including C8 aromatics. The process ~~may~~ also includes producing a sidedraw column bottoms stream including C9+ aromatics. Alternatively, the process ma~~y~~ include producing a sidedraw column second side stream including A9 for recycle to a TOL/A9+ transalkylation reactor without further fractionation, and a C10+ sidedraw column bottoms stream that is substantially free of A9.

[0009] In various ~~aspects~~ embodiments of the disclosure, the process includes recovering paraxylene from the sidedraw column first side stream including C8 aromatics to produce a paraxylene product stream and a paraxylene lean stream.

[0010] In one particular ~~aspect~~ embodiment of the disclosure a benzene column feed stream including benzene, toluene, C8 aromatics, and C9+ aromatics is provided to a benzene column to produce a benzene column top stream including benzene and a benzene column bottom stream including toluene, C8 aromatics, and C9+ aromatics, wherein the benzene column bottom stream is the prefractionation column feed stream.

[0011] In another ~~aspect~~embodiment, the benzene column feed stream is obtained by the process including providing a stabilizer column feed stream including light ends, benzene, toluene, C8 aromatics, and C9+ aromatics to a stabilizer column to produce a stabilizer column top stream or streams including light ends and a stabilizer column bottom stream including benzene, toluene, C8 aromatics, and C9+ aromatics, wherein the stabilizer column bottom stream is the benzene column feed stream.

[0012] In these and other ~~aspects~~ embodiments of the disclosure, the process may include mixing a transalkylation reactor effluent stream including light ends, benzene, toluene, C8 aromatics, and C9+ aromatics with a paraxylene unit stream including benzene and toluene to produce the stabilizer column feed stream.

[0013] In one ~~aspect~~embodiment, the process includes operating the sidedraw column at a pressure above atmospheric pressure and using the condensing vapors in the sidedraw column

top stream to generate steam, to reboil the benzene column, and/or reboil the stabilizer column.

[0014] Another ~~embodiment~~ aspect of the disclosure is directed to an apparatus that includes a reboiled prefractionation column for receiving a prefractionation feed stream including toluene, C8 aromatics, and C9+ aromatics and producing a prefractionation column top stream and a prefractionation column bottom stream; and a sidedraw column for receiving the prefractionation column top stream and the prefractionation column bottom stream and producing a sidedraw column top stream including toluene, and a sidedraw column first side stream including C8 aromatics. In various ~~aspects~~ embodiments of this embodiment, the sidedraw column further produces a sidedraw column bottoms stream including C9+ aromatics. Alternatively, the sidedraw column further produces a sidedraw column second sidedraw stream including A9 for recycle to a TOL/A9+ transalkylation reactor without further fractionation, and a C10+ sidedraw column bottoms stream that is substantially free of A9.

[0015] In another ~~aspect~~embodiment, the apparatus includes a benzene column for receiving a benzene column feed stream including benzene, toluene, C8 aromatics, and C9+ aromatics, and separating the benzene column feed stream into a benzene column top stream including benzene and a benzene column bottom stream including toluene, C8 aromatics, and C9+ aromatics, wherein the benzene column bottom stream is the prefractionation column feed stream.

[0016] The apparatus may also include a stabilizer column for receiving a stabilizer column feed stream including light ends, benzene, toluene, C8 aromatics, and C9+ aromatics, and producing a stabilizer column top stream including light ends and a stabilizer column bottom stream including benzene, toluene, C8 aromatics, and C9+ aromatics; wherein the stabilizer column bottom stream is the benzene column feed stream.

[0017] The apparatus may also include a mixer for mixing a transalkylation reactor effluent stream including light ends, benzene, toluene, C8 aromatics, and C9+ aromatics with a paraxylene unit stream including benzene and toluene to produce the stabilizer column feed stream.

[0018] In yet another ~~embodiment~~aspect, the disclosure is directed to a process including the steps of: reacting in a transalkylation reactor a reactor feed stream including toluene and, optionally, C9+ aromatics to produce a transalkylation reactor effluent stream including light ends, benzene, toluene, C8 aromatics, and C9+ aromatics; optionally mixing the transalkylation reactor effluent stream with a paraxylene unit stream including benzene and toluene to produce a stabilizer column feed stream including light ends, benzene, toluene, C8 aromatics, and C9+ aromatics; separating the stabilizer column feed stream in a stabilizer column to produce a stabilizer column top stream including light ends and a stabilizer column bottom stream including benzene, toluene, C8 aromatics, and C9+ aromatics; separating the stabilizer column bottom stream in a benzene column to produce a benzene column top stream including benzene and a benzene column bottom stream including toluene, C8 aromatics, and C9+ aromatics; providing the benzene column bottom stream to a reboiled prefractionation column to produce a prefractionation column top stream and a prefractionation column bottom stream; providing the prefractionation column top stream and the prefractionation column bottom stream to a sidedraw column to produce a sidedraw column top stream including toluene, and a sidedraw column first side stream including C8 aromatics; recovering paraxylene from the sidedraw column side stream including C8 aromatics; and recovering benzene from the benzene column top stream, wherein at least a portion of the sidedraw column top stream containing toluene and optionally a sidedraw column stream containing C9+ aromatics is recycled to the transalkylation reactor.

