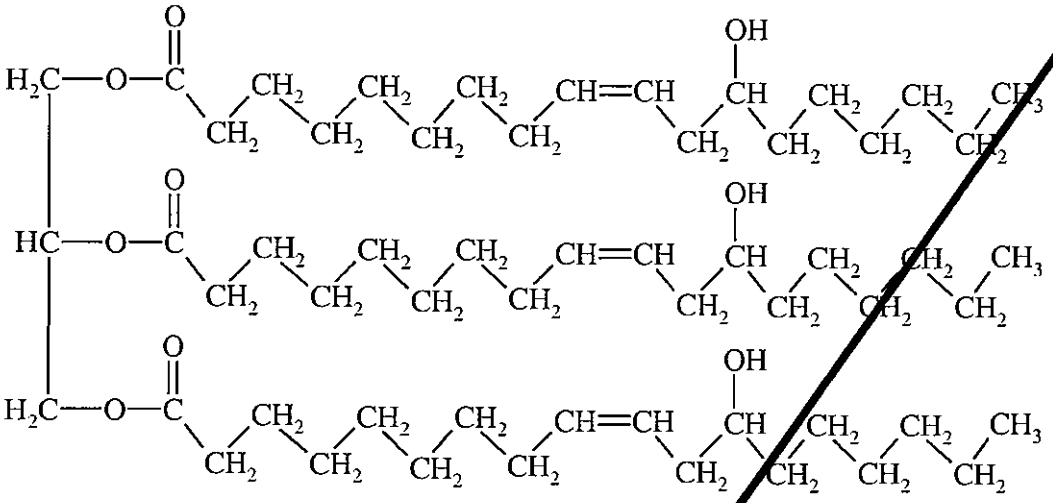
ii) a fumarate.

14. A method as set forth in claim 13 wherein the macromer polyol comprises the reaction product i) and the ethylenically unsaturated compound is further defined as α,α-dimethyl-meta-isopropenylbenzyl isocyanate.

15. A method as set forth in any one of claims 9 through 14, wherein the particles have a volume weighted mean particle diameter of at least 2 μm, alternatively at least 10% of the particles have a volume weighted mean particle diameter of at least 10 μm, alternatively the particles have a volume weighted mean particle diameter of at least 2 μm and at least 10% of the particles have a volume weighted mean particle diameter of at least 10 μm.

16. A polyurethane article comprising the reaction product of a di- and/or poly-isocyanate and a graft polyol comprising:

A) a natural oil comprising at least 50% by weight of a natural oil polyol represented by formula (I);



(I); and

B) particles dispersed in said natural oil A) and comprising the reaction product of;

i) a macromer polyol,

ii) a polymerizable monomer,

iii) a chain transfer agent, and

iv) a free radical initiator;

wherein said macromer polyol i) and said polymerizable monomer ii) react in the presence of said natural oil A).

17. A polyurethane article as set forth in claim 16 wherein said graft polyol is as set forth in any one of claims 2 through 8.

18. A polyurethane article as set forth in claim 16 or 17, having;

i) a tensile hardness of less than 20 psi,

ii) an indentation force deflection value at 25% of from 5 to 45 lbs/50in^2, and/or

iii) an indentation force deflection value at 65% of from 20 to 90 lbs/50in^2.

