HYDROCONVERSION PROCESS WITH ALKYL HALIDE COMPRISING AT LEAST 55 WT% HALIDE

FIELD OF THE INVENTION

This application is directed to hydroconversion processes comprising contacting a mixture of hydrocarbons with at least one alkyl halide comprising at least 55 wt% halide and having a boiling point of 70°C or higher.

SUMMARY OF THE DISCLOSURE

In a first aspect, there is provided a process, comprising: contacting a blend of hydrocarbons under hydroconversion conditions un a hydroconversion zone with a mixture of an acidic ionic liquid catalyst and at least one alkyl halide comprising at least 55 wt% halide and having a boiling point of 70°C or higher; wherein the blend of hydrocarbons are converted.

In a second aspect, there is provided an alkylation process, comprising: contacting a blend of hydrocarbons under alkylation conditions with a mixture of an acidic ionic liquid catalyst that is a chloroaluminate and at least one alkyl halide comprising 1,1,1-trichloroethane, tetrachloroethylene, or a mixture thereof; wherein greater than 99.9 wt% of an at least one olefin in the blend of hydrocarbons is alkylated.

In a third aspect, there is provided a hydroconversion process, comprising: a. drying an alkyl halide comprising at least 55 wt% halide and having a boiling point of 70°C or higher with a dessicant; b. making a mixture of the dried alkyl halide with an acidic ionic liquid catalyst; and c. contacting the mixture with a blend of hydrocabons under hydroconversion conditions, wherein the blend of hydrocarbons are converted.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGURE 1 illustrates the effect of three different alkyl halides on 2-pentene and isopentane alkylation with an acidic ionic liquid catalyst. The three different alkyl halides were tested at the same equivalent weight of chloride, 0.054.

FIGURE 2 illustrates the effect of two different levels of t-butyl chloride on 2-pentene and isopentane alkylation with an acidic ionic liquid catalyst. The levels of t-butyl chloride were 0.054 equivalent weight of chloride and 0.014 equivalent weight of chloride.

DETAILED DESCRIPTION OF THE INVENTION

Definitions:

The term "comprising" means including the elements or steps that are identified following that term, but any such elements or steps are not exhaustive, and an embodiment may include other elements or steps.

The "equivalent weight" of an element or radical is equal to its atomic weight or formula weight divided by the valence it assumes in compounds. The unit of equivalent weight is the atomic mass unit; the amount of a substance in grams numerically equal to the equivalent weight is called a gram equivalent. Hydrogen has atomic weight 1.008 and always assumes valence 1 in compounds, so its equivalent weight is 1.008. Oxygen has an atomic weight of 15.9994 and always assumes valence 2 in compounds, so its equivalent weight is 7.9997. The sulfate radical (SO_4) has formula weight 96.0636 and always has

9. The process of claim 1, wherein the at least one alkyl halide is selected from the group consisting of alkyl chloride, alkyl bromide, alkyl iodide, and mixtures thereof.

10. The process of claim 1, wherein the acidic ionic liquid catalyst is a chloroaluminate, and the at least one alkyl halide compound is an alkyl chloride.

11. The process of claim 1, wherein the at least one alkyl halide has a boiling point of 74°C or higher.

12. The process of claim 1, wherein the molar ratio of the at least one alkyl halide compound to the acidic ionic liquid catalyst is from greater than zero to less than 0.1.

13. The process of claim 12, wherein the molar ratio of the at least one alkyl halide compound to the acidic ionic liquid catalyst is from greater than zero to less than 0.05.

14. The process of claim 1, wherein the blend of hydrocarbons are alkylated to produce an alkylate gasoline, a middle distillate, or a mixture thereof.

15. The process of claim 1, wherein the at least one alkyl halide decomposes under alkylation to liberate a hydrogen halide, and the hydrogen halide promotes an alkylation reaction.

16. The process of claim 1, wherein the blend of hydrocarbons are converted by an alkylation, an isomerization, an oligomerization, or a mixture thereof.

17. The process of claim 1, additionally comprising contacting an n-alkane in a separate isomerization zone with the at least one alkyl halide compound. ~~The process of claim 3, wherein the molar ratio of the at least one alkyl halide to the at least one olefin is from greater than zero:1 to 1:1.~~

18. The process of claim 3, wherein the molar ratio of the at least one alkyl halide to the at least one olefin is from greater than zero:1 to 1:1.

19~~8~~. The process of claim 10, wherein the alkyl chloride is selected from the group of 1,1,1-trichloroethane, tetrachloroethylene, and mixtures thereof.

20~~19~~. The process of claim 3, wherein there is a delay of greater than 1.5 minutes after a start of the contacting until greater than 20 wt% of the at least one olefin is converted.

21~~0~~. The process of claim 20~~19~~, wherein greater than 99.9 wt% of the at least one olefin is alkylated within 60 minutes after the start of the contacting.

22~~1~~. An alkylation process, comprising: contacting a blend of hydrocarbons under alkylation conditions with a mixture of an acidic ionic liquid catalyst that is a chloroaluminate and at least one alkyl halide comprising 1,1,1-trichloroethane, tetrachloroethylene, or a mixture thereof; wherein greater than 99.9 wt% of an at least one olefin in the blend of hydrocarbons is alkylated.

23~~2~~. A hydroconversion process, comprising:

a. drying an alkyl halide comprising at least 55 wt% halide and having a boiling point of 70°C or higher with a dessicant;
b. making a mixture of the dried alkyl halide with an acidic ionic liquid catalyst; and
c. contacting the mixture with a blend of hydrocarbons under hydroconversion conditions, wherein the blend of hydrocarbons are converted.

24~~3~~. The process of claim 23~~2~~, wherein the blend of hydrocarbons comprises at least one olefin and at least one isoparaffin and the blend of hydrocarbons are converted into an alkylate.

25~~4~~. The process of claim 24~~3~~, wherein the alkylate comprises an alkylate gasoline, a middle distillate, or a mixture thereof.

265. The process of claim 232, wherein the dessicant is selected from the group of a montmorillonite clay, a silica gel, an activated alumina, a molecular sieve, a calcium oxide, or a calcium sulfate.

276. The process of claim 265, wherein the molecular sieve is selected from the group of 3A, 4A, 5A, 13X, and mixtures thereof.