CLAIMS

WHAT IS CLAIMED IS:

1. A viscosity modifier (VM) concentrate comprising:

from about 60 parts to about 95 parts of a diluent oil; and

from about 5 parts to about 40 parts of a linear triblock copolymer characterized by the formula:

D'-PA-D'';

wherein D' represents a block derived from diene, PA represents a block derived from monoalkenyl arene, D'' represents a block derived from diene, and the linear triblock copolymer is present in an amount effective to modify a lubricating kinematic viscosity at approximately 100°C (KV100) of the concentrate,

wherein the concentrate comprises at least 50 wt% of the diluent oil and the effective amount of the linear triblock copolymer is such that the concentrate comprises at least 6.0 wt% of the linear triblock copolymer, and

wherein a KV100 of the diluent oil is from about 2 cSt to about 40 cSt, the KV100 of the concentrate is about 2000 cSt or less, and the concentrate has a ~80°C. beaker pour of at least 87% and/or a tan δ of at least 1.8.

2. A concentrate according to claim 1, wherein the D' and D'' dienes each individually comprise butadiene, isoprene, and mixtures thereof, but are not identical to each other, and wherein the D' and D'' blocks are substantially hydrogenated after polymerization.

3. A concentrate according to claim 1, wherein the D' and D'' dienes each individually comprise:

(i) not more than about 3 wt% butadiene;

(ii) at least about 97 wt% isoprene;

(iii) both (i) and (ii).

4. A concentrate according to claim 1, wherein D' has a number average molecular weight from about 62,000 Daltons to about 150,000 Daltons, PA has a number average molecular weight from about 15,000 Daltons to about 50,000 Daltons,

and D'' has a number average molecular weight from about 5,000 to about 80,000 daltons.

5. A concentrate according to claim 4, wherein:

(i) D' has a number average molecular weight from about 63,000 Daltons to about 95,000 Daltons;

(ii) PA has a number average molecular weight from about 20,000 Daltons to about 36,000 Daltons; or

(iii) both (i) and (ii).

6. A concentrate according to claim 4, wherein a ratio of PA number average molecular weight to a sum of D' + D" number average molecular weight is from about 0.25 to about 0.50.

7. A concentrate according to claim 4, wherein a ratio between the number average molecular weight of D' and the number average molecular weight of D'' is from 1.01:1 to about 1.25:1 or from about 6.00:1 to about 20.0:1.

8. A concentrate according to claim 1, wherein the concentrate comprises from 6.0 wt% to about 13 wt% of the linear triblock copolymer.

9. A concentrate according to claim 1, wherein the diluent oil comprises a Group II, Group III, and/or Group IV basestock.

10. A concentrate according to claim 1, wherein the KV100 of the concentrate is from about 100 cSt to about 1600 cSt.

11. A concentrate according to claim 1, wherein the KV100 of the concentrate is about 1000 cSt or less.

12. A concentrate according to claim 1, further comprising one or more of an ashless dispersant, a detergent, an anti-wear agent, an antioxidant, a corrosion

inhibitor, a friction modifier, an antifoamant, a seal-swelling control agent, or a combination thereof.

13. A VM concentrate comprising:

from about 60 parts to about 90 parts of a diluent oil; and

from about 10 parts to about 40 parts of a linear triblock copolymer characterized by the formula:

D'-PA-D'';

wherein D' represents a block derived from diene, PA represents a block derived from monoalkenyl arene, D'' represents a block derived from diene, and the linear triblock copolymer is present in an amount effective to modify a lubricating kinematic viscosity at approximately 100°C (KV100) of the concentrate,

wherein the concentrate comprises at least 50 wt% of the diluent oil and the effective amount of the linear triblock copolymer is such that the concentrate comprises at least 9.5 wt% of the linear triblock copolymer, and

wherein a KV100 of the diluent oil is from about 2 cSt to about 40 cSt and the KV100 of the concentrate is about 3000 cSt or less, and the concentrate has a ~80°C. beaker pour of at least 85% and a tan δ of at least 1.5.

14. A concentrate according to claim 13, wherein the D' and D'' dienes each individually comprise butadiene, isoprene, and mixtures thereof, but are not identical to each other, and wherein the D' and D'' blocks are substantially hydrogenated after polymerization.

15. A concentrate according to claim 14, wherein the D' and D'' dienes each individually comprise:

(i) not more than about 3 wt% butadiene;

(ii) at least about 97 wt% isoprene;

(iii) both (i) and (ii).

16. A concentrate according to claim 13, wherein D' has a number average molecular weight from about 20,000 Daltons to about 60,000 Daltons, PA has a number average molecular weight from about 10,000 Daltons to about 40,000 Daltons,

and D'' has a number average molecular weight from about 5,000 to about 40,000 daltons.

17. A concentrate according to claim 16, wherein one or more of the following is satisfied:

(i) D' has a number average molecular weight from about 25,000 Daltons to about 50,000 Daltons;

(ii) PA has a number average molecular weight from about 15,000 Daltons to about 35,000 Daltons; and

(iii) D'' has a number average molecular weight from about 7,000 to about 20,000.

18. A concentrate according to claim 16, wherein a ratio of PA number average molecular weight to a sum of D' + D" number average molecular weight is from about 0.25 to about 0.50.

