c. operating the distillation unit under conditions including a temperature from 65.6°C (150°F) to 343°C (650°F), wherein the ionic liquid catalyst that has accumulated in the distillation unit induces removal of the alkyl chloride to produce the dechlorinated-hydrocarbon; and wherein a second final boiling point of the dechlorinated-hydrocarbon is within 5 degrees C of a first final boiling point of the chlorinated-hydrocarbon.

In one aspect, there is provided a process for producing a dechlorinated-hydrocarbon, comprising: a. creating an ionic liquid catalyst-rich zone in a distillation unit by feeding an ionic liquid catalyst comprising an anhydrous metal halide to the distillation unit; b. passing a chlorinated-hydrocarbon comprising a mixture of an alkylate product and an alkyl chloride to the distillation unit; c. operating the distillation unit under conditions including a temperature from 65.6° C. (150° F.) to 343° C. (650° F.), wherein the ionic liquid catalyst that has accumulated in the distillation unit induces a removal of the alkyl chloride to produce the dechlorinated-hydrocarbon; and wherein a second final boiling point of the dechlorinated-hydrocarbon is within 5 degrees C. of a first final boiling point of the chlorinated-hydrocarbon.

This application also provides a process for reducing chloride in a hydrocarbon, comprising:

a. feeding a chlorinated-hydrocarbon that is an alkylate gasoline blending component comprising greater than 50 ppmw chlorides and having a first RON, and an ionic liquid catalyst to a treatment unit;

b. operating the treatment unit under conditions including a temperature from 65.6°C (150°F) to 343°C (650°F), wherein the ionic liquid catalyst induces removal of an alkyl chloride in the chlorinated-hydrocarbon to produce a dechlorinated-hydrocarbon and a HCl; and

c. collecting the dechlorinated-hydrocarbon from the treatment unit, wherein at least 90 wt% of the chlorides have been removed from the chlorinated-hydrocarbon and the dechlorinated-hydrocarbon has a second RON that is within 2 points of the first RON.

In one aspect, there is provided a process for reducing chloride in a hydrocarbon, comprising: a. feeding a chlorinated-hydrocarbon that is an alkylate gasoline blending component comprising greater than 50 up to 5,000 ppmw chlorides and having a first RON, and an ionic liquid catalyst comprising an anhydrous metal halide to a treatment unit; b. operating the treatment unit under conditions including a temperature from 65.6° C. (150° F.) to 343° C. (650° F.), wherein the ionic liquid catalyst induces a removal of an alkyl chloride in the chlorinated-hydrocarbon to produce a dechlorinated-hydrocarbon and a HCl; and c.

collecting the dechlorinated-hydrocarbon from the treatment unit, wherein at least 90 wt % of the chlorides have been removed from the chlorinated-hydrocarbon and the dechlorinated-hydrocarbon has a second RON that is within 2 points of the first RON.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG 1 is a diagram of one embodiment of a process to remove chlorides from alkylate gasoline.

DETAILED DESCRIPTION

Hydrocarbons that are contaminated with chlorides can be produced by a wide range of processes. It is important to remove these chlorides to improve product properties, reduce chloride-induced corrosion, and to meet product specifications. For example, hydrocarbons that are made using catalysts comprising chloride can sometimes incorporate either trace levels or high levels of alkyl chlorides that subsequently need to be reduced. There is a concern that alkyl chlorides can create unwanted dioxins when hydrocarbons containing alkyl chlorides are combusted, such as could happen in an engine burning hydrocarbon fuel.

A chlorinated-hydrocarbon, in the context of this disclosure, has greater than 30 ppmw of chlorides, as measured by XRF Spectroscopy. In some embodiments, the chlorinated-hydrocarbon has greater than 50 ppmw, greater than 100 ppmw, greater than 250 ppmw, greater than 500 ppmw, and up to 5,000 ppmw chlorides. The chlorinated-hydrocarbon can comprise, for example, a mixture of an alkylate product, a hydrogen

c. operating the distillation unit under conditions including a temperature from 65.6°C (150°F) to 343°C (650°F), wherein the ionic liquid catalyst that has accumulated in the distillation unit induces removal of the alkyl chloride to produce the dechlorinated-hydrocarbon; and wherein a second final boiling point of the dechlorinated-hydrocarbon is within 5 degrees C of a first final boiling point of the chlorinated-hydrocarbon.

