CLAIMS

1. Use of at least one surfactant that is capable of dispersing water in a liquid hydrocarbon fuel to provide a stable clear water-in-oil microemulsion wherein the droplet size of the dispersed water phase is no greater than 0.25 μm in a liquid hydrocarbon fuel comprising less than 50 ppm water to reduce or substantially eliminate the formation in said liquid hydrocarbon fuel of ice particles having a weight average particle size greater than 1 μm when said liquid hydrocarbon fuel is cooled to temperatures in the range of from 0 to -50°C, wherein the amount of said at least one surfactant used in said liquid hydrocarbon fuel is sufficient to disperse at least 50 ppm water in said liquid hydrocarbon fuel.

2. A method of reducing or substantially eliminating the formation in a liquid hydrocarbon fuel of ice particles having a weight average particle size greater than 1 μm when said liquid hydrocarbon fuel is cooled to temperatures in the range of from 0 to -50°C, said method comprising a) providing a specified amount of liquid hydrocarbon fuel, said liquid hydrocarbon fuel comprising less than 50 ppm water, b) providing at least one surfactant that is capable of dispersing water in said liquid hydrocarbon fuel to provide a stable clear water-in-oil microemulsion wherein the droplet size of the dispersed water phase is no greater than 0.25 μm, c) adding said at least one surfactant to said specified amount of liquid hydrocarbon fuel in an amount sufficient to disperse at least 50 ppm water in said liquid hydrocarbon fuel, and d) dispersing said at least one surfactant in said liquid hydrocarbon fuel.

3. The use of claim 1 or the method of claim 2, wherein said at least one surfactant is a mixture of i) at least one (C_6-C_{15}) alcohol ethoxylate and/or ii) at least one (C_8-C_{24})_alkyl amido (C_1-C_6)_alkyl betaine.

4. The use or method of claim 3, wherein the liquid hydrocarbon fuel after addition of said at least one surfactant comprises i) from 45 to 4575 ppm of at least one (C_6-C_{15}) alcohol ethoxylate and ii) from 5 to 425 ppm of at least one (C_8-C_{24})_alkyl amido (C_1-C_6)_alkyl betaine.

5. The use or method as claimed in any one of the preceding claims, respectively, wherein the total amount of said at least one surfactant is sufficient to disperse no more than 5000 ppm water, preferably no more than 1000 ppm water, in said liquid hydrocarbon.

6. The use or method as claimed in any one of the preceding claims, respectively, wherein the total amount of said at least one surfactant is sufficient to disperse no more than 250 ppm water in said liquid hydrocarbon fuel.

7. The use or method of claim 6, wherein said hydrocarbon fuel after addition of said at least one surfactant comprises i) about 160 ppm of at least one (C_6-C_{15}) alcohol ethoxylate and ii) about 10 ppm of at least one (C_8-C_{24})_alkyl amido (C_1-C_6)_alkyl betaine.

8. A method of refuelling an aircraft with a liquid hydrocarbon fuel which after refuelling has a reduced tendency to form ice particles having a weight average particle size greater than 1 μm when said liquid hydrocarbon fuel is cooled to temperatures in the range of from 0 to -50°C, said method comprising a) pumping a specified amount of liquid hydrocarbon fuel into a fuel tank of an aircraft, said liquid hydrocarbon fuel comprising less than 50 ppm water, b) providing at least one surfactant that is capable of dispersing water in said liquid hydrocarbon fuel to provide a stable clear water-in-oil microemulsion wherein the droplet size of the dispersed water phase is no greater than 0.25 μm, c) adding said at least one surfactant to said liquid hydrocarbon fuel in an amount sufficient to disperse at least 50 ppm water in said liquid hydrocarbon fuel during or after said liquid hydrocarbon fuel is pumped into said fuel tank, and d) dispersing said at least one surfactant in said liquid hydrocarbon fuel.

9. ~~An aircraft~~ liquid hydrocarbon fuel for a turbine engine aircraft that in use has~~having~~ a reduced tendency to form ice particles having a weight average particle size greater than 1 μm when said liquid hydrocarbon fuel is cooled to temperatures in the range of from 0 to -50°C, said liquid hydrocarbon fuel comprising less than 50 ppm water and:

i) from 45 to 4575 ppm of at least one (C_6-C_{15}) alcohol ethoxylate and~~/or~~ ii) from 5 to 425 ppm of at least one (C_8-C_{24})_alkyl amido (C_1-C_6)_alkyl betaine.

10. ~~An aircraft~~ fuel as claimed in claim 9 comprising:

i) from 45 to 200 ppm of at least one (C_6-C_{15}) alcohol ethoxylate and ii) from 5 to 15 ppm of at least one (C_8-C_{24})_alkyl amido (C_1-C_6)_alkyl betaine.

11. ~~An aircraft~~ fuel as claimed in claim 10 comprising one or more additional components selected from one or more static dissipaters, antioxidants, metal deactivators, leak detector

additives, corrosion inhibitors, lubricity improvers, alcohols, glycols and other standard products known to those skilled in the art, and contaminants, such as fatty acid methyl ester.

