CLAIMS

1. A process, comprising:

providing a first hydrocarbon-containing composition comprising, per gram of the first hydrocarbon-containing composition, at least 0.05 grams of hydrocarbons having a boiling point in the range from 25°C up to 204°C, at least 0.1 gram of hydrocarbons having a boiling point in the range from 204°C up to 260°C, at least 0.25 gram of hydrocarbons having a boiling point in the range from 260°C up to 343°C, at least 0.3 gram of hydrocarbons having a boiling point in the range from 343°C to 538°C, at most 0.03 gram of hydrocarbons having a boiling point of greater than 538°C, where the boiling point ranges of the first hydrocarbon-containing composition are as determined by ASTM Method D5307; from 0.0005 to 0.05 gram of sulfur on an atomic basis as determined by ASTM Method D4294, wherein at least 40 wt.% of the sulfur, on an atomic sulfur basis as determined by ASTM Method D4294, is contained in hydrocarbon-containing compounds having a boiling point of less than 343°C as determined by ASTM Method D5307, and at least 40 wt.% of the sulfur contained in hydrocarbon-containing compounds having a boiling point of less than 343°C in the first hydrocarbon-containing composition is contained in benzothiophenic compounds as determined by GC-GC sulfur chemiluminscence;

contacting the first hydrocarbon-containing composition with hydrogen and a catalyst comprised of a Column 6 metal of the Periodic Table or a compound thereof at a temperature of from 270°C to 425°C and a pressure of from 3.4 MPa to 27.5 MPa to produce a second hydrocarbon-containing composition.

2. The process of claim 1 wherein the catalyst comprising of a Column 6 metal is further comprised of a support material selected from alumina, silica, titania, zirconia, or mixtures thereof, where the Column 6 metal or compound thereof is deposited on or dispersed in the support material.

3. The process of claim 1 or claim 2 wherein the catalyst comprising a Column 6 metal further comprises a Column 7-10 metal of the Periodic Table or compound thereof.

4. The process of claim 1 or any of claims 2-3 wherein the sulfur content of the second hydrocarbon-containing composition, on an atomic sulfur basis as determined in accordance with ASTM Method D4294, is at most 10 wt.% of the sulfur content of the first hydrocarbon-containing composition.

5. The process of claim 1 or any of claims 2-4 wherein the second hydrocarbon-containing composition has a sulfur content in which at most 50 wt.% of the sulfur, on an atomic sulfur basis as determined by ASTM Method D4294, is contained in hydrocarbon-containing compounds having a boiling point of less than 343°C as determined by ASTM Method D5307.

CLAIMS

1. A process, comprising:

providing a first hydrocarbon-containing composition comprising, per gram of the first hydrocarbon-containing composition, at least 0.05 grams of hydrocarbons having a boiling point in the range from 25°C up to 204°C, at least 0.1 gram of hydrocarbons having a boiling point in the range from 204°C up to 260°C, at least 0.25 gram of hydrocarbons having a boiling point in the range from 260°C up to 343°C, at least 0.3 gram of hydrocarbons having a boiling point in the range from 343°C to 538°C, at most 0.03 gram of hydrocarbons having a boiling point of greater than 538°C, where the boiling point ranges of the first hydrocarbon-containing composition are as determined by ASTM Method D5307; from 0.0005 to 0.05 gram of sulfur on an atomic basis as determined by ASTM Method D4294, wherein at least 40 wt.% of the sulfur, on an atomic sulfur basis as determined by ASTM Method D4294, is contained in hydrocarbon-containing compounds having a boiling point of less than 343°C as determined by ASTM Method D5307, and at least 40 wt.% of the sulfur contained in hydrocarbon-containing compounds having a boiling point of less than 343°C in the first hydrocarbon-containing composition is contained in benzothiophenic compounds as determined by GC-GC sulfur chemiluminscence,

wherein the first hydrocarbon-containing composition is produced by continuously or intermittently providing hydrogen to a mixing zone;

providing a metal-containing catalyst to the mixing zone wherein any metal-containing catalyst provided to the mixing zone has an acidity as measured by ammonia chemisorption of at most 200 μmol ammonia per gram of catalyst;

selecting a hydrocarbon-containing feedstock containing at least 20 wt.% hydrocarbons having a boiling point of greater than 538°C as determined in accordance with ASTM Method D5307;

continuously or intermittently providing the hydrocarbon-containing feedstock to the mixing zone at a selected rate and blending the hydrogen, the hydrocarbon-containing feedstock, and the catalyst in the mixing zone at a temperature of from 375°C to 500°C and at a total pressure of from 6.9 MPa to 27.5 MPa to produce: a) a vapor comprised of hydrocarbons that are vaporizable at the temperature and the pressure within the mixing zone, and b) a hydrocarbon-

depleted feed residuum comprising hydrocarbons that are liquid at the temperature and pressure within the mixing zone;

separating at least a portion of the vapor from the mixing zone while retaining in the mixing zone at least a portion of the hydrocarbon-depleted feed residuum and at least a portion of the catalyst;

and apart from the mixing zone, condensing at least a portion of the vapor separated from the mixing zone to produce the first liquid hydrocarbon-containing composition separate from the mixing zone; and

contacting the first hydrocarbon-containing composition with hydrogen and a catalyst comprised of a Column 6 metal of the Periodic Table or a compound thereof at a temperature of from 270°C to 425°C and a pressure of from 3.4 MPa to 27.5 MPa to produce a second hydrocarbon-containing composition.

2. The process of claim 1 wherein the catalyst comprising a Column 6 metal is further comprised of a support material selected from alumina, silica, titania, zirconia, or mixtures thereof, where the Column 6 metal or compound thereof is deposited on or dispersed in the support material.

3. The process of claim 1 wherein the catalyst comprising a Column 6 metal further comprises a Column 7-10 metal of the Periodic Table or compound thereof.

4. The process of claim 1 wherein the sulfur content of the second hydrocarbon-containing composition, on an atomic sulfur basis as determined in accordance with ASTM Method D4294, is at most 10 wt.% of the sulfur content of the first hydrocarbon-containing composition.

5. The process of claim 1 wherein the second hydrocarbon-containing composition has a sulfur content in which at most 50 wt.% of the sulfur, on an atomic sulfur basis as determined by ASTM Method D4294, is contained in hydrocarbon-containing compounds having a boiling point of less than 343°C as determined by ASTM Method D5307.