In one aspect, there is provided a process for producing a dechlorinated-hydrocarbon, comprising: a. creating an ionic liquid catalyst-rich zone in a distillation unit by feeding an ionic liquid catalyst comprising an anhydrous metal halide to the distillation unit; b. passing a chlorinated-hydrocarbon comprising a mixture of an alkylate product and an alkyl chloride to the distillation unit; c. operating the distillation unit under conditions including a temperature from 65.6° C. (150° F.) to 343° C. (650° F.), wherein the ionic liquid catalyst that has accumulated in the distillation unit induces a removal of the alkyl chloride to produce the dechlorinated-hydrocarbon; and wherein a second final boiling point of the dechlorinated-hydrocarbon is within 5 degrees C. of a first final boiling point of the chlorinated-hydrocarbon; wherein the amount of the ionic liquid catalyst in the distillation unit is from 20 ppmw to 2 wt %.

This application also provides a process for reducing chloride in a hydrocarbon, comprising:

a. feeding a chlorinated-hydrocarbon that is an alkylate gasoline blending component comprising greater than 50 ppmw chlorides and having a first RON, and an ionic liquid catalyst to a treatment unit;

b. operating the treatment unit under conditions including a temperature from 65.6°C (150°F) to 343°C (650°F), wherein the ionic liquid catalyst induces removal of an alkyl chloride in the chlorinated-hydrocarbon to produce a dechlorinated-hydrocarbon and a HCl; and

c. collecting the dechlorinated-hydrocarbon from the treatment unit, wherein at least 90 wt% of the chlorides have been removed from the chlorinated-hydrocarbon and the dechlorinated-hydrocarbon has a second RON that is within 2 points of the first RON; wherein the process as described herein, wherein the amount of the ionic liquid catalyst in the treatment unit is from 20 ppmw to 2 wt %.

In one aspect, there is provided a process for reducing chloride in a hydrocarbon, comprising: a. feeding a chlorinated-hydrocarbon that is an alkylate gasoline blending component comprising greater than 50 up to 5,000 ppmw chlorides and having a first RON, and an ionic liquid catalyst comprising an anhydrous metal halide to a treatment unit; b.

operating the treatment unit under conditions including a temperature from 65.6° C. (150° F.) to 343° C. (650° F.), wherein the ionic liquid catalyst induces a removal of an alkyl chloride in the chlorinated-hydrocarbon to produce a dechlorinated-hydrocarbon and a HCl; and c. collecting the dechlorinated-hydrocarbon from the treatment unit, wherein at least 90 wt % of the chlorides have been removed from the chlorinated-hydrocarbon and the dechlorinated-hydrocarbon has a second RON that is within 2 points of the first RON wherein the amount of the ionic liquid catalyst in the treatment unit is from 20 ppmw to 2 wt %.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG 1 is a diagram of one embodiment of a process to remove chlorides from alkylate gasoline.

DETAILED DESCRIPTION

Hydrocarbons that are contaminated with chlorides can be produced by a wide range of processes. It is important to remove these chlorides to improve product properties, reduce chloride-induced corrosion, and to meet product specifications. For example, hydrocarbons that are made using catalysts comprising chloride can sometimes incorporate either trace levels or high levels of alkyl chlorides that subsequently need to be reduced. There is a concern that alkyl chlorides can create unwanted dioxins when hydrocarbons containing alkyl chlorides are combusted, such as could happen in an engine burning hydrocarbon fuel.

