Claims

1. An emulsifier comprising:

at least one C_8 to C_{18} fatty acid diethanolamide;

at least one C_{12} to C_{24} fatty acid; and

at least one C_6 to C_{18} alcohol ethoxylate; wherein said emulsifier does not comprise naphtha.

2. An emulsion comprising:

a fuel comprising at least one of diesel, low sulphur diesel, biodiesel and heavy fuel oil;

less than or equal to 30wt% water

from 0.5 to 15wt% of the emulsifier of Claim 1.

3. An emulsifier comprising:

60-90wt% of at least one C_8 to C_{18} fatty acid diethanolamide;

2-10wt% of at least one C_{12} to C_{24} fatty acid; and

5-20wt% of at least one C_6 to C_{18} alcohol ethoxylate.

4. An emulsifier as claimed in claim 3, wherein said emulsifier does not comprise naphtha.

5. A nanoemulsion comprising:

a fuel comprising at least one of diesel, low sulphur diesel and heavy fuel oil, wherein the fuel does not contain any bio-components;

less than or equal to 20wt% water; and

the emulsifier as claimed in Claim 3 or claim 4, wherein the emulsifier:water volume ratio is from 1.5:1 to 1:2.9.

6. The emulsifier of claim 1 or claim 3 further comprising 10-40wt% of at least one sorbitan ester.

7. The emulsifier of claim 6 comprising:

50-75 wt% of at least one C_8 to C_{18} fatty acid diethanolamide;

2-10 wt% of at least one C_{12} to C_{24} fatty acid;

5-20 wt% of at least one C_6 to C_{18} alcohol ethoxylate; and

10-40 wt% of at least one sorbitan ester.

8. An emulsifier as claimed in claim 6 or claim 7, wherein said emulsifier does not comprise naphtha.

9. A nanoemulsion comprising:

a fuel comprising at least one of diesel, low sulphur diesel, biodiesel and heavy fuel oil, wherein the fuel comprises bio-components;

less than or equal to 20wt% water

the emulsifier as claimed in any one of Claims 6 to 8.

10. The nanoemulsion of claim 9 wherein the emulsifier:water volume ratio is from 1.5:1 to 1:2.9.

11. A scavenger solution comprising

i. 10-40% emulsifier of any one of claims 1, 6, 7 or 8;

ii. 60-90% alkylene glycol monoalkyl ether.

12. The scavenger solution of claim 11 comprising:

10-25wt% of at least one C_8 to C_{18} fatty acid diethanolamide;

0.2-3wt% of at least one C_{12} to C_{24} fatty acid;

1-4wt% of at least one C_6 to C_{18} alcohol ethoxylate; and

60-90wt% alkylene glycol monoalkyl ether.

13. A scavenger solution as claimed in claim 12, wherein said emulsifier does not comprise naphtha.

14. A formulation comprising:

a fuel comprising at least one of diesel, low sulphur diesel, biodiesel and heavy fuel oil;

the scavenger solution of Claims 11 to 13 in an amount of 0.03 to 0.2% by volume.

15. An emulsifier as claimed in any one of claims 1, 6, 7 or 8 or the scavenger solution as claimed in any one of claims 11 to 13, wherein the fatty acid ethanolamide is derived from a natural source.

16. An emulsifier as claimed in any one of claims 1, 6, 7, 8 or 15 or the scavenger solution as claimed in any one of claims 11, 12, 13 or 15, wherein the fatty acid is a monounsaturated fatty acid and preferably a C_{14-20} monounsaturated fatty acid.

17. An emulsifier as claimed in any one of claims 1, 6, 7, 8, 15 or 16 or the scavenger solution as claimed in any one of claims 11, 12, 13, 15 or 16, wherein the alcohol ethoxylate has a HLB in the range of from 9 to 12.

18. A method of making a nanoemulsion according to any one of claims 5, 9 or 10 or a formulation according to claim 14, comprising emulsifying a mixture of the fuel, water and the emulsifier using ultrasonic emulsification.