**CLAIMS:**

*What is claimed is:*

1. A process for producing mesophase pitch, the process comprising:

providing a feedstock having a T5 ≥ 400°F (204°C) and a T95 ≤ 1,400°F (760°C);

heating the feedstock at a temperature of at least 450°C to produce a heat treated product including mesophase pitch, wherein the heating is conducted under reaction conditions sufficient to have an equivalent reaction time greater than or equal to 1,000 seconds; and

recovering the mesophase pitch.

2. The process of claim 1, wherein the temperature is below 600°C.

3. The process of claim 1, wherein the feedstock has a hydrogen content of 5.5 to 10 wt%.

4. The process of claim 1, wherein the heating is an only heating step applied to the feedstock to produce the mesophase pitch.

5. The process of claim 1, further comprising injecting steam, wherein the steam is injected into the reactor, into the feedstock as the feedstock is supplied to the reactor or into a heat treated product including the mesophase pitch output from a reactor in which the heating is occurring.

6. The process of claim 1, wherein a yield of the mesophase pitch is more than 1 wt%.

7. The process of claim 1, wherein the reaction conditions include an inert atmosphere, a temperature ranging from 450°C to 520°C, and a pressure ranging from 500 to 1,500 psig.

8. The process of claim 1, wherein X is the equivalent reaction time (ERT) of the heating, and wherein Y is the bromine number of the feedstock as measured in accordance with ASTM D1159, and the heating is conducted under reaction conditions sufficient to satisfy the relationship [X*Y] ≥ 31,000 seconds.

9. The process of claim 1, further comprising controlling a temperature of the heating step to cause the equivalent reaction time to be greater than 1,000 seconds.

10. The process of claim 1, wherein the feedstock comprises a fraction having a boiling point of ≥ 1,050°F (566°C) ranging from about 1 wt% to about 40 wt% based on the weight of the feedstock.

11. The process of claim 1, wherein the feedstock comprises at least one member selected from the group consisting of main column bottoms (MCB), hydroprocessed MCB, steam cracker tar, hydrotreated steam cracker tar, heavy coker gas oil, steam cracker gas oil, vacuum resid, deasphalted residue or rock, and mixtures or combinations thereof.

12. The process of claim 1, wherein the recovering the mesophase pitch includes separating the mesophase pitch from light hydrocarbons.

13. The process of claim 1, wherein the heating is performed in a reactor, and the process further comprises controlling a liquid linear velocity in the reactor, which causes mesophase precursors to be in slurry form.

14. A system, comprising:

a reactor configured to receive a feedstock having a T5 ≥ 400°F (204°C) and a T95 ≤ 1,400°F (760°C) and to heat the feedstock at a temperature of at least 450°C to produce a heat treated product including mesophase pitch, wherein the reactor is configured to heat the feedstock under reaction conditions sufficient to have an equivalent reaction time greater than or equal to 1,000 seconds; and

a separation device in fluid communication with the reactor, wherein the separator is configured to separate mesophase pitch from an effluent received from the reactor.

15. The system of claim 14, further comprising a steam injector configured to inject steam into the reactor, into the effluent, and/or into the feedstock.