A chlorinated-hydrocarbon, in the context of this disclosure, has greater than 30 ppmw of chlorides, as measured by XRF Spectroscopy. In some embodiments, the chlorinated-hydrocarbon has greater than 50 ppmw, greater than 100 ppmw, greater than 250 ppmw, greater than 500 ppmw, and up to 5,000 ppmw chlorides. The chlorinated-hydrocarbon can comprise, for example, a mixture of an alkylate product, a hydrogen

Claims

1. A process for reducing chloride in a hydrocarbon, comprising:

a. feeding a chlorinated-hydrocarbon, comprising greater than 50 up to 5,000 ppmw chlorides, and an ionic liquid catalyst comprising an anhydrous metal halide to a treatment unit; wherein an amount of the ionic liquid catalyst comprising the anhydrous metal halide in the treatment unit is from 20 ppmw to 2 wt %;

b. operating the treatment unit under conditions including a temperature from 65.6° C. (150° F.) to 343° C. (650° F.), wherein the ionic liquid catalyst induces a removal of an alkyl chloride in the chlorinated-hydrocarbon to produce a dechlorinated-hydrocarbon and a HCl; and

c. collecting the dechlorinated-hydrocarbon from the treatment unit, wherein at least 90 wt % of the chlorides have been removed from the chlorinated-hydrocarbon.

2. The process of claim 1, wherein the treatment unit comprises a distillation column.

3. The process of claim 2, wherein the ionic liquid catalyst is supported in the distillation column.

4. The process of claim 2, wherein the treatment unit comprises a series of distillation columns.

5. The process of claim 1, wherein the treatment unit is a catalytic dechlorination zone.

6. The process of claim 1, wherein the treatment unit comprises a distillation unit and the ionic liquid catalyst has accumulated in a part of the distillation unit.

7. The process of claim 6, wherein the part of the distillation unit is a distillation column, a bottom of a reboiler, a product-recycle loop, or combinations thereof.

8. The process of claim 1, wherein the chlorinated-hydrocarbon has greater than 500 ppmw chlorides.

9. The process of claim 1, wherein greater than 92 wt % up to 99.9 wt % of the chlorides have been removed from the chlorinated-hydrocarbon.

10. The process of claim 1, wherein the dechlorinated-hydrocarbon comprises less than 25 ppmw chlorides.

11. The process of claim 1, wherein the ionic liquid catalyst is fed together with the chlorinated-hydrocarbon to the treatment unit.

12. The process of claim 11, where the chlorinated-hydrocarbon is mixed with 0.001 to 0.1 wt % of the ionic liquid catalyst when feeding to the treatment unit.

13. The process of claim 1, wherein the ionic liquid catalyst is fed separately from the chlorinated-hydrocarbon to the treatment unit.

14. The process of claim 1, wherein the ionic liquid catalyst is different from a conversion-ionic liquid catalyst that was used to produce the chlorinated-hydrocarbon.

15. The process of claim 1, wherein the ionic liquid catalyst is impregnated on a porous support.

16. The process of claim 1, wherein the ionic liquid catalyst is supported on a polymer support by covalent bond interaction between the ionic liquid catalyst and the polymer support.

17. The process of claim 1, wherein the HCl is recovered from the treatment unit.

18. The process of claim 17, wherein the HCl is recycled to a hydrocarbon conversion reactor that produces the chlorinated-hydrocarbon.

19. The process of claim 17, wherein the removal of the alkyl chloride in the chlorinated-hydrocarbon is by catalytic cracking of the alkyl chloride.

20. The process of claim 1, wherein the dechlorinated-hydrocarbon is an alkylate gasoline blending component, and wherein a second RON of the dechlorinated-hydrocarbon is within 5 points of a first RON of the chlorinated-hydrocarbon.

21. The process of claim 1, wherein a second final boiling point of the dechlorinated-hydrocarbon is within 5 degrees C. of a first final boiling point of the chlorinated-hydrocarbon.

22. The process of claim 1, wherein the conditions for operating the treatment unit include the temperature from 121° C. (250° F.) to 288° C. (550° F.).

