CLAIMS

1. A method for the transalkylation of a heavy reformate to produce a xylenes stream and mixed olefins, the method comprising the steps of:

providing a heavy reformate comprising at least 90% by weight C9+ aromatics and hydrogen gas to a transalkylation reactor, the transalkylation reactor being charged with a transalkylation catalyst to selectively convert the C9+ aromatics to a xylene-rich product stream, the transalkylation catalyst comprising

zeolites comprising beta zeolite and ZSM-5, and

a metal component comprising cerium, nickel, and platinum;

separating the product stream into a light gas recycle stream, a C9+ heavy aromatic recycle stream and a mixed aromatics product stream;

separating the mixed aromatics product stream into a benzene stream, a toluene stream and the xylenes stream; and

separating light alkanes from the light gas recycle stream and supplying the light alkanes to a steam cracker, where the light alkanes are converted to mixed olefins.

2. The method of claim 1 further comprising the step of separating hydrogen gas from the light gas recycle stream and recycling the hydrogen gas to the transalkylation reactor.

3. The method of claim 1 or claim 2 where the transalkylation reaction zone is maintained at a temperature in a range of from 200 °C to 540 °C.

4. The method of any one of claims 1 to 3 where the transalkylation reaction zone is maintained at a pressure in a range of from 1 MPa to 5 MPa.

5. The method of any one of claims 1 to 4 wherein the ratio of hydrogen to heavy reformate is in a range of from 0.1:1 to 10:1.

6. The method of any one of claims 1 to 5 wherein the steam cracker includes a reaction zone that is maintained at a temperature in a range of from 600 °C to 850 °C.

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7. The method of any one of claims 1 to 6 wherein the residence time of the light alkanes in the steam cracker reaction zone is less than 0.1 seconds.

8. The method of any one of claims 1 to 7 wherein the beta zeolite is present in an amount in a range of from 10 % to 90% by weight of the total catalyst weight.

9. The method of any one of claims 1 to 8 where the ZSM-5 is present in an amount in a range of from 10 % to 90% by weight of the total catalyst weight.

10. The method of any one of claims 1 to 9 where the transalkylation catalyst further includes a binder selected from inorganic oxides.

11. The method of any one of claims 1 to 10 where the metal component is present in an amount in a range of from 0.01 % to 5% by weight of the total catalyst weight.

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