Claims

1. An ophthalmic emulsion, the emulsion comprising:

water forming an aqueous phase;

oil forming an oil phase;

a hydrophilic surfactant having an HLB value from 10 to 18;

a hydrophobic surfactant having an HLB value from 1 to 6;

a charged phospholipid;

borate;

a mucoadhesive galactomannan polymer; and

a preservative;

wherein the mucoadhesive galactomannan polymer is present in the emulsion at a concentration of at least about 0.13 w/v % but no greater than 0.3 w/v %;

wherein the preservative is free of a benzalkonium chloride; and

wherein the ophthalmic emulsion has a hydration protection against desiccation of at least 10% higher than a control emulsion, wherein the control emulsion has the same composition of the ophthalmic emulsion except of containing 0.05 w/v % of the same galactomannan polymer used in the ophthalmic emulsion.

2. The emulsion as in claim 1 wherein the oil is a hydrocarbon selected from mineral oil, paraffin oil and petrolatum.

3. The emulsion as in claim 1 wherein the oil is at least 0.1 w/v % and no greater than 3 w/v % of the emulsion.

4. The emulsion as in claim 3 wherein the hydrophilic surfactant is present in the emulsion in an amount that is at least 0.08 w/v % and is no greater than about 0.8 w/v %.

5. The emulsion as in claim 4 wherein the hydrophilic surfactant is polyoxyethylene-40-stearate.

6. The emulsion as in claim 4 wherein the hydrophobic surfactant is at least about 0.01 w/v % and is no greater than 2.0 w/v %.

7. The emulsion as in claim 6 wherein the hydrophobic surfactant is a sorbitan tristearate.

8. The emulsion as in claim 1 wherein the mucoadhesive galactomannan polymer is selected from the group consisting of guar and hydroxypropyl guar.

9. The emulsion as in claim 8 wherein the charged phospholipid is an anionic phospholipid named dimyristoyl phosphatidylglycerol.

10. The emulsion as in claim 1 further comprising a borate/polyol buffer system.

11. The emulsion as in claim 10 wherein the preservative is a polymeric quaternary ammonium compound.

12. The emulsion as in claim 1, wherein:

i. the oil phase is in droplets within the aqueous phase and the droplets have a D_{90} diameter that is no greater than about 700 nm but is at least 10 nm; and

ii. the borate and galactomannan polymer cooperatively act to form a gel upon instillation of the emulsion in an eye of an individual.

13. The emulsion as in claim 12, wherein the oil phase is in droplets within the aqueous phase and the droplets have a D_{90} diameter that is no greater than about 500 nm but is at least 30 nm.

14. The emulsion as in claim 13, wherein the oil phase is in droplets within the aqueous phase and the droplets have a D_{90} diameter that is no greater than about 300 nm but is at least 50 nm.