# C L A I M S

1. A process for preparing an alkylate comprising contacting in a reactor a hydrocarbon mixture comprising at least an isoparaffin and an olefin with an acidic ionic liquid catalyst under alkylation conditions to obtain an alkylate, which process further comprises:
   - withdrawing an alkylate-comprising reactor effluent from the reactor, wherein the reactor effluent comprises an ionic liquid phase and a hydrocarbon phase;
   - separating at least part the reactor effluent into an ionic liquid phase effluent and a multiple-phase effluent in a first separation unit;
   - separating at least part of the multiple-phase effluent into a hydrocarbon phase effluent and another effluent in a second separation unit; and
   - recycling at least part of the ionic liquid phase effluent to the reactor.

2. A process according to claim 1, wherein the first separation unit and/or the second separation unit is a settler separation unit or a centrifugal separation unit, preferably a centrifugal separation unit.

3. A process according to any one of the preceding claims, wherein the centrifugal separation unit is a cyclone separation unit.

4. A process according to any one of the preceding claims, wherein the ionic liquid phase effluent comprises ionic liquid phase and in the range of from 0 to 20 vol%, preferably of from 0 to 10 vol% of hydrocarbon phase based on the total liquid weight of the ionic liquid phase effluent.

5. A process according to any one of the preceding claims, wherein the hydrocarbon phase effluent comprises a hydrocarbon phase and in the range of from 0 to 3 vol% of ionic liquid phase, preferably 0 to 0.5 vol% of ionic liquid phase based on the total liquid weight of the hydrocarbon phase effluent.

6. A process according to any one of the preceding claims, further comprising:

- fractionating said hydrocarbon phase effluent into an at least a stream comprising alkylate and a stream comprising isoparaffin.

7. A process according to any one of the preceding claims, wherein the ionic liquid phase effluent comprises solids, which process further comprises:

- providing the ionic liquid phase effluent to a third separation unit suitable for separating solids and liquids; and
- removing at least part of the solids from the ionic liquid phase effluent.

8. A process according to any one of the preceding claims, wherein the isoparaffin is isobutane and/or isopentane.

9. A process according to any one of the preceding claims, wherein the hydrocarbon mixture comprises an olefin comprising in the range of from 3 to 6 carbon atoms, preferably 4 or 5 carbon atoms.

10. Process according to any one of the preceding claims, wherein the acidic ionic liquid catalyst is a composite ionic liquid comprising of cations derived from a hydrohalide of an alkyl-containing amine or pyridine, anions being multiple-phase coordinate anions derived from two or more metal halides, wherein at least one metal halide is an aluminium halide and any further metal

halide is a halide of a metal selected from the group consisting of Group IB elements of the Periodic Table, Group IIB elements of the Periodic Table and transition elements of the Periodic Table.

11. A process according to claim 10, wherein to the catalyst comprises aluminium chloride and copper (I) chloride or copper (II) chloride.

# CLAIMS

1. A process for preparing an alkylate comprising contacting in a reactor a hydrocarbon mixture comprising at least an isoparaffin and an olefin with an acidic ionic liquid catalyst under alkylation conditions to obtain an alkylate, which process further comprises:

- withdrawing an alkylate-comprising reactor effluent from the reactor, wherein the reactor effluent comprises an ionic liquid phase and a hydrocarbon phase;
- separating at least part the reactor effluent into an ionic liquid phase effluent and a multiple-phase effluent in a first separation unit;
- separating at least part of the multiple-phase effluent into a hydrocarbon phase effluent and another effluent in a second separation unit; and
- recycling at least part of the ionic liquid phase effluent to the reactor;

in which process the ionic liquid phase effluent comprises solids, which process further comprises:

- providing the ionic liquid phase effluent to a separation unit suitable for separating solids and liquids; and
- removing at least part of the solids from the ionic liquid phase effluent.

2. A process according to claim 1, wherein the first separation unit and/or the second separation unit is a settler separation unit or a centrifugal separation unit, preferably a centrifugal separation unit.

3. A process according to any one of the preceding claims, wherein the centrifugal separation unit is a cyclone separation unit.

4. A process according to any one of the preceding claims, wherein the ionic liquid phase effluent comprises ionic liquid phase and in the range of from 0 to 20 vol%, preferably of from 0 to 10 vol% of hydrocarbon phase based on the total liquid weight of the ionic liquid phase effluent.

5. A process according to any one of the preceding claims, wherein the hydrocarbon phase effluent comprises a hydrocarbon phase and in the range of from 0 to 3 vol% of ionic liquid phase, preferably 0 to 0.5 vol% of ionic liquid phase based on the total liquid weight of the hydrocarbon phase effluent.

6. A process according to any one of the preceding claims, further comprising:

- fractionating said hydrocarbon phase effluent into an at least a stream comprising alkylate and a stream comprising isoparaffin.

7. A process according to any one of the preceding claims, wherein the isoparaffin is isobutane and/or isopentane.

8. A process according to any one of the preceding claims, wherein the hydrocarbon mixture comprises an olefin comprising in the range of from 3 to 6 carbon atoms, preferably 4 or 5 carbon atoms.

9. Process according to any one of the preceding claims, wherein the acidic ionic liquid catalyst is a composite ionic liquid comprising of cations derived from a hydrohalide of an alkyl-containing amine or pyridine, anions being multiple-phase coordinate anions derived from two or more metal halides, wherein at least one

metal halide is an aluminium halide and any further metal halide is a halide of a metal selected from the group consisting of Group IB elements of the Periodic Table, Group IIB elements of the Periodic Table and transition elements of the Periodic Table.

10. A process according to claim 9, wherein to the catalyst comprises aluminium chloride and copper (I) chloride or copper (II) chloride.

11. An alkylate produced by the process of any one of claims 1 to 10.