12. A liquid concentrate suitable for the use or method as claimed in any one of claims 1 to 8 consisting ~~comprising~~ essentially of:

(A) 0.1 to 10 wt.% of one or more fatty (C_8-C_{24})-amido-(C_1-C_6)-alkyl betaine~~amphoteric emulsifying agents~~;

(B) 30 to 95 wt.% of one or more C_6-C_{15}-alkanol ethoxylate~~nonionic alkoxylated surfactants~~;

(C) 0 to 20 wt.% of one or more glycol-based solubilizers; and

(D) 0 to 65 wt.% of one or more organic solvents.

~~13. A concentrate as claimed in Claim 12 comprising~~

~~(A) 0.1 to 10 wt.% of one or more betaine based emulsifying agents;~~

~~(B) 30 to 95 wt.% of one or more C_6-C_{15} alkanol ethoxylate surfactants;~~

~~(C) 0 to 20 wt.% of one or more glycol based solubilizers; and~~

~~(D) 0 to 65 wt.% of one or more organic solvents.~~

~~14~~13. A concentrate as claimed in Claim ~~13~~12 ~~comprising~~consisting essentially of

(A) 0.5 to 5 wt.% of one or more fatty (C_8-C_{24})-amido-(C_1-C_6)-alkyl betaine ~~emulsifying agents~~;

(B) 45 to 75 wt.% of one or more C_6-C_{15}-alkanol ethoxylate ~~surfactants~~;

(C) 0.5 to 10 wt.% of one or more glycol-based solubilizers; and

(D) 5 to 50 wt.% of one or more organic solvents.

~~15~~14. A concentrate as claimed in any of claims 12-~~14~~13 comprising cocoamidopropyl betaine as component (A).

~~16~~15. A concentrate as claimed in any of claims 12-~~15~~14 comprising as component (B) one or more C_6-C_{15}-alkanol ethoxylates with 2 to 5 moles of ethylene oxide units on average per mole of alkanol.

~~17~~16. A concentrate as claimed in any of claims 12-~~16~~15 comprising as component (B) one or more C_6-C_{15}-alkanol ethoxylates with an average degree of methyl branching for the alkanol unit of 3.7 or less.

~~18~~17. A concentrate as claimed in any of claims 12-~~17~~16 comprising one or more C_6-C_{11}-alkanol ethoxylates as component (B).

~~19~~18. A concentrate as claimed in Claim ~~18~~17 comprising one or more C_6-C_{11}-alkanol ethoxylates with 2 to 12 moles of ethylene oxide units on average per mole of alkanol as component (B)

~~20~~19. A concentrate as claimed in any of claims 12-~~19~~18 comprising ethylene glycol as component (C).

~~21~~20. A concentrate as claimed in any of claims 12-~~20~~19 comprising one or more C_1-C_4 alkanols as component (D).

~~22~~21. A concentrate as claimed in Claim ~~21~~20 comprising ethanol as component (D).

~~23. A process for manufacturing a concentrate as claimed in any of claims 12-22, characterised in that components (A) to (D) are mixed together at a temperature in the range of from -10°C to 60°C, preferably 0°C to 40°C.~~

~~24. A stable water-in-oil emulsion comprising~~

~~(a) a liquid fuel or oil which is immiscible with water;~~

~~(b) up to 1 wt.%, preferably up to 0.1 wt.%, based on the amount of (a), of water; and~~

~~(c) 10 to 10,000 wt.ppm, preferably 10 to 1,000 wt.ppm, based on the amount of (a), of a concentrate as claimed in any of claims 1-11.~~

~~25. A water-in-oil emulsion as claimed in Claim 24 which is a water-in-oil micro-emulsion.~~

~~26. A stable water-in-oil-emulsion or water-in-oil-microemulsion as claimed in Claim 24 or 25, characterised in that the liquid fuel or oil is a jet fuel or kerosene.~~

~~27. The use in a liquid fuel or oil for a turbine engined aircraft of a concentrate as claimed in any one of Claims 12 to 22, wherein said liquid fuel or oil is immiscible with water, characterised in that said use is to scavenge free water which exists in or is introduced into the said liquid fuel or oil as a contaminant by forming a stable water-in-oil-emulsion or water-in-oil-microemulsion, thereby to render or retain the said liquid fuel or oil in a usable state.~~

~~28. The use as claimed in Claim 27, characterised in that the liquid fuel or oil is a jet fuel or kerosene.~~

~~29. A method of scavenging free water which exists in or is introduced as a contaminant into a liquid fuel or oil which is immiscible with water, thereby to render or retain the said liquid fuel or oil in a usable state, which method comprises: adding to a substantially water-free liquid fuel or oil or to a liquid fuel or oil contaminated with free water a concentrate as claimed in Claims 12 to 22 in order to form a stable water-in-oil-emulsion or water-in-oil-microemulsion.~~

~~30. A method as claimed in Claim 29, characterised in that the liquid fuel or oil is a jet fuel or kerosene.~~