C L A I M S

1. A regeneration process for producing a regenerated ionic liquid catalyst from solids formed in an ionic liquid alkylation process wherein a first ionic liquid is used as a catalyst which is a composite ionic liquid comprising ammonium cations, and anions being composite coordinate anions derived from two or more metal salts, wherein at least one metal salt is an aluminium salt and any further metal salt is a salt 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,
the regeneration process comprising
(a) removing the solids from the reaction zone of the alkylation process; and
(b) subsequently treating the solids with a second ionic liquid made from an ammonium salt as cation, and an aluminium salt as anion which is the same as the aluminium salt present in the first ionic liquid.

2. The process of claim 1, wherein in step (a) at least part of the reaction mixture of the alkylation process is withdrawn from the reaction zone as a solids-comprising effluent, followed by separation of the effluent in a separator unit into a catalyst-rich phase and a hydrocarbon-rich phase and the solids are subsequently removed from the catalyst-rich phase by filtration, precipitation or centrifugation.

3. The process of claim 1 or 2, wherein the solids treated in step (b) are in the form of a paste.

4. The process of any one of claims 1 to 3, wherein the cation in the second ionic liquid is the same as the cation present in the first ionic liquid.

5. The process of any one of claims 1 to 4, wherein the anion in the first ionic liquid is a composite coordinate anion derived from aluminium (III) chloride and copper (I) chloride.

6. The process of any one of claims 1 to 5, wherein the anion in the second ionic liquid is derived from aluminium (III) chloride.

7. The process of any one of claims 1 to 6, wherein the molar ratio of the aluminium salt to the ammonium salt in the second ionic liquid ranges from 1.3 to 2.2, preferably 1.6 to 2.0, and more preferred 1.6 to 1.8.

8. The process of any one of claims 1 to 7, wherein the cation in the first ionic liquid and the cation in the second ionic liquid are derived from a triethylammonium salt, and preferably from triethylammonium chloride.

9. The process of any one of claims 1 to 8, wherein the solids in step (b) are stirred with the second ionic liquid at a temperature from 15 to 100 °C, preferably from 20 to 80 °C, most preferably from 25 to 45 °C.

10. An ionic liquid alkylation process comprising a regeneration process according to any one of the preceding claims, wherein after the regeneration process (at least part of) the regenerated ionic liquid catalyst is recycled to the reaction zone of the alkylation process.

CLAIMS

1. A regeneration process for producing a regenerated ionic liquid catalyst from solids formed in an ionic liquid alkylation process wherein a first ionic liquid is used as a catalyst which is a composite ionic liquid comprising ammonium cations, and anions being composite coordinate anions derived from two or more metal salts, wherein at least one metal salt is an aluminium salt and any further metal salt is a salt 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, the regeneration process comprising

(a) removing the solids from the reaction zone of the alkylation process; and

(b) subsequently treating the solids with a second ionic liquid made from an ammonium salt as cation, and an aluminium salt as anion which is the same as the aluminium salt present in the first ionic liquid.

2. The process of claim 1, wherein in step (a) at least part of the reaction mixture of the alkylation process is withdrawn from the reaction zone as a solids-comprising effluent, followed by separation of the effluent in a separator unit into a catalyst-rich phase and a hydrocarbon-rich phase and the solids are subsequently removed from the catalyst-rich phase by filtration, precipitation or centrifugation.

3. The process of claim 1, wherein the solids treated in step (b) are in the form of a paste.

4. The process of claim 1, wherein the cation in the second ionic liquid is the same as the cation present in the first ionic liquid.

5. The process of claim 1, wherein the anion in the first ionic liquid is a composite coordinate anion derived from aluminium (III) chloride and copper (I) chloride.

6. The process of claim 1, wherein the anion in the second ionic liquid is derived from aluminium (III) chloride.

7. The process of claim 1, wherein the molar ratio of the aluminium salt to the ammonium salt in the second ionic liquid ranges from 1.3 to 2.2.

8. The process of claim 1, wherein the cation in the first ionic liquid and the cation in the second ionic liquid are derived from a triethylammonium salt.

9. The process of claim 1, wherein the solids in step (b) are stirred with the second ionic liquid at a temperature from 15 to 100°C.

10. An ionic liquid alkylation process comprising a regeneration process according to claim 1, wherein after the regeneration process (at least part of) the regenerated ionic liquid catalyst is recycled to the reaction zone of the alkylation process.