C L A I M S

1. A method for revamping an HF or sulphuric acid alkylation unit to an ionic liquid alkylation unit, wherein the HF or sulphuric acid alkylation unit comprise at least:

- a reactor unit for contacting catalyst and hydrocarbon reactants;
- a separator unit for separating a reactor effluent into a catalyst phase and an alkylate-comprising hydrocarbon phase;
- a fractionator unit for fractionating the alkylate-comprising hydrocarbon phase into at least one stream comprising alkylate;
- a catalyst phase recycle means to recycle at least part of the catalyst phase from the separator unit to the reactor unit;

which method includes:

- adapting the catalyst phase recycle means by providing a means for acid injection and/or a means for halohydrocarbon injection into the catalyst recycle means.

2. A method according to claim 1, wherein the catalyst phase recycle means is further adapted by providing a bypass around the means for acid injection and/or a means for halohydrocarbon injection to allow part of the catalyst phase to bypass the acid injection and/or halohydrocarbon injection.

3. A method according to claim 1 or 2, wherein the means for acid injection comprises a gas injector or a gas bubbler.

4. A method according to any one of the preceding claims, wherein means for measuring the pressure are provided in the catalyst recycle or the reactor unit.

5. A method for the production of alkylate comprising:

a) in an alkylation process for producing an alkylate from a feed mixture comprising isobutene and olefin in the presence of an ionic liquid catalyst and under alkylation conditions, separating off all or a portion of the ionic liquid catalyst from the process for producing an alkylate;

b) injecting a hydrohalide or halohydrocarbon into the separated portion of the acidic ionic liquid; and

c) re-introducing the acidic ionic liquid, into which the hydrohalide or halohydrocarbon has been introduced, into the process for producing an alkylate of step (a).

6. A method according to claim 5, wherein in step (b) the acidic ionic liquid and the hydrohalide or halohydrocarbon are mixed.

7. The method according to claim 5 or 6, wherein the quantity of hydrohalide or halohydrocarbon injected is between 0.01-1wt% of the alkylate produced, based on the halide content.

8. The method according to any one of claims 5 to 7, wherein the source of cations within the aforementioned acidic ionic liquid is a hydrohalide amine containing alkyls, halogenated imidazole or halogenated pyridine, the source of the anions being one or more metallic compounds.

9. The method according to any one of claims 5 to 8, wherein the anions within the aforementioned acidic ionic liquid come from two or more metallic compounds, where at least one of these metallic compounds is either aluminium chloride or aluminium bromide, the other metallic

compounds being halides, sulphates or nitrates of copper, iron, zinc, nickel, titanium or silver.

10. The method according to any one of claims 5 to 9, wherein a hydrohalide is injected, preferably the hydrohalide is hydrogen chloride or hydrogen bromide

11. The method according to any one of claims 5 to 9, wherein a halohydrocarbon is injected, preferably the halohydrocarbon is a chloroalkane or a bromoalkane containing at least 4 carbon atoms.

12. The method according to claim 11, wherein the halohydrocarbon contains 4 to 8 carbon atoms and a halide and the carbon connecting to the halide in the halohydrocarbon is a secondary carbon atom or tertiary carbon atom.

13. The method according to any one of claims 5 to 12, wherein the olefins include 1-butene, 2-butene, isobutene or a mixture of two or more of these.

C L A I M S

1. A method for revamping an HF or sulphuric acid alkylation unit to an ionic liquid alkylation unit, wherein the HF or sulphuric acid alkylation unit comprise at least:

- a reactor unit for contacting catalyst and hydrocarbon reactants;
- a separator unit for separating a reactor effluent into a catalyst phase and an alkylate-comprising hydrocarbon phase;
- a fractionator unit for fractionating the alkylate-comprising hydrocarbon phase into at least one stream comprising alkylate;
- a catalyst phase recycle means to recycle at least part of the catalyst phase from the separator unit to the reactor unit;

which method includes:

- adapting the catalyst phase recycle means by providing a means to rejuvenate the ionic liquid catalyst, being a gas or liquid injector or gas bubbler for acid injection and/or for halohydrocarbon injection into the catalyst recycle means.

2. A method according to claim 1, wherein the catalyst phase recycle means is further adapted by providing a bypass around the means for acid injection and/or a means for halohydrocarbon injection to allow part of the catalyst phase to bypass the acid injection and/or halohydrocarbon injection.

3. A method according to claim 1 or 2, wherein the means for acid injection comprises a gas injector or a gas bubbler.

4. A method according to any one of the preceding claims, wherein means for measuring the pressure are provided in the catalyst recycle or the reactor unit.

5. A method for the production of alkylate comprising:

a) in an alkylation process for producing an alkylate from a feed mixture comprising isobutene and olefin in the presence of an ionic liquid catalyst and under alkylation conditions, separating off all or a portion of the ionic liquid catalyst from the process for producing an alkylate;

b) injecting a hydrohalide or halohydrocarbon into the separated portion of the acidic ionic liquid; and

c) re-introducing the acidic ionic liquid, into which the hydrohalide or halohydrocarbon has been introduced, into the process for producing an alkylate of step (a).

6. A method according to claim 5, wherein in step (b) the acidic ionic liquid and the hydrohalide or halohydrocarbon are mixed.

7. The method according to claim 5 or 6, wherein the quantity of hydrohalide or halohydrocarbon injected is between 0.01-1wt% of the alkylate produced, based on the halide content.

8. The method according to any one of claims 5 to 7, wherein the source of cations within the aforementioned acidic ionic liquid is a hydrohalide amine containing alkyls, halogenated imidazole or halogenated pyridine, the source of the anions being one or more metallic compounds.

9. The method according to any one of claims 5 to 8, wherein the anions within the aforementioned acidic ionic liquid come from two or more metallic compounds, where at least one of these metallic compounds is either aluminium chloride or aluminium bromide, the other metallic

compounds being halides, sulphates or nitrates of copper, iron, zinc, nickel, titanium or silver.

10. The method according to any one of claims 5 to 9, wherein a hydrohalide is injected, preferably the hydrohalide is hydrogen chloride or hydrogen bromide.

11. The method according to any one of claims 5 to 9, wherein a halohydrocarbon is injected, preferably the halohydrocarbon is a chloroalkane or a bromoalkane containing at least 4 carbon atoms.

12. The method according to claim 11, wherein the halohydrocarbon contains 4 to 8 carbon atoms and a halide and the carbon connecting to the halide in the halohydrocarbon is a secondary carbon atom or tertiary carbon atom.

13. The method according to any one of claims 5 to 12, wherein the olefins include 1-butene, 2-butene, isobutene or a mixture of two or more of these.

14. Alkylate produced by the method of any one of claims 5 to 13.