What is claimed is:

1. A method for processing a heavy oil feedstock, comprising:

providing a heavy oil feedstock having a 10 wt% distillation point of at least about 650ºF (343ºC) and a first Conradson carbon residue wt%;

exposing the heavy oil feedstock to a slurry hydroconversion catalyst in one or more reactors under effective slurry hydroconversion conditions to form a slurry hydroconversion effluent, the effective slurry hydroconversion conditions being effective for conversion of at least about 80 wt% of the heavy oil feedstock relative to a conversion temperature of 1050ºF (566ºC);

separating a bottoms product from the slurry hydroconversion effluent, the bottoms product having a 10 wt% distillation point of at least about 650ºF (343ºC); and

hydrocracking at least a portion of the bottoms product in the presence of a hydrocracking catalyst under effective hydrocracking conditions, the at least a portion of the bottoms product having a final boiling point of at least about 1050ºF (566ºC),

wherein the slurry hydroconversion catalyst comprises a bulk multimetallic catalyst comprising at least one non-noble Group VIII (Group 8-10) metal and at least one Group VIB (Group 6) metal, a weight of the slurry hydroconversion catalyst being about 2 wt% to 25 wt% of a weight of the heavy oil feedstock in the reactor, and

wherein the bulk catalyst is formed from a catalyst precursor that comprises at least one metal from Group 6 of the Periodic Table of the Elements, at least one metal from Groups 8-10 of the Periodic Table of the Elements, and a reaction product formed from (i) a first organic compound containing at least one amine group and at least 10 carbons or (ii) a second organic compound containing at least one carboxylic acid group and at least 10 carbons, but not both (i) and (ii), wherein the reaction product contains additional unsaturated carbon atoms, relative to (i) the first organic compound or (ii) the second organic compound, wherein the metals of the catalyst precursor composition are arranged in a crystal lattice, and wherein the reaction product is not located within the crystal lattice.

2. The method of claim 1, wherein the bottoms product has a nitrogen content of about 500 wppm or less.

3. The method of claim 1, wherein the bottoms product is separated from the slurry hydroconversion effluent without formation of a slurry hydroconversion pitch.

4. The method of claim 1, wherein the bulk multimetallic catalyst has an average particle size of about 40 μm to about 100 μm.

5. The method of claim 1, wherein the heavy oil feedstock comprises about 5 vol% to about 50 vol% of catalyst slurry oil, a weight of fluid catalytic cracking catalyst fines comprising about 1 wt% to about 5 wt% of the heavy oil feedstock in the reactor, the slurry hydroconversion catalyst comprising about 2 wt% to about 20 wt% of the heavy oil feedstock in the reactor.

6. The method of claim 1, wherein the slurry hydroconversion catalyst further comprises a demetallization catalyst, a weight of the demetallization catalyst comprising about 5% to 50% of a total catalyst weight in the reactor, the total catalyst weight being about 2 wt% to about 25 wt% of the weight of the heavy oil feedstock in the reactor.

7. The method of claim 6, wherein the demetallization catalyst has an average particle size of at least about 100 μm.

8. The method of claim 1, wherein the slurry hydroconversion effluent comprises entrained slurry hydroconversion catalyst, and wherein the separating of the bottoms product also includes fractionating a plurality of liquid and gaseous products, the method further comprising separating the entrained slurry hydroconversion catalyst from the plurality of liquid products, and recycling at least a portion of the separated slurry hydroconversion catalyst to the reactor.

9. The method of claim 1, wherein the heavy oil feedstock is exposed to the slurry hydroconversion catalyst in a plurality of reactors.

10. The method of claim 1, wherein exposing the heavy oil feedstock to a catalyst under effective slurry hydroconversion conditions to form a slurry hydroconversion effluent comprises:

exposing the heavy oil feedstock to a first catalyst under first effective slurry hydroconversion conditions to form a first slurry hydroconversion effluent; and

exposing at least a portion of the first slurry hydroconversion effluent to a second catalyst under second effective slurry hydroconversion conditions to form a second slurry hydroconversion effluent, the bottoms product comprising at least a portion of the second slurry hydroconversion effluent.

11. The method of claim 10, wherein a temperature of the second effective slurry hydroconversion conditions is greater than a temperature of the first effective slurry hydroconversion conditions by about 10ºC to about 80ºC.

12. The method of claim 10, further comprising fractionating the first slurry hydroconversion effluent to form at least one of a naphtha fraction or a distillate fuel fraction, and at least one slurry bottoms fraction, the slurry bottoms fraction containing a portion of the first catalyst corresponding to at least about 50 wt% of the first catalyst in the first slurry hydroconversion effluent, wherein exposing at least a portion of the first slurry hydroconversion effluent to the second catalyst comprises exposing at least a portion of the slurry bottoms fraction to the second catalyst.

13. The method of claim 1, wherein the slurry hydroconversion catalyst comprises a bulk multimetallic catalyst comprising at least one non-noble Group VIII metal and at least two Group VIB metals, a ratio of the non-noble Group VIII metal to the Group VIB metals being from about 10:1 to about 1:10.

14. The method of claim 13, wherein the bulk multimetallic catalyst is represented by the formula

$$(X)_b(Mo)_c(W)_dO_z$$

wherein X is a Group VIII non-noble metal.

15. The method of claim 14, wherein a ratio of b:(c+d) is from 0.5:1 to 3:1.

16. The method of claim 1, wherein said at least one metal from Group 6 is Mo, W, or a combination thereof, and wherein said at least one metal from Groups 8-10 is Co, Ni, or a combination thereof.

17. The method of claim 16, wherein said catalyst precursor composition further comprises at least one metal from Group 5 of the Periodic Table of the Elements, for example V, Nb, or a combination thereof.

18. The method of claim 1, wherein said first organic compound comprises a primary monoamine having from 10 to 30 carbon atoms, and/or wherein said second organic compound comprises only one carboxylic acid group and has from 10 to 30 carbon atoms.

19. The method of claim 1, further comprising heating the catalyst precursor to a temperature from about 195ºC to about 250ºC for a time sufficient for the first or second organic compounds to form a reaction product in situ that contains unsaturated carbon atoms not present in the first or second organic compounds.