CLAIMS

What is claimed is:

1. An oxygenated hydrocarbon conversion process, comprising:

a) reacting an oxygenated hydrocarbon feed with a first catalyst in a first zone of a reactor to produce a first mixture comprising olefins, paraffins, and aromatics;

b) reacting the first mixture with a second catalyst in a second zone of the reactor to convert at least a portion of the first mixture's olefins to aromatics and produce a second mixture comprising olefins, paraffins, and aromatics;

wherein, the aromatics weight concentration in the second mixture is greater than the aromatics weight concentration in the first mixture and the first and second catalysts comprise at least one molecular sieve and at least one transition metal element selected from groups 2-14 of the Periodic Table;

c) conducting the second mixture away as reactor effluent;

d) separating at least a portion of the reactor effluent to form i) a light ends product comprising ethylene, propylene, or a combination thereof, and ii) a liquid effluent; and

e) separating at least a portion of the liquid effluent to form a C_8 product stream and one or more of a C_{7-} stream and a C_{9+} stream.

2. The process of claim 1, wherein the first zone temperature is from 300°C to 450°C and the second zone temperature is from 400°C to 550°C.

3. The process of any of claims 1-2, wherein the first catalyst in the first zone is prepared by steaming the first catalyst in the presence of at least 1 vol% water at a temperature of about 400°C for at least 0.25 hours prior to executing step (a).

4. The process of any of claims 1-3, wherein the first catalyst and second catalyst are prepared by steaming the first and second catalyst in the presence of at

least 1 vol% water at a temperature of about 400°C for at least 0.25 hours prior to executing step (a).

5. The process of any of claims 1-4, wherein the at least one molecular sieve of the first and second catalyst comprises ZSM-5.

6. The process of claim 5, wherein the at least one element selected from groups 2-14 of the Periodic Table is one or more selected from the group consisting of Zn, Ga, or Ag.

7. The process of any of claims 1-6, where the reactor is operated at a pressure from 100 kPaa to 2500 kPaa and a weight hourly space velocity from 0.1 hr^{-1} to 20 hr^{-1}.

8. The process of any of claims 1-7, where the first catalyst further comprises at least about 0.1 wt% of phosphorus based on the total weight of the first catalyst.

9. The process of any of claims 1-8, wherein the second catalyst has at least > 1 wt% more transition metal concentration than the first catalyst.

10. The process of any of claims 1-9, where the second catalyst further comprises at least about 0.1 wt% of phosphorus based on the total weight of the second catalyst.

11. The process of any of claims 1-10, wherein the oxygenated hydrocarbon feed comprises ≥ 90.0 wt% methanol and/or dimethylether based on the total weight of the feed.

12. The process of claim 1, further comprising separating the C_8 product stream to form at least a para-xylene product stream, the para-xylene product stream having a higher concentration of para-xylene than the C_8 product stream.

13. An oxygenated hydrocarbon conversion process, comprising:

a) reacting an oxygenated hydrocarbon feed with a first catalyst in a first zone of a reactor to produce a first mixture comprising olefins, paraffins, and aromatics; and

b) reacting the first mixture with a second catalyst in a second zone of the reactor to convert at least a portion of the olefins in the first mixture to aromatics and produce a second mixture comprising olefins, paraffins, and aromatics;

wherein, the aromatics weight concentration in the second mixture is greater than the aromatics weight concentration in the first mixture and the first and second catalysts comprise at least one molecular sieve and at least one transition metal element selected from groups 2-14 of the Periodic Table;

c) reacting the second mixture from step b) with a third catalyst in a third zone of the reactor to convert at least a portion of the paraffins in the second mixture to unsaturated hydrocarbons and produce a third mixture comprising olefins, paraffins, and aromatics, wherein the third catalyst comprises at least one molecular sieve and at least one element selected from groups 2-14 of the Periodic Table;

d) conducting the third mixture away as reactor effluent.

14. The process of claim 13, wherein the first zone temperature is from 300°C to 450°C, the second zone temperature is from 400°C to 550°C, and the third zone, if present, is at a temperature greater than 500°C.

15. The process of any of claims 13-14, wherein the first catalyst in the first zone is prepared by steaming the first catalyst in the presence of at least 1 vol% water at a temperature of about 400°C for at least 0.25 hours prior to executing step (a).

16. The process of any of claims 13-15, wherein the first catalyst and second catalyst are prepared by steaming the first and second catalyst in the presence of at least 1 vol% water at a temperature of about 400°C for at least 0.25 hours prior to executing step (a).

17. The process of any of claims 13-16, wherein the at least one molecular sieve of the first and second catalyst comprises ZSM-5.

18. The process of claim 17, wherein the at least one element selected from groups 2-14 of the Periodic Table is one or more selected from the group consisting of Zn, Ga, or Ag.

19. The process of any of claims 13-18, where the reactor is operated at a pressure from 100 kPaa to 2500 kPaa and a weight hourly space velocity from 0.1 hr^{-1} to 20 hr^{-1}.

20. The process of any one of claims 13-19, wherein the second catalyst has at least > 1 wt% more transition metal concentration than the first catalyst.