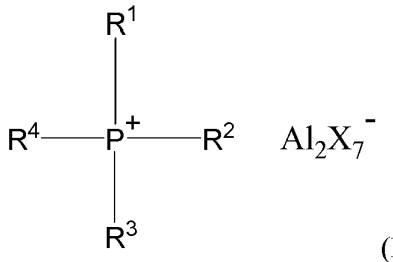
CLAIMS

1. A quaternary phosphonium haloaluminate compound according to Formula (I):



(I)

wherein

X is a halogen and either

(A)

R^1-R^3 are the same alkyl group and are chosen from a C_1-C_8 alkyl;

R^4 is different than R^1-R^3, is chosen from a C_4-C_{12} alkyl, and has a greater number of carbon atoms than R^1, R^2 and R^3; or

(B)

R^1-R^3 are the same alkyl group and are chosen from a C_4-C_{12} alkyl;

R^4 is different than R^1-R^3, is chosen from a C_4-C_{12} alkyl, and wherein R^4 has at least 1 more carbon atom than R^1; and wherein HR^4 has a boiling point of at least 30° C greater than the boiling point of HR^1, at atmospheric pressure.

2. A compound according to formula (I) of claim 1, wherein the quaternary phosphonium haloaluminate compound is according to claim 1 (A).

3. A compound according to Formula (I) of claim 2, wherein each of R^1-R^3 is a C_3-C_6 alkyl and R^4 is chosen from C_5-C_8 alkyl, preferably wherein each of R^1-R^3 has 4 carbon atoms.

4. A compound according to Formula (I) of any one of claims 1 to 3, wherein R^4 has 5 to 8 carbon atoms, preferably wherein R^4 is hexyl.

5. A compound according to Formula (I) of any one of claims 1 to 4, wherein X is selected from the group consisting of F, Cl, Br, and I.

6. A compound according to Formula (I) of claim 5, wherein X is Cl.

7. A compound according to Formula (I) of claim 1 to 4, wherein the quaternary phosphonium haloaluminate is selected from the group consisting of tripropylhexylphosphonium— Al_2X_7; tributylpentylphosphonium— Al_2X_7; tributylhexylphosphonium—Al_2X_7; tributylheptylphosphonium— Al_2X_7; tributyloctylphosphonium— Al_2X_7; tributylnonylphosphonium— Al_2X_7; tributyldecylphosphonium— Al_2X_7; tributylundecylphosphonium— Al_2X_7; and tributyldodecylphosphonium— Al_2X_7, wherein X is selected from the group consisting of F, Cl, Br, and I.

8. A compound according to Formula (I) of claim 7, wherein the quaternary phosphonium haloaluminate is tributylhexylphosphonium—Al_2Cl_7.

9. A compound according to Formula (I) of claim 7, wherein the quaternary phosphonium haloaluminate is tri-n-butyl-hexylphosphonium—Al_2Cl_7.

10. An ionic liquid catalyst for reacting olefins and isoparaffins to generate an alkylate, said catalyst comprising a quaternary phosphonium haloaluminate compound as defined in any one of claims 1 to 9.

11. An ionic liquid catalyst according to claim 10, wherein the catalyst has an initial kinematic viscosity of at least 50 cSt at a temperature of 20 °C.

12. An ionic liquid catalyst according to claim 10, wherein the catalyst has an initial kinematic viscosity of at least 20 cSt at a temperature of 50 °C.

13. An ionic liquid catalyst according to any one of claims 10 to 12, wherein the quaternary phosphonium haloaluminate compound is according to claim 1 (B).

14. An ionic liquid catalyst according to any one of claims 10 to 13 further comprising a Brønsted acid selected from the group consisting of HCl, HBr, HI, and mixtures thereof as co-catalyst, wherein said ionic liquid catalyst is mixed with the co-catalyst.

15. An ionic liquid catalyst according to claim 14, wherein said Brønsted acid co-catalyst is HCl.