19. A concentrate according to claim 16, wherein a ratio between the number average molecular weight of D' and the number average molecular weight of D'' is from about 1.4:1 to about 3.0:1 or from about 6.00:1 to about 20.0:1.

20. A concentrate according to claim 13, wherein the diluent oil comprises a Group II, Group III, and/or Group IV basestock.

21. A concentrate according to claim 13, wherein the KV100 of the concentrate is from about 1000 cSt to about 2000 cSt.

22. A concentrate according to claim 13, ~~wherein the concentrate has a ~80°C beaker pour of at least 85% and/or a tan δ of at least 1.5.~~

~~23. A concentrate according to claim 13,~~ further comprising one or more of an ashless dispersant, a detergent, an anti-wear agent, an antioxidant, a corrosion inhibitor, a friction modifier, an antifoamant, a seal-swelling control agent, or a combination thereof.

23.~~24.~~ A VM concentrate comprising:

from about 60 parts to about 95 parts of a diluent oil; and

from about 5 parts to about 40 parts of a linear triblock copolymer characterized by the formula:

D'-PA-D'';

wherein D' represents a block derived from diene, PA represents a block derived from monoalkenyl arene, D'' represents a block derived from diene, and the linear triblock copolymer exhibits a thickening efficiency span of at most 0.5 and is present in an amount effective to modify a lubricating kinematic viscosity at approximately 100°C (KV100) of the concentrate,

wherein the concentrate comprises at least 50 wt% of the diluent oil, and

wherein the KV100 of the diluent oil is from about 2 cSt to about 40 cSt and the KV100 of the concentrate is about 2000 cSt or less, and the concentrate has a ~80°C. beaker pour of at least 87% and a tan δ of at least 1.8.

24.~~25.~~ A concentrate according to claim 23~~24~~, wherein the effective amount of the linear triblock copolymer is such that the concentrate comprises from 6.0 wt% to 14 wt% of the linear triblock copolymer.

25.~~26.~~ A concentrate according to claim 23~~24~~, wherein the D' and D'' dienes each individually comprise butadiene, isoprene, and mixtures thereof, but are not identical to each other, and wherein the D' and D'' blocks are substantially hydrogenated after polymerization.

26.~~27.~~ A concentrate according to claim 25~~26~~, wherein D' has a number average molecular weight from about 30,000 Daltons to about 95,000 Daltons, PA has a number average molecular weight from about 20,000 Daltons to about 35,000 Daltons, D'' has a number average molecular weight from about 1,800 to about 60,000 daltons, and a ratio between the number average molecular weight of D' and the number average molecular weight of D'' is from about 1.0:1 to about 30:1.

27.~~28.~~ A concentrate according to claim 23~~24~~, wherein the linear triblock copolymer exhibits an average thickening efficiency in Group III diluent oil of at least 1.8.

28.~~29.~~ A concentrate according to claim 23~~24~~, wherein the diluent oil comprises a Group II, Group III, and/or Group IV basestock.

29.~~30.~~ A concentrate according to claim 28~~29~~, wherein the diluent oil comprises a Group II and/or Group III basestock.

30.~~31.~~ A concentrate according to claim 23~~24~~, wherein the KV100 of the concentrate is from about 100 cSt to about 1600 cSt.

~~32. A concentrate according to claim 24, wherein the concentrate has a -80°C beaker pour of at least 87% and/or a tan δ of at least 1.8.~~

31.~~33.~~ A concentrate according to claim 23~~24~~, further comprising one or more of an ashless dispersant, a detergent, an anti-wear agent, an antioxidant, a corrosion inhibitor, a friction modifier, an antifoamant, a seal-swelling control agent, or a combination thereof.

32.~~34.~~ A method of modifying the kinematic viscosity at approximately 100°C (KV100) of the VM concentrate of claim 1, the method comprising adding to the concentrate an effective amount of the linear triblock copolymer characterized by the formula:

D'-PA-D'';

wherein D' represents the block derived from diene, PA represents the block derived from monoalkenyl arene, D'' represents the block derived from diene, and the effective amount of the linear triblock copolymer comprises at least 6.0 wt% of the concentrate while the KV100 of the concentrate is about 2000 cSt or less.

33.~~35.~~ A method of modifying the kinematic viscosity at approximately 100°C (KV100) of the concentrate of claim 13, the method comprising adding to the concentrate an effective amount of the linear triblock copolymer characterized by the formula:

D'-PA-D'';

wherein D’ represents the block derived from diene, PA represents the block derived from monoalkenyl arene, D’’ represents the block derived from diene, and the effective amount of the linear triblock copolymer comprises at least 9.5 wt% of the concentrate while the KV100 of the concentrate is about 3000 cSt or less.

34.~~36.~~ A method of modifying the kinematic viscosity at approximately 100°C (KV100) of the VM concentrate of claim 23~~24~~, the method comprising adding to the concentrate an effective amount of the linear triblock copolymer characterized by the formula:

D’-PA-D’’;

wherein:

D’ represents the block derived from diene;

PA represents the block derived from monoalkenyl arene;

D’’ represents the block derived from diene;

the linear triblock copolymer exhibits a thickening efficiency span of at most 0.5; and

the KV100 of the concentrate containing the effective amount of the linear triblock copolymer is about 2000 cSt or less.