Claims

1. A process of separating an ionic liquid and an organic acid from a crude oil in a desalting unit, the process comprising the steps of:
   (i) introducing into the desalter a mixture comprising crude oil, ionic liquid and organic acid, together with water in an amount of greater than 10 % by volume relative to the mixture; and
   (ii) separating a crude oil phase from one or more liquid phases comprising the ionic liquid, organic acid and water.

2. The process of Claim 1, wherein the water is introduced into the desalter in an amount of greater than 20 % by volume relative to the mixture.

3. The process of Claim 2, wherein the water is introduced into the desalter in an amount of greater than 30 % by volume relative to the mixture.

4. The process of any one of Claims 1 to 3, wherein the water is introduced into the desalter in an amount of less than 70 % by volume relative to the mixture.

5. The process of any one of Claims 1 to 4, wherein the mixture and the water are subjected to mixing.

6. The process of Claim 5, wherein the mixture and the water are passed through a mixing valve.

7. The process of Claim 6, wherein the pressure differential across the mixing valve is from 1 to 20 psi.

8. The process of any one of Claims 1 to 7, wherein an electrostatic field is

applied to the desalting unit.

9. The process of Claim 8, wherein the electrostatic field is from 1 to 25 kV AC.

10. The process of any one of Claims 1 to 9, wherein the desalting unit is maintained at a temperature of from 60 to 120 °C.

11. The process of Claim 10, wherein the desalting unit is maintained at a temperature of about 90 °C.

12. The process of any one of Claims 1 to 11, wherein a demulsifier is introduced into the desalting unit.

13. The process of any one of Claims 1 to 12, wherein the one or more liquid phases include a water extract phase comprising the organic acid and the ionic liquid and the process further comprises the step of separating the ionic liquid and the organic acid.

14. The process of Claim 13, wherein at least one of the ionic liquid and the organic acid are regenerated.

15. The process of any one of Claims 1 to 14, wherein the mixture is obtainable by contacting an organic acid containing crude oil with an ionic liquid.

16. The process of any one of Claims 1 to 15, wherein the organic acid is naphthenic acid.

17. The process of any one of Claims 1 to 16, wherein the process is a

continuous process.

