CLAIMS

1. A method for manufacture of a plasticized polyvinyl alcohol polymer mixture, the method comprising the steps of:

introducing into a mixing reactor a polyvinyl alcohol polymer comprising homopolymeric polyvinyl alcohol or a blend thereof having a degree of hydrolysis in the range of 93% to 98% or more;

wherein the mixing reactor comprises a blending chamber having a primary inlet, a primary outlet and at least two inter-engaging components extending between the primary inlet and primary outlet, the components being arranged to apply a shearing force to the polymer while the polymer is conveyed by the components from the inlet through a reaction zone to the outlet;

one or more secondary inlets located downstream from the primary inlet for introducing reactants comprising water as a processing aid and a plasticizer, to the chamber to form a reaction mixture;

wherein the plasticizer comprises two or more compounds selected from the group consisting of: diglycerol, triglycerol, xylose, D-mannitol, triacetin, dipentaerythritol, 1,4-butanediol, 3,3-dimethyl-1,2-butanediol and caprolactam;

wherein the blending chamber comprises a plurality of heated regions arranged so that the mixture is subjected to a temperature profile whereby the temperature increases from the inlet to the outlet;

a secondary outlet located between the reaction zone and primary outlet arranged to allow removal of water from the chamber;

reacting the water, plasticizer and polymer in the reaction zone to form plasticized polymer; and

allowing the plasticized polymer to pass from the primary outlet.

2. A method as claimed in claim 1 wherein the homopolymeric polyvinyl alcohol comprises a product of hydrolysis of homopolymeric polyvinyl acetate, wherein the degree of hydrolysis is 93 wt% to 98 wt%.

3. A method as claimed in claim 2 wherein the degree of hydrolysis is 93 wt% to 97 wt%.

4. A method as claimed in claim 3 wherein the degree of hydrolysis is 93 wt% to 95 wt%.

5. A method as claimed in claim 1 wherein the plasticizer comprises one of the following:

a) a mixture of diglycerol and a further compound selected from: triglycerol, xylose, D-mannitol, triacetin, dipentaerythritol, 1,4- butanediol, 3,3-dimethyl-1,2-butanediol and caprolactam.

b) a mixture of triglycerol and a further compound selected from: diglycerol, xylose, D-mannitol, triacetin, dipentaerythritol, 1,4- butanediol, 3,3-dimethyl-1,2-butanediol and caprolactam.

c) a mixture of xylose and a further compound selected from: diglycerol, triglycerol, D-mannitol, triacetin, dipentaerythritol, 1,4- butanediol, 3,3-dimethyl-1,2-butanediol and caprolactam.

d) a mixture of D-mannitol and a further compound selected from: diglycerol, triglycerol, xylose, triacetin, dipentaerythritol, 1,4- butanediol, 3,3-dimethyl-1,2-butanediol and caprolactam.

e) a mixture of dipentaerythritol and a further compound selected from: diglycerol, triglycerol, xylose, triacetin, D-mannitol, 1,4- butanediol, 3,3-dimethyl-1,2-butanediol and caprolactam.

f) a mixture of triacetin and a further compound selected from: diglycerol, triglycerol, xylose, D-mannitol, dipentaerythritol, 1,4- butanediol, 3,3-dimethyl-1,2-butanediol and caprolactam.

g) a mixture of 1,4- butanediol and a further compound selected from: diglycerol, triglycerol, xylose, D-mannitol, triacetin, dipentaerythritol, 3,3-dimethyl-1,2-butanediol and caprolactam.

h) a mixture of 3,3-dimethyl-1,2-butanediol and a further compound selected from: diglycerol, triglycerol, xylose, D-mannitol, triacetin, dipentaerythritol, 1,4- butanediol, and caprolactam.

i) a mixture of caprolactam and a further compound selected from: diglycerol, triglycerol, xylose, D-mannitol, triacetin, dipentaerythritol, 1,4- butanediol, and 3,3-dimethyl-1,2- butanediol.

6. A method as claimed in any preceding claim, wherein the polyvinyl alcohol polymer comprises a lower viscosity polymer and a higher viscosity polymer, wherein both polymers have the same degree of hydrolysis.

7. A method as claimed in any preceding claim, wherein the reactants further comprise a reactive stabilizer selected from the group consisting of:
sodium stearate, potassium oleate, sodium benzoate, calcium stearate, dimethyl propionic acid and mixtures thereof.

8. A method as claimed in claim 7, wherein the amount of the reactive stabilizer is from 0.2 wt% to 5 wt%.

9. A method as claimed in claim 8, wherein the amount of the reactive stabilizer is from 0.5 wt% to 3 wt%.

10. A method as claimed in claim 9, wherein the amount of the reactive stabilizer is from 0.5 wt% to 2 wt%.

11. A method as claimed in claim 10, wherein the amount of reactive stabilizer is from 0.5 wt% to 1.5 wt%.

12. A method as claimed in any preceding claim, wherein the amount of each plasticiser compound is from 2 wt% to 15 wt%.

13. A method as claimed in claim 12, wherein the total amount of the plasticisers is from 15 wt% to 30 wt%.

14. A method as claimed in any preceding claim, wherein the water content of the plasticised polymer is in the range 0.1 wt% to 5 wt%.