23. The process of claim 1, wherein the ionic liquid catalyst comprises an anhydrous metal halide selected from the group consisting of $AlCl_3$, $AlBr_3$, $GaCl_3$, $GaBr_3$, $InCl_3$, and mixtures thereof.

24. The process of claim 1, wherein the ionic liquid catalyst comprises a cation that is an ammonium, phosphonium, or sulphonium.

25. A process for producing a dechlorinated-hydrocarbon, comprising:

a. creating an ionic liquid catalyst-rich zone in a distillation unit by feeding an ionic liquid catalyst comprising an anhydrous metal halide to the distillation unit;

b. passing a chlorinated-hydrocarbon comprising a mixture of an alkylate product and an alkyl chloride to the distillation unit;

c. operating the distillation unit under conditions including a temperature from 65.6° C. (150° F.) to 343° C. (650° F.), wherein the ionic liquid catalyst that has accumulated in the distillation unit induces a removal of the alkyl chloride to produce the dechlorinated-hydrocarbon; and wherein a second final boiling point of the dechlorinated-hydrocarbon is within 5 degrees C. of a first final boiling point of the chlorinated-hydrocarbon.

26. A process for reducing chloride in a hydrocarbon, comprising:

a. feeding a chlorinated-hydrocarbon that is an alkylate gasoline blending component comprising greater than 50 up to 5,000 ppmw chlorides and having a first RON, and an ionic liquid catalyst comprising an anhydrous metal halide to a treatment unit;

b. operating the treatment unit under conditions including a temperature from 65.6° C. (150° F.) to 343° C. (650° F.), wherein the ionic liquid catalyst induces a removal of an alkyl chloride in the chlorinated-hydrocarbon to produce a dechlorinated-hydrocarbon and a HCl; and

c. collecting the dechlorinated-hydrocarbon from the treatment unit, wherein at least 90 wt % of the chlorides have been removed from the chlorinated-hydrocarbon and the dechlorinated-hydrocarbon has a second RON that is within 2 points of the first RON.

27. The process of claim 25, wherein the amount of the ionic liquid catalyst in the distillation unit is from 20 ppmw to 2 wt %.

28. The process of claim 26,wherein the amount of the ionic liquid catalyst in the treatment unit is from 20 ppmw to 2 wt %.

Claims

1. A process for reducing chloride in a hydrocarbon, comprising:

a. feeding a chlorinated-hydrocarbon, comprising greater than 50 up to 5,000 ppmw chlorides, and an ionic liquid catalyst comprising an anhydrous metal halide to a treatment unit; wherein an amount of the ionic liquid catalyst comprising the anhydrous metal halide in the treatment unit is from 20 ppmw to 2 wt %;

b. operating the treatment unit under conditions including a temperature from 65.6° C. (150° F.) to 343° C. (650° F.), wherein the ionic liquid catalyst induces a removal of an alkyl chloride in the chlorinated-hydrocarbon to produce a dechlorinated-hydrocarbon and a HCl; and

c. collecting the dechlorinated-hydrocarbon from the treatment unit, wherein at least 90 wt % of the chlorides have been removed from the chlorinated-hydrocarbon.

2. The process of claim 1, wherein the treatment unit comprises a distillation column.

3. The process of claim 2, wherein the ionic liquid catalyst is supported in the distillation column.

4. The process of claim 2, wherein the treatment unit comprises a series of distillation columns.

5. The process of claim 1, wherein the treatment unit is a catalytic dechlorination zone.

6. The process of claim 1, wherein the treatment unit comprises a distillation unit and the ionic liquid catalyst has accumulated in a part of the distillation unit.

7. The process of claim 6, wherein the part of the distillation unit is a distillation column, a bottom of a reboiler, a product-recycle loop, or combinations thereof.

8. The process of claim 1, wherein the chlorinated-hydrocarbon has greater than 500 ppmw chlorides.

9. The process of claim 1, wherein greater than 92 wt % up to 99.9 wt % of the chlorides have been removed from the chlorinated-hydrocarbon.