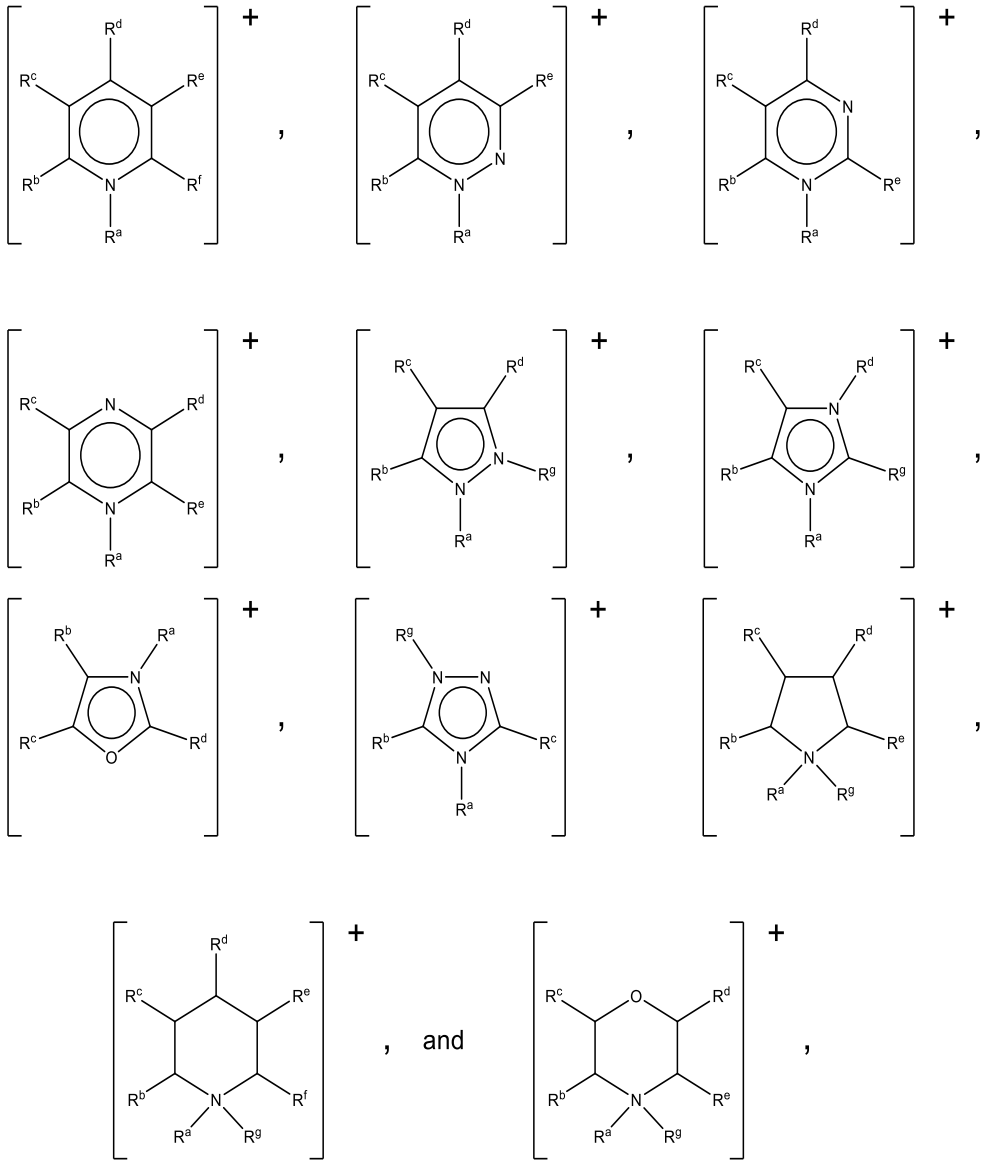
18. The process of any one of Claims 1 to 17, wherein the ionic liquid is a basic ionic liquid.

19. The process of Claim 18, wherein the ionic liquid comprises a basic anion selected from serinate, prolinate, histidinate, threoninate, valinate, asparaginate, taurinate, lysinate, alkylcarbonate and hydrogen carbonate.

20. The process of Claim 19, wherein the basic anion is an alkylcarbonate.

21. The process of any one of Claims 18 to 20, wherein the basic ionic liquid comprises a cation selected or derived from the group consisting of: ammonium, azaannulenium, azathiazolium, benzimidazolium, benzofuranium, benzothiophenium, benzotriazolium, borolium, cinnolinium, diazabicyclodecenium, diazabicyclononenium, diazabicycloundecenium, dibenzofuranium, dibenzothiophenium, dithiazolium, furanium, guanidinium, imidazolium, indazolium, indolinium, indolium, morpholinium, oxaborolium, oxaphospholium, oxathiazolium, oxazinium, oxazolium, *iso*-oxazolium, oxazolinium, pentazolium, phospholium, phosphonium, phthalazinium, piperazinium, piperidinium, pyranium, pyrazinium, pyrazolium, pyridazinium, pyridinium, pyrimidinium, pyrrolidinium, pyrrolium, quinazolinium, quinolinium, *iso*-quinolinium, quinoxalinium, selenazolium, sulfonium, tetrazolium, thiadiazolium, *iso*-thiadiazolium, thiazinium, thiazolium, *iso*-thiazolium, thiophenium, thiuronium, triazadecenium, triazinium, triazolium, *iso*-triazolium, and uronium.