WHAT IS CLAIMED IS:

1. A process comprising the steps of:

(a) providing a prefractionation column feed stream comprising toluene, C8 aromatics, and C9+ aromatics to a reboiled prefractionation column to produce a prefractionation column top stream and a prefractionation column bottom stream; and

(b) providing the prefractionation column top stream and the prefractionation column bottom stream to a sidedraw column to produce a sidedraw column top stream comprising toluene, and a sidedraw column first side stream comprising C8 aromatics.

2. The process of claim 1, further comprising producing a sidedraw column bottoms stream comprising C9+ aromatics.

3. The process of claim 1, further comprising producing a sidedraw column second side stream comprising A9 for recycle to a TOL/A9+ transalkylation reactor without further fractionation, and a C10+ sidedraw column bottoms stream that is substantially free of A9.

4. The process of one of claims 1-3, further comprising recovering paraxylene from the sidedraw column first side stream comprising C8 aromatics to produce a paraxylene product stream and a paraxylene lean stream.

5. The process of one of claims 1-4, further comprising, prior to step (a):

providing a benzene column feed stream comprising benzene, toluene, C8 aromatics, and C9+ aromatics to a benzene column to produce a benzene column top stream comprising benzene and a benzene column bottom stream comprising toluene, C8 aromatics, and C9+ aromatics,

wherein the benzene column bottom stream is the prefractionation column feed stream.

6. The process of claim 5, wherein the benzene column feed stream is obtained by the process comprising

providing a stabilizer column feed stream comprising light ends, benzene, toluene, C8 aromatics, and C9+ aromatics to a stabilizer column to produce a stabilizer column top stream or streams comprising light ends and a stabilizer column bottom stream comprising benzene, toluene, C8 aromatics, and C9+ aromatics,

wherein the stabilizer column bottom stream is the benzene column feed stream.

7. The process of claim 6, further comprising mixing a transalkylation reactor effluent stream comprising light ends, benzene, toluene, C8 aromatics, and C9+ aromatics with a paraxylene unit stream comprising benzene and toluene to produce the stabilizer column feed stream.

8. The process of claim 7, wherein the stabilizer column feed stream is preheated.

9. The process of one of claims 1-4, further comprising recycling at least a portion of the sidedraw column top stream to a transalkylation reactor.

10. The process of claim 2, further comprising recycling at least a portion of the sidedraw column bottoms stream comprising C9+ aromatics to a transalkylation reactor.

11. The process of claim 3, further comprising recycling at least a portion of the sidedraw column second side stream comprising A9 to a transalkylation reactor.

12. The process of one of claims 1-4, wherein the sidedraw column top stream is substantially free of C8 aromatics.

13. The process of one of claims 1-4, wherein the sidedraw column side stream comprising C8 aromatics is substantially free of toluene and C9+ aromatics.

14. The process of claim 2, wherein the sidedraw column bottoms stream comprising C9+ aromatics is substantially free of C8 aromatics.

15. The process of claim 3, wherein the sidedraw column second side stream comprising A9 is substantially free of C8 aromatics.

16. The process of one of claims 1-4, further comprising operating the sidedraw column at a pressure above atmospheric pressure and using the condensing vapors in the sidedraw column top stream to generate steam.

17. The process of claim 5, wherein the sidedraw column is operated at a pressure above atmospheric pressure such that condensing vapors of the sidedraw column top stream is used to reboil the benzene column.

18. The process of claim 6, wherein the sidedraw column is operated at a pressure above atmospheric pressure such that condensing vapors of the sidedraw column top stream is used to reboil the stabilizer column.

19. The process of one of claims 1-4, wherein the sidedraw column receives the prefractionation column top stream as a vapor stream without condensation.

20. The process of one of claims 1-4, wherein the prefractionation column and the sidedraw column share a common shell with a dividing wall.

