c. separating out an ionic liquid catalyst stream (60) from the mixture made in step b) to produce the blended alkylate gasoline (97) comprising greater than 50 wppm methylcyclohexane,

wherein the blended alkylate gasoline (97) comprises an extracted conjunct polymer naphtha (45) having a final boiling point less than 246°C (475°F), a boiling point range distribution from 90°F to 474°F (32°C to 245°C), a Bromine Number of 5 or less, and at least 30 wt% naphthenes.

This application also provides an integrated alkylation process, comprising:

a. regenerating a used ionic liquid catalyst comprising a conjunct polymer in a hydrogenation reactor (100) to make a regenerated catalyst effluent (10);

b. mixing the regenerated catalyst effluent (10) or a separated liquid from the regenerated catalyst effluent (10) with an effluent from an alkylation reactor (40); and

c. separating out an ionic liquid catalyst stream (60) from the mixture made in step b) to produce a blended alkylate gasoline (97) comprising greater than 50 wppm methylcyclohexane,

wherein the blended alkylate gasoline (97) comprises an extracted conjunct polymer naphtha (45) having a final boiling point less than 246°C (475°F), a boiling point range distribution from 90°F to 474°F (32°C to 245°C), a Bromine Number of 5 or less, and at least 30 wt% naphthenes.

This application also provides a method to analyze alkylate products, comprising: determining an amount of methylcyclohexane in alkylate products (80) and based on the amount, estimating a quantity of extracted conjunct polymer naphtha (45) in the alkylate products (80).

This application provides a method to analyze alkylate products, comprising: determining an amount of methylcyclohexane in the alkylate products (80) and based on the amount of methylcyclohexane, estimating a quantity of extracted conjunct polymer naphtha (45) in the alkylate products (80); wherein the extracted conjunct polymer naphtha has a final boiling point less than 246°C (475°F), a boiling point range distribution from 90°F to 474°F (32°C to 245°C), a Bromine Number of 5 or less, and at least 30 wt% naphthenes.

This application also provides a process for making an extracted conjunct polymer naphtha comprising:

a. regenerating a used ionic liquid catalyst comprising a conjunct polymer in a hydrogenation reactor to make a regenerated catalyst effluent, wherein the hydrogenation reactor contacts the used ionic liquid catalyst with hydrogen and a hydrogenation catalyst and the hydrogenation is carried out at hydrogen gauge pressure of 50 to 3000 psi (0.3 to 21 MPa), a temperature of -20°C to 400°C and for 0.1 min to 24 hours;

b. mixing the regenerated catalyst effluent or a separated liquid from the regenerated catalyst effluent with a conjunct polymer extraction solvent; and

c. separating out the conjunct polymer extraction solvent to produce the extracted conjunct polymer naphtha; wherein the extracted conjunct polymer naphtha has a final boiling point less than 246°C (475°F), a Bromine Number of 5 or less, and at least 30 wt%

d. naphthenes wherein at least a portion of the conjunct polymer extraction solvent comes from an effluent from an alkylation reactor.

This application also provides an integrated alkylation process, comprising:

a. regenerating a used ionic liquid catalyst comprising a conjunct polymer in a hydrogenation reactor to make a regenerated catalyst effluent, wherein the hydrogenation reactor contacts the used ionic liquid catalyst with hydrogen and a hydrogenation catalyst and the hydrogenation is carried out at hydrogen gauge pressure of 50 to 3000 psi (0.3 to 21 MPa), a temperature of -20°C to 400°C, and for 0.1 min to 24 hours;

b. mixing the regenerated catalyst effluent or a separated liquid from the regenerated catalyst effluent with an effluent from an alkylation reactor to make a mixture; and

c. separating out an ionic liquid catalyst stream from the mixture made in step b) to produce a blended alkylate gasoline comprising greater than 50 wppm methylcyclohexane.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGURE 1 is a diagram of an integrated alkylation process, demonstrating direct blending of extracted conjunct polymer naphtha with alkylate products.

FIGURE 2 is a diagram of an integrated alkylation process to produce extracted conjunct polymer naphtha.

DETAILED DESCRIPTION

Referring to Figure 1, isoparaffin feed (65) and olefin feed (75) are fed to an alkylation reactor (300). The effluent from an alkylation reactor (40) is blended with regenerated catalyst effluent (10) and fed to an ionic liquid catalyst and hydrocarbon

wherein the blended alkylate gasoline has either a slight tarnish or no tarnish in a silver strip test and a rating of 1a or 1b in a copper strip test; or

wherein the blended alkylate gasoline has an AKI from 85 to 100.9. A process for making an extracted conjunct polymer naphtha comprising:

a. regenerating a used ionic liquid catalyst comprising a conjunct polymer in a hydrogenation reactor to make a regenerated catalyst effluent, wherein the hydrogenation reactor contacts the used ionic liquid catalyst with hydrogen and a hydrogenation catalyst and the hydrogenation is carried out at hydrogen gauge pressure of 50 to 3000 psi (0.3 to 21 MPa), a temperature of -20°C to 400°C and for 0.1 min to 24 hours;
b. mixing the regenerated catalyst effluent or a separated liquid from the regenerated catalyst effluent with a conjunct polymer extraction solvent; and
c. separating out the conjunct polymer extraction solvent to produce the extracted conjunct polymer naphtha; wherein the extracted conjunct polymer naphtha has a final boiling point less than 246°C (475°F), a Bromine Number of 5 or less, and at least 30 wt% naphthenes wherein at least a portion of the conjunct polymer extraction solvent comes from an effluent from an alkylation reactor.

10. An integrated alkylation process, comprising:

a. regenerating a used ionic liquid catalyst comprising a conjunct polymer in a hydrogenation reactor to make a regenerated catalyst effluent, wherein the hydrogenation reactor contacts the used ionic liquid catalyst with hydrogen and a hydrogenation catalyst and the hydrogenation is carried out at hydrogen gauge pressure of 50 to 3000 psi (0.3 to 21 MPa), a temperature of -20°C to 400°C, and for 0.1 min to 24 hours;
b. mixing the regenerated catalyst effluent or a separated liquid from the regenerated catalyst effluent with an effluent from an alkylation reactor to make a mixture; and
c. separating out an ionic liquid catalyst stream from the mixture made in step b) to produce a blended alkylate gasoline comprising greater than 50 wppm methylcyclohexane,

11. The integrated alkylation process of claim 10, wherein conditions in the hydrogenation reactor are selected to produce a hydrogenated conjunct polymer having a property selected from the group consisting of a final boiling point less than 246°C (475°F), a Bromine Number of 5 or less, at least 30 wt% naphthenes, at least 3 wt%

methylcyclohexane, and combinations thereof.

12. A method to analyze a blended alkylate gasoline as set out in claim 5, the method comprising: determining an amount of methylcyclohexane in the blended alkylate gasoline and based on the amount of methylcyclohexane, estimating a quantity of a hydrogenated extracted conjunct polymer naphtha (45) in the blended alkylate gasoline.