19. A pavement composition comprising:

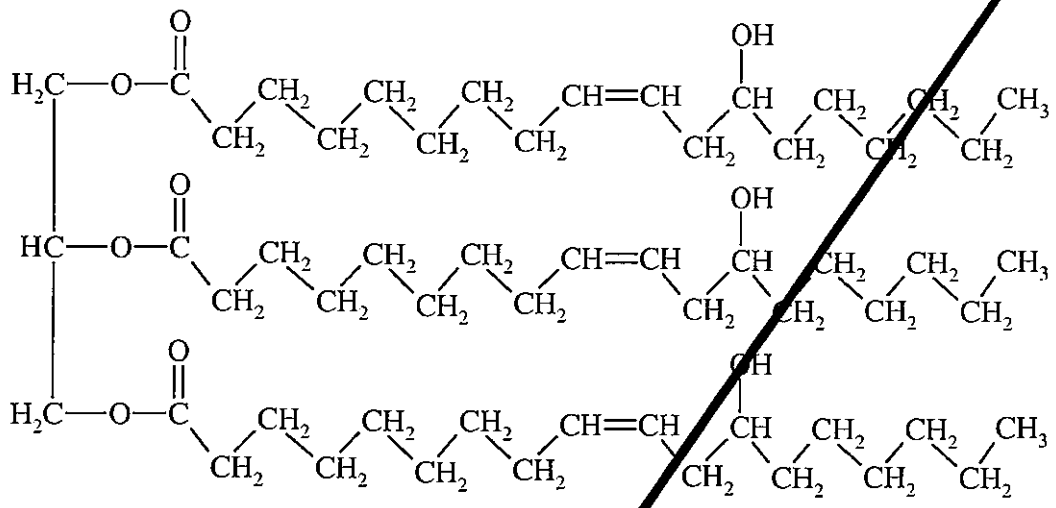
a construction aggregate; and

a binder comprising;

an isocyanate, and

a graft polyol comprising,

A) a natural oil comprising at least 50% by weight of a natural oil polyol represented by formula (I);



(I); and

B) particles dispersed in said natural oil A) and comprising the reaction product of;

i) a macromer polyol,

ii) a polymerizable monomer,

iii) a chain transfer agent, and

iv) a free radical initiator;

wherein said macromer polyol i) and said polymerizable monomer ii) react in the presence of said natural oil A).

20. A pavement composition as set forth in claim 19 wherein said graft polyol is as set forth in any one of claims 2 through 8.

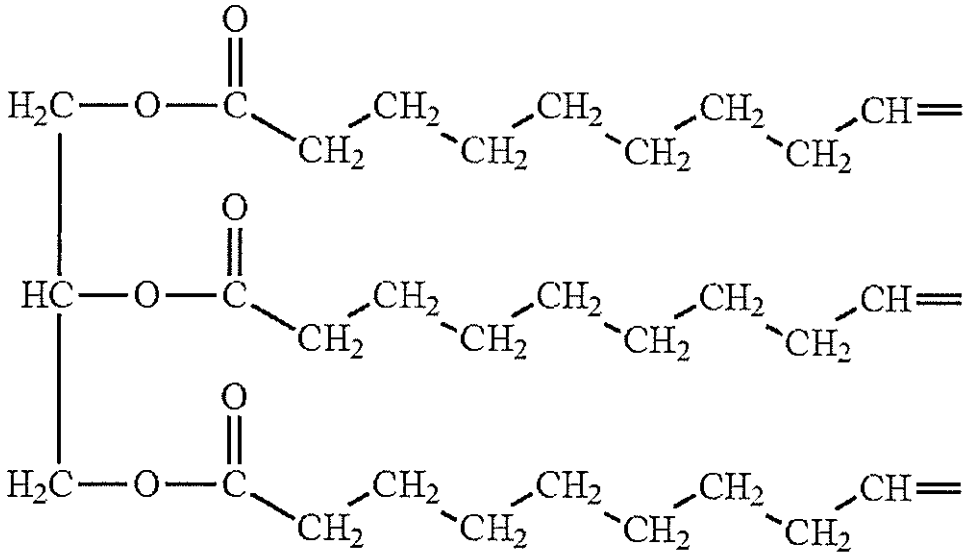
CLAIMS

What is claimed is:

1. A graft polyol comprising:

A) a natural oil comprising at least 50% by weight of a natural oil polyol represented by formula (I);

(I)



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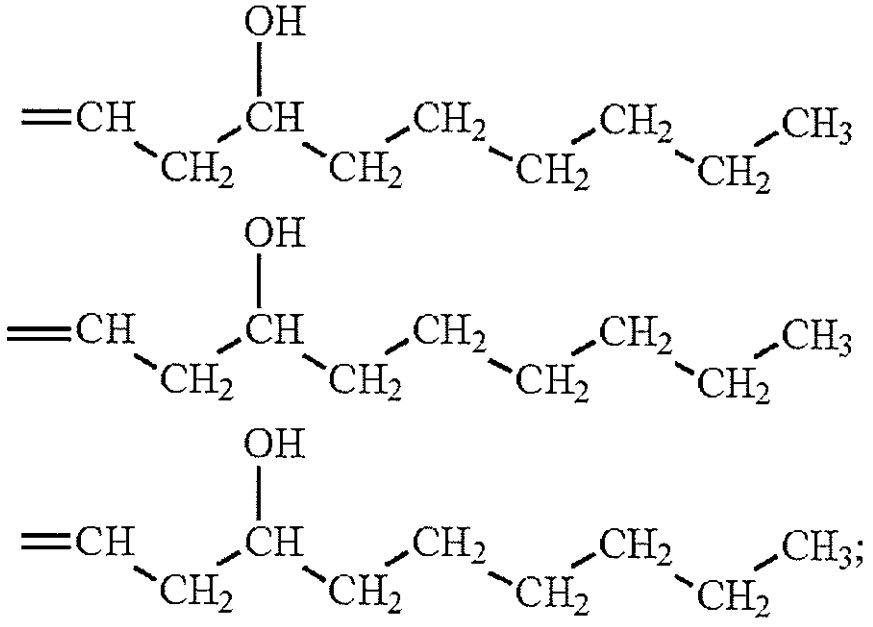


