

CLAIMS:

What is claimed is:

1. A hydrocarbon pyrolysis process, comprising:
introducing a flow of a hydrocarbon feed into a pyrolysis furnace comprising a first
5 radiant coil and a second radiant coil to establish flows of the hydrocarbon feed into the first
and second radiant coils;
pyrolysing at least a portion of the hydrocarbon feed in the first radiant coil and in the
second radiant coil to produce a pyrolysis effluent and to deposit coke on an inner surface of
each of the first radiant coil and the second radiant coil;
10 decreasing the flow of the hydrocarbon feed into the first radiant coil and maintaining
the flow of the hydrocarbon feed into the second radiant coil, wherein the flow of the
hydrocarbon feed into the pyrolysis furnace is decreased by about 10 vol. % to about 90 vol.
%; and
introducing a decoking feed comprising steam at a pressure of ≥ 690 kPag into the first
15 radiant coil of the pyrolysis furnace to remove at least a portion of the coke deposited on the
inner surface of the first radiant coil.
2. The process of claim 1, wherein the decoking feed is supplied from a dilution steam
line maintained at a pressure of ≥ 930 kPag.
- 20 3. The process of claim 1 or 2, wherein the decoking feed comprises steam at a pressure
of ≥ 930 kPag or ≥ 1200 kPag.
4. The process of any one of claims 1 to 3, wherein the decoking feed comprises steam at
25 a pressure of ≥ 1380 kPag.
5. The process of any one of claims 1 to 4, wherein the decoking feed comprises steam
supplied from a dilution steam line maintained at a pressure of ≥ 1380 kPag.
- 30 6. The process of any one of claims 1 to 5, further comprising comparing a maximum
crossover temperature of the pyrolysis furnace and a target temperature of the pyrolysis furnace
to determine a maximum firing rate of the pyrolysis furnace to maintain a crossover
temperature of the pyrolysis furnace at or below the target temperature of the pyrolysis furnace.

7. The process of claim 6, further comprising utilizing an automated system to maintain the crossover temperature of the pyrolysis furnace at or below the target temperature of the pyrolysis furnace.

5 8. The process of any one of claims 1 to 7, wherein the decoking feed introduced into the first radiant coil comprises ≤ 1 wt. % of water.

9. The process of any one of claims 1 to 8, wherein the decoking feed consists essentially of steam.

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10. The process of any one of claims 1 to 9, further comprising increasing the flow of the hydrocarbon feed into the first radiant coil after the portion of the coke deposited on the inner surface of the first radiant coil has been removed.

15 11. The process of any one of claims 1 to 10, wherein the step of decreasing the flow of the hydrocarbon feed into the first radiant coil comprises terminating the flow of the hydrocarbon feed into the first radiant coil.

12. The process of any one of claims 1 to 11, wherein the transition from pyrolysis to
20 decoking is ≤ 60 minutes, ≤ 45 minutes, ≤ 30 minutes, or ≤ 15 minutes.

13. The process of any one of claims 1 to 12, wherein the transition from pyrolysis to decoking is ≤ 45 minutes.

25 14. The process of any one of claims 1 to 11, wherein the transition from pyrolysis to decoking is ≤ 30 minutes.

15. The process of any one of claims 1 to 11, wherein the transition from pyrolysis to decoking is ≤ 15 minutes.

16. A hydrocarbon pyrolysis process, comprising:

introducing a flow of a hydrocarbon feed into a pyrolysis furnace comprising a first radiant coil and a second radiant coil to establish flows of the hydrocarbon feed into the first and second radiant coils;

5 pyrolysing at least a portion of the hydrocarbon feed in the first radiant coil and the second radiant coil to produce a pyrolysis effluent and to deposit coke on an inner surface of each of the first radiant coil and the second radiant coil;

 decreasing the flow of the hydrocarbon feed into the first radiant coil and maintaining the flow of the hydrocarbon feed into the second radiant coil wherein the flow of the
10 hydrocarbon feed into the pyrolysis furnace is decreased 10 vol. % to 90 vol. %;

 introducing a decoking feed comprising steam at a pressure of ≥ 930 kPag into the first radiant coil of the pyrolysis furnace to remove at least a portion of the coke deposited on the inner surface of the first radiant coil; and

 adjusting a firing rate of the pyrolysis furnace to maintain a crossover temperature of
15 the pyrolysis furnace at or below a target temperature of the pyrolysis furnace.

17. The process of claim 16, wherein an automated system is utilized to adjust the firing rate of the pyrolysis furnace.

20 18. The process of claim 17, wherein the automated system comprises a dynamic matrix control.

19. The process of any one of claims 16 to 18, wherein (i) the firing rate of the pyrolysis furnace and (ii) the amount of the decoking feed introduced into the first radiant coil are both
25 adjusted to optimize a composition of the pyrolysis effluent.

20. The process of any one of claims 16 to 19, wherein the decoking feed is supplied from a dilution steam line maintained at a pressure of ≥ 930 kPag.

30 21. The process of any one of claims 16 to 20, wherein the decoking feed comprises steam at a pressure of ≥ 1200 kPag.

22. The process of any one of claims 16 to 21, wherein the decoking feed comprises steam at a pressure of ≥ 1380 kPag.

23. The process of any one of claims 16 to 22, wherein the decoking feed is supplied from
5 a dilution steam line maintained at a pressure of ≥ 1380 kPag.

24. The process of any one of claims 16 to 23, wherein the decoking feed introduced into the first radiant coil comprises ≤ 1 wt. % of water.

10 25. The process of any one of claims 16 to 24, wherein the decoking feed consists essentially of steam.

26. The process of any one of claims 16 to 25, further comprising increasing the flow of the hydrocarbon feed into the first radiant coil after the portion of the coke deposited on the
15 inner surface of the first radiant coil has been removed.

27. The process of any one of claims 16 to 26, wherein the step of decreasing the flow of the hydrocarbon feed into the first radiant coil comprises terminating the flow of the hydrocarbon feed into the first radiant coil.

20 28. The process of any one of claims 16 to 27, wherein the transition from pyrolysis to decoking is ≤ 15 minutes.

29. A hydrocarbon pyrolysis process, comprising:
25 introducing a flow of a hydrocarbon feed into at least one radiant coil of a pyrolysis furnace;

pyrolysing at least a portion of the hydrocarbon feed in the at least one radiant coil to produce a pyrolysis effluent and to deposit coke on an inner surface of the at least one radiant coil;

30 decreasing the flow of the hydrocarbon feed into the at least one radiant coil; and
introducing a flow of a decoking feed comprising steam at a pressure of ≥ 690 kPag into the at least one radiant coil of the pyrolysis furnace to remove at least a portion of the coke deposited on the inner surface of the at least one radiant coil.

30. The process of claim 29 wherein the wherein the decoking feed comprises steam at a pressure of ≥ 930 kPag.

31. The process of claim 29 or 30, wherein the decoking feed consists essentially of steam.