22. The process of Claim 21, wherein the cation is selected from the group consisting of:



wherein: R^a, R^b, R^c, R^d, R^e, R^f and R^g are each independently selected from hydrogen, a C_1 to C_{30}, straight chain or branched alkyl group, a C_3 to C_8 cycloalkyl group, or a C_6 to C_{10} aryl group, wherein said alkyl, cycloalkyl or aryl groups are unsubstituted or may be substituted by one to

three groups selected from: C_1 to C_6 alkoxy, C_2 to C_{12} alkoxyalkoxy, C_3 to C_8 cycloalkyl, C_6 to C_{10} aryl, -CN, -OH, -SH, $-NO_2$, C_6 to C_{10} aryl and C_7 to C_{10} alkaryl, $-CO_2(C_1$ to $C_6)$alkyl, $-OC(O)(C_1$ to $C_6)$alkyl, or any two of R^b, R^c, R^d, R^e and R^f attached to adjacent carbon atoms form a methylene chain $-(CH_2)_q-$ wherein q is from 3 to 6.

23. The process of Claim 21, wherein the cation is selected from:

$[N(R^a)(R^b)(R^c)(R^d)]^+$, $[P(R^a)(R^b)(R^c)(R^d)]^+$, and $[S(R^a)(R^b)(R^c)]^+$,

wherein: R^a, R^b, R^c and R^d are as defined in Claim 22.

24. The process of Claim 23, wherein the cation is selected from:

$[N(R^a)(R^b)(R^c)(R^d)]^+$,

wherein: R^a, R^b, R^c and R^d are each independently selected from C_1 to C_8 alkyl, including C_2 ,C_4 and C_6 alkyl.

25. The process of Claim 24, wherein the cation is tributyl(methyl)ammonium or triethyl(methyl)ammonium.

26. The process of any one of Claims 18 to 20, wherein the basic ionic liquid comprises a cation represented by the formula:

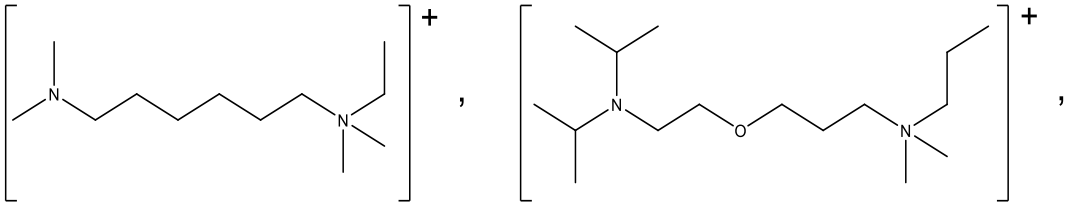
Cat^+-$(Z\text{-}Bas)_n$

wherein: Cat^+ is a positively charged moiety;
Bas is a basic moiety;

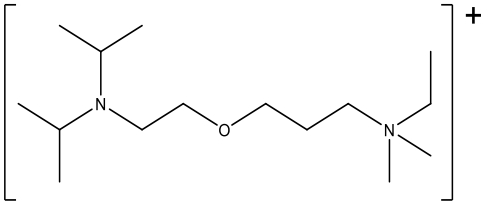
Z is a covalent bond joining Cat^+ and Bas, or is a divalent linking group; and

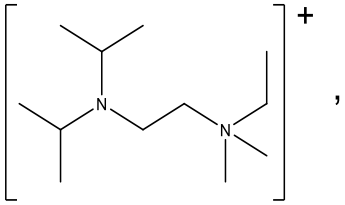
n is an integer of from 1 to 3, and preferably n is 1.

27. The process of Claim 26, wherein [Cat^+-Z-Bas] is selected from the group consisting of:

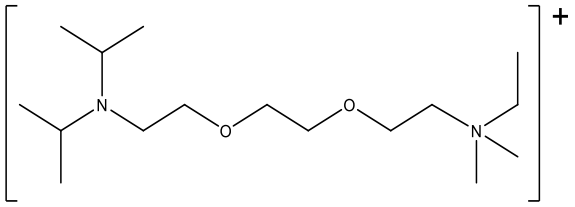

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and


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28. A process according to any one of Claims 1 to 27, wherein the acid containing crude oil is pre-treated in a de-salter to remove inorganic salts.

~~29. A desalter substantially as described herein with reference to Fig. 1.~~