CLAIMS

1. A process for preparing a liquid hydrocarbon product comprising:

providing a first process stream comprising a first tar, wherein the first tar is produced by heat soaking a second tar, and the first tar has a reduced reactivity compared to the second tar;

blending the first process stream with a utility fluid to reduce viscosity of the first process stream and produce a second process stream comprising solids and a reduced reactivity, lower viscosity tar;

introducing the second process stream into a guard reactor comprising one or more catalysts without sulfiding the guard reactor catalyst(s) before introducing the second process stream into the guard reactor;

hydroprocessing the second process stream in the guard reactor under hydroprocessing conditions to produce a third process stream;

hydroprocessing the third process stream in a pretreater to produce a fourth process stream having a bromine number of 12 or less;

hydroprocessing the fourth process stream to produce a fifth process stream comprising the liquid hydrocarbon product and the utility fluid; and

separating the utility fluid from the liquid hydrocarbon product.

2. The process of claim 1, further comprising removing solids from the second process stream before introducing the second process stream into the guard reactor.

3. The process of claim 2, wherein the second process stream is free of solids of size larger than 25 μm.

4. The process of claim 1, wherein the fourth process stream has a bromine number lower than 10.

5. The process of claim 1, wherein the fourth process stream has a bromine number lower than 8.

6. The process of claim 1, wherein the first tar is produced by separating the second tar from a steam cracker effluent and exposing the second tar to temperatures

from 200ºC to 300ºC for 10 min to 30 min.

7. The process of claim 1, wherein 90 wt. % or greater of the first process stream's molecules have an atmospheric boiling point of 290°C or greater.

8. The process of claim 1, wherein the first process stream comprises one or more of: (i) a TH content of from 5 wt. % to 40 wt. %, based on the weight of the first process stream; wherein TH means a product of hydrocarbon pyrolysis having an atmospheric boiling point of 565°C or greater and comprising 5 wt. % or greater of molecules having a plurality of aromatic cores based on the weight of the product; and (ii) an API gravity (measured at a temperature of 15.8°C) of -7.5°API or less, and (iii) a 50°C viscosity of from 200 cSt to 1.0 x 10^7 cSt.

9. The process of claim 8, wherein the first process stream has a sulfur content of from 0.5 wt. % to 7 wt. %.

10. The process of claim 1, wherein hydroprocessing the second process stream is performed at a liquid hourly space velocity of from 0.1 h^{-1} to 30 h^{-1} and hydroprocessing the third process stream is performed at a liquid hourly space velocity of from 0.5 h^{-1} to 8 h^{-1}.

11. A process for preparing a liquid hydrocarbon product comprising:

blending a first process stream with a utility fluid to produce a second process stream, wherein the first process stream comprises a first tar produced by heat soaking a second tar, and the first tar has a reduced reactivity compared to the second tar;

introducing the second process stream into a guard reactor comprising one or more catalysts without sulfiding the catalyst(s) before introducing the second process stream into the guard reactor;

hydroprocessing the second process stream in the guard reactor under hydroprocessing conditions to produce a third process stream; and

hydroprocessing the third process stream to produce a fourth process stream having a bromine number of 12 or less and comprising the liquid hydrocarbon product and the utility fluid.

12. The process of claim 11, wherein hydroprocessing the second process stream is performed at a temperature of from 250°C to 300°C.

13. The process of claim 11, wherein hydroprocessing the second process stream is performed at a liquid hourly space velocity of from 0.1 h^{-1} to 30 h^{-1}.

14. The process of claim 11, wherein hydroprocessing the third process stream is performed at a temperature of from 260°C to 320°C.

15. The process of claim 11, wherein hydroprocessing the third process stream is performed at a pressure of from 900 psig to 1,800 psig.

16. The process of claim 11, wherein hydroprocessing the fourth process stream is performed at a pressure of from 900 psig to 1,800 psig.

17. The process of claim 11, wherein hydroprocessing the third process stream is performed at a molecular hydrogen consumption rate from 25 S m^3/m^3 to 100 S m^3/m^3.

18. The process of claim 11, wherein hydroprocessing the third process stream is performed at a liquid hourly space velocity of from 0.5 h^{-1} to 8 h^{-1}.

19. The process of claim 11, wherein hydroprocessing the second process stream in the guard reactor comprises preheating the second process stream in a heater and combining the second process stream with a treat gas.

20. The process of claim 19, wherein the treat gas comprises molecular hydrogen.

21. A process for preparing a liquid hydrocarbon product comprising:

blending a first process stream with a utility fluid to produce a second process stream;

introducing the second process stream into a reactor into which one or more catalysts has been loaded, but without sulfiding the loaded catalyst(s) prior to introducing the second process stream into the reactor;

hydroprocessing the second process stream in the reactor under hydroprocessing conditions to produce a third process stream;

hydroprocessing the third process stream to produce a fourth process stream;

hydroprocessing the fourth process stream to produce a fifth process stream comprising the utility fluid and the liquid hydrocarbon product; and

separating the utility fluid from the liquid hydrocarbon product.

22. The process of claim 21, wherein hydroprocessing the second process stream in the reactor is performed at a run length of 2 months or greater.

23. The process of claim 21, wherein the fourth process stream has a bromine number of 12 or less.

24. The process of claim 21, wherein hydroprocessing the third process stream is performed at one or more of:

a temperature of from 260°C to 340°C,

a liquid hourly space velocity of from 0.2 h^{-1} to 6 h^{-1},

a molecular hydrogen partial pressure of from 0.1 MPa to 12 Mpa, or

a molecular hydrogen consumption rate of from 25 SCF/B to 100 SCF/B.

25. A process for preparing a liquid hydrocarbon product comprising:

steam cracking a heavy oil at a temperature of from 760°C to 880°C and a pressure of from 1 to 5 bars (absolute) to produce a first process stream, wherein the first process stream comprises a first tar produced by heat soaking a second tar, and the first tar has a reduced reactivity compared to the second tar;

blending the first process stream with a utility fluid to produce a second process stream;

introducing the second process stream into a guard reactor into which has been loaded one or more catalysts, wherein the catalysts have not been sulfided after loading the catalyst into the guard reactor;

hydroprocessing the second process stream in the guard reactor at a temperature of from 250°C to 300°C and a liquid hourly space velocity of from 1 to 10 to produce a third process stream;

hydroprocessing the third process stream in a pretreater at a temperature of from 260°C to 340°C, at a molecular hydrogen consumption rate from 25 S m^3/m^3 to 100 S m^3/m^3, at a molecular hydrogen partial pressure of from 0.1 MPa to 12 Mpa, and at a liquid hourly space velocity of from 0.2 h^{-1} to 6 h^{-1} to produce a fourth process stream having a bromine number of 12 or less;

hydroprocessing the fourth process stream at a temperature of 340°C or greater, at a liquid hourly space velocity of from 0.2 h^{-1} to 2 h^{-1}, at a molecular hydrogen partial pressure of from 0.1 MPa to 12 Mpa, and at a molecular hydrogen consumption rate of from 1,000 SCF/B to 3,000 SCF/B to produce a fifth process stream comprising the liquid hydrocarbon product and the utility fluid; and

separating the utility fluid from the liquid hydrocarbon product.