21. An apparatus comprising:

(a) a reboiled prefractionation column for receiving a prefractionation feed stream comprising toluene, C8 aromatics, and C9+ aromatics and producing a prefractionation column top stream and a prefractionation column bottom stream; and

(b) a sidedraw column for receiving the prefractionation column top stream and the prefractionation column bottom stream and producing a sidedraw column top stream comprising toluene, and a sidedraw column first side stream comprising C8 aromatics.

22. The apparatus of claim 21, wherein the sidedraw column further produces a sidedraw column bottoms stream comprising C9+ aromatics

23. The apparatus of claim 21, wherein the sidedraw column that further produces a sidedraw column second stream comprising A9 for recycle to a TOL/A9+ transalkylation reactor without further fractionation, and a C10+ sidedraw column bottoms stream that is substantially free of A9.

24. The apparatus of claim 21, further comprising a benzene column for receiving a benzene column feed stream comprising benzene, toluene, C8 aromatics, and C9+ aromatics, and separating the benzene column feed stream into a benzene column top stream comprising benzene and a benzene column bottom stream comprising toluene, C8 aromatics, and C9+ aromatics;

wherein the benzene column bottom stream is the prefractionation column feed stream.

25. The apparatus of claim 24, further comprising a stabilizer column for receiving a stabilizer column feed stream comprising light ends, benzene, toluene, C8 aromatics, and C9+ aromatics, and producing a stabilizer column top stream comprising light ends and a stabilizer column bottom stream comprising benzene, toluene, C8 aromatics, and C9+ aromatics; wherein the stabilizer column bottom stream is the benzene column feed stream.

26. The apparatus of claim 24, further comprising a mixer for mixing a transalkylation reactor effluent stream comprising light ends, benzene, toluene, C8 aromatics, and C9+ aromatics with a paraxylene unit stream comprising benzene and toluene to produce the stabilizer column feed stream.

27. The apparatus of one of claims 21-26, further comprising a paraxylene recovery section for recovering paraxylene from the sidedraw column side stream comprising C8 aromatics.

28. The apparatus of claim 27, wherein the paraxylene recovery section comprises a paraxylene selective adsorption unit.

29. The apparatus of claim 27, wherein the paraxylene recovery section comprises a crystallization unit.

30. The apparatus of one of claims 21-29, further comprising a transalkylation reactor for reacting a reactor feed stream comprising toluene and, optionally, C9+ aromatics to produce a transalkylation reactor effluent stream comprising light ends, benzene, toluene, C8 aromatics, and C9+ aromatics.

31. The apparatus of one of claims 21-30, wherein the sidedraw column receives the prefractionation column top stream as a vapor stream without condensation.

32. The apparatus of one of claims 21-31, wherein the prefractionation column and the sidedraw column share a common shell with a dividing wall.

33. A process comprising the steps of:

(a) reacting in a transalkylation reactor a reactor feed stream comprising toluene and, optionally, C9+ aromatics to produce a transalkylation reactor effluent

stream comprising light ends, benzene, toluene, C8 aromatics, and C9+ aromatics;

(b) optionally mixing the transalkylation reactor effluent stream with a paraxylene unit stream comprising benzene and toluene to produce a stabilizer column feed stream comprising light ends, benzene, toluene, C8 aromatics, and C9+ aromatics;

(c) separating the stabilizer column feed stream in a stabilizer column to produce a stabilizer column top stream comprising light ends and a stabilizer column bottom stream comprising benzene, toluene, C8 aromatics, and C9+ aromatics;

(d) separating the stabilizer column bottom stream in a benzene column to produce a benzene column top stream comprising benzene and a benzene column bottom stream comprising toluene, C8 aromatics, and C9+ aromatics;

(e) providing the benzene column bottom stream to a reboiled prefractionation column to produce a prefractionation column top stream and a prefractionation column bottom stream;

(f) providing the prefractionation column top stream and the prefractionation column bottom stream to a sidedraw column to produce a sidedraw column top stream comprising toluene, and a sidedraw column first side stream comprising C8 aromatics;

(g) recovering paraxylene from the sidedraw column side stream comprising C8 aromatics; and

(h) recovering benzene from the benzene column top stream,

wherein at least a portion of the sidedraw column top stream is recycled to the transalkylation reactor.

34. The process of claim 33, wherein the sidedraw tower further produces a sidedraw column bottoms stream comprising C9+ aromatics wherein at least a portion of this stream is recycled to the transalkylation reactor.

35. The process of claim 33, further comprising producing a sidedraw tower second side stream comprising A9, at least a portion of which is recycled to a TOL/A9+ transalkylation reactor without further fractionation, and a C10+ sidedraw column bottoms stream that is substantially free of A9.

