CLAIMS

1. A clear thermoplastic polyurethane polymer composition comprising the reaction product of:

(a) at least one hydrophobic polyol, wherein said hydrophobic polyol is a diacid polyester polyol made with dimerised fatty acids and wherein said dimerised fatty acid contains from 26 to 44 carbon atoms,

(b) at least one linear diol chain extender having from 10 to 14 carbon atoms;

(c) at least one branched diol chain extender having from 8 to 12 carbon atoms and wherein at least 2 carbon atoms of said branched chain extender are in the branch, wherein the weight ratio of said linear chain extender to said branched chain extender is from ~~about~~ 70:30 to ~~about~~ 85:15;

(d) at least one diisocyanate; and

(e) optionally at least one urethane catalyst.

2. The thermoplastic polyurethane composition of Claim 1 wherein said dimerised fatty acid contains from 26 to 36 carbon atoms.

3. The thermoplastic polyurethane composition of Claim 1 wherein said polyol is made from a dimerised fatty acid having 36 carbon atoms reacted with 1,6-hexane diol.

4. The thermoplastic polyurethane composition of Claim 1, wherein said linear diol chain extender is 1,12-dodecane diol.

5. The thermoplastic polyurethane composition of Claim 1, wherein said branched diol chain extender is selected from the group consisting of 2-butyl-2-ethyl propane diol and 1,4-cyclohexane dimethanol.

6. The thermoplastic polyurethane composition of Claim 1, wherein the weight ratio of said linear diol chain extender to said branched diol chain extender is ~~about~~ 75:25.

7. The thermoplastic polyurethane composition of Claim 1, wherein said diisocyanate is 4,4'-methylene bis-(phenyl isocyanate).

8. The thermoplastic polyurethane composition of Claim 1 having a Shore A hardness of from 70 to 98.

9. The thermoplastic polyurethane composition of Claim 1 having a Shore A hardness of from 70 to 90 and wherein a polyurethane catalyst is used in the reaction.

10. The thermoplastic polyurethane composition of Claim 1 having a Shore A hardness of from 91 to 98 and a polyurethane catalyst is absent from the reaction.

11. The thermoplastic polyurethane composition of Claim 8, wherein said composition has a specific gravity of from 0.90 to 1.10 g/cc.

12. The thermoplastic polyurethane composition of Claim 11, wherein said composition has a specific gravity of from 0.95 to 1.07 g/cc.

13. The thermoplastic polyurethane composition of Claim 1 in the form of a shaped article.

14. The thermoplastic polyurethane composition of Claim 13, wherein said shaped article is a medical article.

15. The thermoplastic polyurethane composition of claim 1 made from a process selected from the group consisting of the one-shot process and the batch process.

16. A batch process to produce a clear thermoplastic polyurethane polymer composition as claimed in Claim 1, comprising the steps of:

(a) making a diol chain extender mixture of at least one liner chain extender and at least one branched chain extender;

(b) heating the chain extender mixture to form a clear homogenous liquid mixture;

(c) maintaining the heated chain extender mixture in a liquid state until used;

(d) adding at least one hydrophobic polyol to a reaction vessel;

(e) adding said heated chain extender mixture to the reaction vessel;

(f) mixing the heated chain extender mixture with the polyol in the reaction vessel;

(g) adding at least one diisocyanate to the reaction vessel to form a reaction mixture;

(h) allow the reaction to proceed for about 1 to about 3 minutes;

(i) once the reaction temperature reaches a temperature of from ~~about~~ 80°C to ~~about~~ 100°C and the reaction mixture is still in a pourable state, transfer the reaction mixture to a container; and

(j) transfer the container into a heated environment to complete the reaction.

17. The batch process of Claim 16, wherein the linear chain extender is 1,12-dodecane diol and the branched chain extender is selected from the group consisting of 2-butyl-2-ethyl propane diol and 1,4-cyclohexane dimethanol.

18. The batch process of Claim 17, wherein the weight ratio of said linear chain extender to said branched chain extender is from ~~about~~ 70:30 to ~~about~~ 85:15.

19. The batch process of Claim 18, wherein the weight ratio of said liner chain extender to said branched chain extender is ~~about~~ 75:25.

20. The batch process of Claim 16, wherein said chain extender mixture is heated to a temperature of from 85°C to 110°C to form a homogenous mixture.

21. The batch process of Claim 16, wherein said hydrophobic polyol is a 36 carbon atom dimerised fatty acid reacted with 1,6-hexane diol.

22. The batch process of Claim 21, wherein said hydrophobic polyol is heated to a temperature between 80°C and 100°C before adding said hydrophobic polyol to the reaction vessel.

23. The batch process of Claim 16, wherein the chain extender mixture is heated to a temperature of from 80°C to 105°C before adding said chain extender mixture to the reaction vessel.

24. The batch process of Claim 16, wherein said diisocyanate is melted before adding said diisocyanate to the reaction vessel to form a reaction mixture.

25. The batch process of Claim 16, wherein the reaction mixture is from ~~about~~ 60°C to ~~about~~ 70°C at the start of reaction and the reaction is allowed to proceed until the reaction mixture reaches a temperature of from ~~about~~ 80°C to ~~about~~ 100°C.

26. The batch process of Claim 16, wherein the reaction mixture is transferred to a container and the container is placed in a heated oven for from 3 to 5 hours at a temperature of from 120°C to 130°C to complete the reaction.

27. The batch process of Claim 16, wherein the fully reacted thermoplastic polyurethane is granulated and the granules are extruded and pelletized into pellet form.