CLAIMS

What is claimed is:

1. A method of producing at least one of ethylene and propylene, the method comprising:

providing a first mixture of C4+ compounds; and

contacting the first mixture of C4+ compounds with a catalyst comprising:

(a) a phosphorus treated zeolite, wherein the phosphorus treated zeolite comprises an alkali metal, and wherein the alkali metal is present in an amount no greater than about 0.5 % by weight of the phosphorus treated zeolite, and

(b) a binder, wherein the binder comprises bentonite clay, silica and kaolin and wherein the bentonite clay, silica and kaolin are present in the binder in a bentonite clay:silica:kaolin weight ratio of about 1:8-16:20-28;

to convert at least a portion of the first mixture of C4+ compounds to at least one of ethylene and propylene, thereby producing a first effluent comprising at least one of ethylene and propylene

wherein the first mixture of C4+ compounds comprises at least one of t-butyl alcohol and methyl t-butyl ether.

2. The method of claim 1, further comprising separating the ethylene and/or the propylene from the first effluent to form a second mixture of C4+ compounds, and contacting the second mixture of C4+ compounds with the catalyst to convert at least a portion of the second mixture of C4+ compounds to at least one of ethylene and propylene.

3. The method of claim 1 wherein the first mixture of C4+ compounds comprises the t-butyl alcohol, and at least 20 weight % of the t-butyl alcohol is converted to at least one of ethylene and propylene.

4. The method of claim 3, wherein at least 22 weight % of the t-butyl alcohol is converted to propylene.

5. The method of claim 1 wherein the first mixture of C4+ compounds comprises the methyl t-butyl ether, and at least 20 weight % of the methyl t-butyl ether is converted to at least one of ethylene and propylene.

6. The method of claim 5, wherein at least 22 weight % of the methyl t-butyl ether is converted to propylene.

7. The method of claim 1 wherein the phosphorus treated zeolite comprises a ZSM-5 zeolite.

8. The method of claim 7, wherein the ZSM-5 zeolite has an alkali metal content of about 0.5 % by weight of the ZSM-5 zeolite.

9. The method of claim 1 wherein the phosphorus treated zeolite comprises phosphorus in an amount of about 0.1 % to about 10 % by weight of the phosphorus treated zeolite.

10. The method of claim 1 wherein the phosphorus treated zeolite comprises phosphorus in an amount of about 1 % to about 3 % by weight of the phosphorus treated zeolite.

11. The method of claim 1, wherein the binder further comprises calcium, alumina, silica aluminate, or a combination thereof.

12. The method of claim 1 wherein the contacting occurs at ambient pressure.

13. The method of claim 1 wherein the contacting occurs at a pressure of about 1 psig to about 20 psig.

14. The method of claim 1 wherein the contacting occurs at a temperature of about 600 °F to about 1,200 °F.

15. The method of claim 1 further comprising steaming the catalyst prior to contacting the first mixture of C4+ compounds with the catalyst.

16. The method of claim 15, wherein the steaming is performed at a temperature of about 800 °F to about 1200 °F.

17. The method of claim 2, wherein the first mixture of C4+ compounds and/or the second mixture of C4+ compounds is diluted with steam.

18. The method of claim 17, wherein the first mixture of C4+ compounds and/or the second mixture of C4+ compounds is diluted with about 20 to about 35 % by weight of steam, based on the weight of the first mixture of C4+ compounds and/or the second mixture of C4+ compounds, respectively.