36. The process of claim 33, further comprising operating the sidedraw column at a pressure above atmospheric pressure and reboiling the benzene column by condensing at least a portion of the sidedraw column top stream.

37. The process of claim 33, further comprising generating steam from condensing at least a portion of the sidedraw column top stream.

38. The process of claim 33, wherein the sidedraw column receives the prefractionation column top stream as a vapor stream without condensation.

39. The process of claim 33, wherein the prefractionation column and the sidedraw column share a common shell with a dividing wall.

WHAT IS CLAIMED IS:

1. A process comprising the steps of:

(a) providing a prefractionation column feed stream comprising toluene, C8 aromatics, and C9+ aromatics to a reboiled prefractionation column to produce a prefractionation column top stream and a prefractionation column bottom stream; and

(b) providing the prefractionation column top stream and the prefractionation column bottom stream to a sidedraw column to produce a sidedraw column top stream comprising toluene, and a sidedraw column first side stream comprising C8 aromatics, and a sidedraw column bottoms stream comprising C9+ aromatics.

2. The process of claim 1, further comprising producing a sidedraw column second side stream comprising A9 for recycle to a TOL/A9+ transalkylation reactor without further fractionation, and a C10+ sidedraw column bottoms stream that is substantially free of A9.

3. The process of claim 1, further comprising recovering paraxylene from the sidedraw column first side stream comprising C8 aromatics to produce a paraxylene product stream and a paraxylene lean stream.

4. The process of claim 1, further comprising recycling at least a portion of the sidedraw column top stream to a transalkylation reactor.

5. The process of claim 1, further comprising recycling at least a portion of the sidedraw column bottoms stream comprising C9+ aromatics to a transalkylation reactor.

6. The process of claim 2, further comprising recycling at least a portion of the sidedraw column second side stream comprising A9 to a transalkylation reactor.

7. The process of claim 1, wherein the sidedraw column top stream is substantially free of C8 aromatics.

8. The process of claim 1, wherein the sidedraw column side stream comprising C8 aromatics is substantially free of toluene and C9+ aromatics.

9. The process of claim 1, wherein the sidedraw column receives the prefractionation column top stream as a vapor stream without condensation.

10. An apparatus comprising:

(a) a reboiled prefractionation column for receiving a prefractionation feed stream comprising toluene, C8 aromatics, and C9+ aromatics and producing a prefractionation column top stream and a prefractionation column bottom stream; and

(b) a sidedraw column for receiving the prefractionation column top stream and the prefractionation column bottom stream and producing a sidedraw column top stream comprising toluene, and a sidedraw column first side stream comprising C8 aromatics.

11. The apparatus of claim 10, further comprising a paraxylene recovery section for recovering paraxylene from the sidedraw column side stream comprising C8 aromatics.

12. The apparatus of claim 11, wherein the paraxylene recovery section comprises a paraxylene selective adsorption unit.

13. The apparatus of claim 11, wherein the paraxylene recovery section comprises a crystallization unit.

14. The apparatus of claim 10, wherein the prefractionation column and the sidedraw column share a common shell with a dividing wall.

15. A process comprising the steps of:

(a) reacting in a transalkylation reactor a reactor feed stream comprising toluene and, optionally, C9+ aromatics to produce a transalkylation reactor effluent stream comprising light ends, benzene, toluene, C8 aromatics, and C9+ aromatics;

(b) optionally mixing the transalkylation reactor effluent stream with a paraxylene unit stream comprising benzene and toluene to produce a stabilizer column feed stream comprising light ends, benzene, toluene, C8 aromatics, and C9+ aromatics;

(c) separating the stabilizer column feed stream in a stabilizer column to produce a stabilizer column top stream comprising light ends and a stabilizer column bottom stream comprising benzene, toluene, C8 aromatics, and C9+ aromatics;

(d) separating the stabilizer column bottom stream in a benzene column to produce a benzene column top stream comprising benzene and a benzene column bottom stream comprising toluene, C8 aromatics, and C9+ aromatics;

(e) providing the benzene column bottom stream to a reboiled prefractionation column to produce a prefractionation column top stream and a prefractionation column bottom stream;

(f) providing the prefractionation column top stream and the prefractionation column bottom stream to a sidedraw column to produce a sidedraw column top stream comprising toluene, and a sidedraw column first side stream comprising C8 aromatics;

(g) recovering paraxylene from the sidedraw column side stream comprising C8 aromatics; and

(h) recovering benzene from the benzene column top stream,

wherein at least a portion of the sidedraw column top stream is recycled to the transalkylation reactor.