and

B) particles dispersed in said natural oil A) and comprising the reaction product of;

i) a reactor charge comprising a macromer polyol and a portion of said natural oil,

ii) a polymerizable monomer,

iii) a chain transfer agent, and

iv) a free radical initiator, and

v) a macromer charge different from said reactor charge and also comprising said macromer polyol;

wherein said reactor charge, said polymerizable monomer, said chain transfer agent, and said free radical initiator react in the presence of said natural oil to form a reaction intermediary, and said reaction intermediary reacts with said macromer in said macromer charge in the presence of said natural oil to form particles B) dispersed in the natural oil A).

2. The graft polyol as set forth in claim **1**, having a solids content of at least 25% by weight of said graft polyol.

3. The graft polyol as set forth in claim **1**, having a viscosity of less than 30,000 cP measured at 25° C.

4. The graft polyol as set forth in claim **1**, wherein said macromer polyol comprises;

i) the reaction product of a sorbitol initiated polyol and an ethylenically unsaturated compound, in the presence of a catalyst, or

ii) a fumarate.

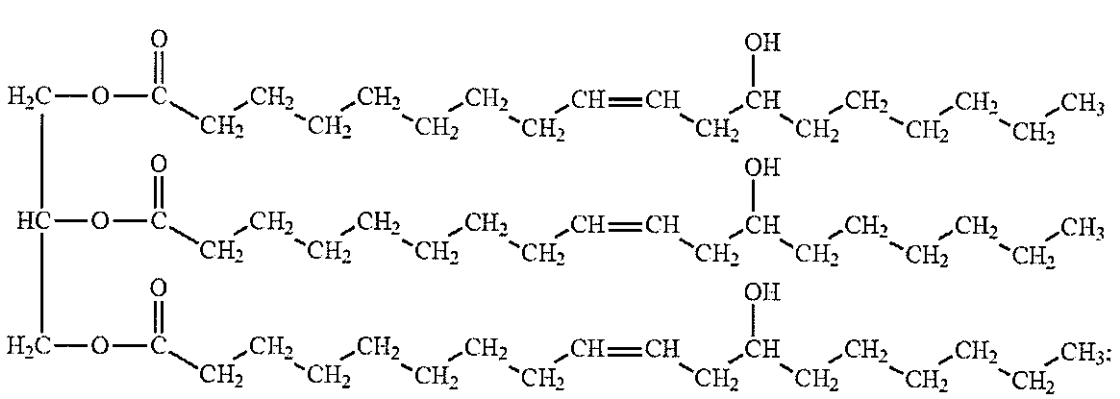
5. The graft polyol as set forth in claim **4**, wherein said macromer polyol comprises the reaction product i) and the ethylenically unsaturated compound is α,α-dimethyl-meta-isopropenylbenzyl isocyanate.

6. The graft polyol as set forth in claim **1**, wherein said particles have a volume weighted mean particle diameter of at least 2 μm and/or at least 10% of said particles have a volume weighted mean particle diameter of at least 10 μm.

7. The graft polyol as set forth in claim **1**, wherein said chain transfer agent is a thiol.

8. A method of forming a graft polyol, said method comprising the steps of:

providing A) a natural oil comprising at least 50% by weight of a natural oil polyol represented by the formula (I);



(I)

providing each of a macromer polyol, a chain transfer agent, a free radical initiator, and a polymerizable monomer;

combining the natural oil A), the macromer polyol, the chain transfer agent, the free radical initiator, and the polymerizable monomer wherein a first portion of the

natural oil A) is combined with the macromer polyol to form a reactor charge prior to combining a remaining portion of the natural oil A), the chain transfer agent, the free radical initiator, and the polymerizable monomer; and

reacting the polymerizable monomer, the macromer polyol, and the free radical initiator wherein the polymerizable monomer, the reactor charge, and the free radical initiator are reacted to form a reaction intermediary and the reaction intermediary is further reacted with a macromer charge different from the reactor charge and also comprising the macromer polyol to form B) particles dispersed in the natural oil A).