10. The process of claim 1, wherein the dechlorinated-hydrocarbon comprises less than 25 ppmw chlorides.

11. The process of claim 1, wherein the ionic liquid catalyst is fed together with the chlorinated-hydrocarbon to the treatment unit.

12. The process of claim 11, where the chlorinated-hydrocarbon is mixed with 0.001 to 0.1 wt % of the ionic liquid catalyst when feeding to the treatment unit.

13. The process of claim 1, wherein the ionic liquid catalyst is fed separately from the chlorinated-hydrocarbon to the treatment unit.

14. The process of claim 1, wherein the ionic liquid catalyst is different from a conversion-ionic liquid catalyst that was used to produce the chlorinated-hydrocarbon.

15. The process of claim 1, wherein the ionic liquid catalyst is impregnated on a porous support.

16. The process of claim 1, wherein the ionic liquid catalyst is supported on a polymer support by covalent bond interaction between the ionic liquid catalyst and the polymer support.

17. The process of claim 1, wherein the HCl is recovered from the treatment unit.

18. The process of claim 17, wherein the HCl is recycled to a hydrocarbon conversion reactor that produces the chlorinated-hydrocarbon.

19. The process of claim 17, wherein the removal of the alkyl chloride in the chlorinated-hydrocarbon is by catalytic cracking of the alkyl chloride.

20. The process of claim 1, wherein the dechlorinated-hydrocarbon is an alkylate gasoline blending component, and wherein a second RON of the dechlorinated-hydrocarbon is within 5 points of a first RON of the chlorinated-hydrocarbon.

21. The process of claim 1, wherein a second final boiling point of the dechlorinated-hydrocarbon is within 5 degrees C. of a first final boiling point of the chlorinated-hydrocarbon.

22. The process of claim 1, wherein the conditions for operating the treatment unit include the temperature from 121° C. (250° F.) to 288° C. (550° F.).

23. The process of claim 1, wherein the ionic liquid catalyst comprises an anhydrous metal halide selected from the group consisting of $AlCl_3$, $AlBr_3$, $GaCl_3$, $GaBr_3$, $InCl_3$, and mixtures thereof.

24. The process of claim 1, wherein the ionic liquid catalyst comprises a cation that is an ammonium, phosphonium, or sulphonium.

25. A process for producing a dechlorinated-hydrocarbon, comprising:

a. creating an ionic liquid catalyst-rich zone in a distillation unit by feeding an ionic liquid catalyst comprising an anhydrous metal halide to the distillation unit;

b. passing a chlorinated-hydrocarbon comprising a mixture of an alkylate product and an alkyl chloride to the distillation unit;

c. operating the distillation unit under conditions including a temperature from 65.6° C. (150° F.) to 343° C. (650° F.), wherein the ionic liquid catalyst that has accumulated in the distillation unit induces a removal of the alkyl chloride to produce the dechlorinated-hydrocarbon; and wherein a second final boiling point of the dechlorinated-hydrocarbon is within 5 degrees C. of a first final boiling point of the chlorinated-hydrocarbon; wherein the amount of the ionic liquid catalyst in the distillation unit is from 20 ppmw to 2 wt %

26. A process for reducing chloride in a hydrocarbon, comprising:

a. feeding a chlorinated-hydrocarbon that is an alkylate gasoline blending component comprising greater than 50 up to 5,000 ppmw chlorides and having a first RON, and an ionic liquid catalyst comprising an anhydrous metal halide to a treatment unit;

b. operating the treatment unit under conditions including a temperature from 65.6° C. (150° F.) to 343° C. (650° F.), wherein the ionic liquid catalyst induces a removal of an alkyl chloride in the chlorinated-hydrocarbon to produce a dechlorinated-hydrocarbon and a HCl; and

c. collecting the dechlorinated-hydrocarbon from the treatment unit, wherein at least 90 wt % of the chlorides have been removed from the chlorinated-hydrocarbon and the dechlorinated-hydrocarbon has a second RON that is within 2 points of the first RON; wherein the amount of the ionic liquid catalyst in the treatment unit is from 20 ppmw to 2 wt %