9. The method as set forth in claim **8**, wherein the graft polyol has a solids content of at least 25% by weight of the graft polyol.

10. The method as set forth in claim **8**, wherein the graft polyol has a viscosity of less than 30,000 cP measured at 25° C.

11. The method as set forth in claim **8**, wherein the macromer polyol comprises;

i) the reaction product of a sorbitol initiated polyol and an ethylenically unsaturated compound, in the presence of a catalyst, or

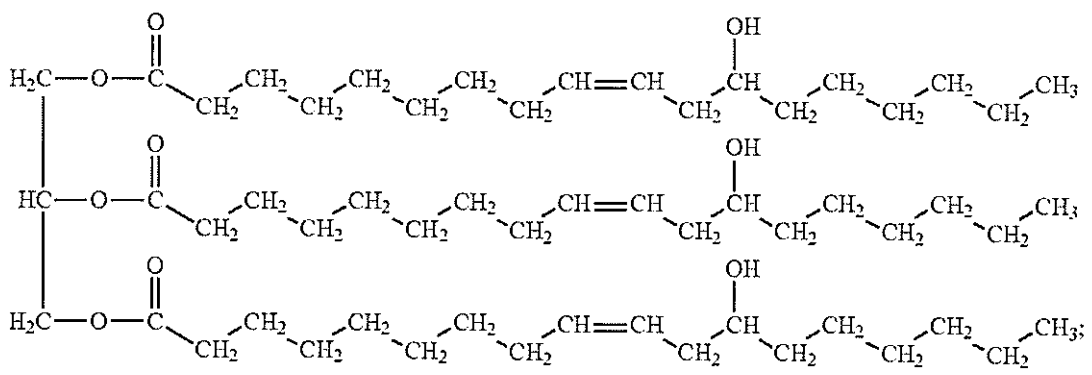
ii) a fumarate.

12. The method as set forth in claim **11**, wherein the macromer polyol comprises the reaction product i) and the ethylenically unsaturated compound is α,α-dimethyl-meta-isopropenylbenzyl isocyanate.

13. The method as set forth in claim **8**, wherein the particles have a volume weighted mean particle diameter of at least 2 μm and/or at least 10% of the particles have a volume weighted mean particle diameter of at least 10 μm.

14. A polyurethane article comprising the reaction product of a di- and/or poly-isocyanate and a graft polyol comprising:

A) a natural oil comprising at least 50% by weight of a natural oil polyol represented by formula (I);



(I)

and

B) particles dispersed in said natural oil A) and comprising the reaction product of;

i) a reactor charge comprising a macromer polyol and a portion of said natural oil,

ii) a polymerizable monomer,

iii) a chain transfer agent, and

iv) a free radical initiator, and

v) a macromer charge different from said reactor charge and also comprising said macromer polyol;

wherein said reactor charge, said polymerizable monomer, said chain transfer agent, and said free radical initiator react in the presence of said natural oil to form a reaction intermediary, and said reaction intermediary reacts with said macromer in said macromer charge in the presence of said natural oil to form particles B) dispersed in the natural oil A).

15. The polyurethane article as set forth in claim **14**, wherein said graft polyol has a solids content of at least 25% by weight of said graft polyol.

16. The polyurethane article as set forth in claim **14**, having;

i) a tensile hardness of less than 20 psi (137.9 kPa), and/or

ii) an indentation force deflection value at 25% of from 5 to 45 lbs/50in^2 (0.69 to 6.2 kPa), and/or

iii) an indentation force deflection value at 65% of from 20 to 90 lbs/50in^2 (2.7 to 12.4 kPa).

17. The polyurethane article as set forth in claim **14**, wherein the reaction product includes the macromer charge v).

18. The polyurethane article as set forth in claim **16**, having;

i) a tensile hardness of less than 20 psi (137.9 kPa),

ii) an indentation force deflection value at 25% of from 5 to 45 lbs/50in^2 (0.69 to 6.2 kPa), and

iii) an indentation force deflection value at 65% of from 20 to 90 lbs/50in^2 2.7 to 12.4 kPa).