CLAIMS

What is claimed is:

1. A process for manufacturing methyl t-butyl ether (MTBE) comprising:

a first step comprising cracking raw material comprising ethane or propane to form ethylene; and recovering residual uncracked raw material;

a second step comprising dimerizing ethylene to form n-butylene at a temperature of about 10-100 °C;

a third step comprising isomerizing the n-butylene to form isobutylene using an acidic catalyst at a weight hourly space velocity (WHSV) of 0.2-4 kg feedstock per kg catalyst in the presence of an isomerization catalyst at a pressure of about 345-3450 kPa and a temperature of about 40-200 °C;

recovering unconverted n-butylene;

alkylating isobutylene with isobutane at a pressure of at least 600 kPa to form gasoline alkylate;

recovering gasoline alkylate;

isomerizing a higher molecular weight ethylene oligomer; and

recovering the isomerized higher molecular weight ethylene oligomer;

a fourth step comprising oxidizing methane to form methanol;

a fifth step comprising etherifying the isobutylene with methanol to form methyl t-butyl ether;

etherifying a higher molecular weight ethylene oligomer with methanol to form a higher-molecular-weight-ethylene-oligomer-based methyl ether;

recovering the higher-molecular-weight-ethylene-oligomer-based methyl ether;

etherifying an isomerized higher molecular weight ethylene oligomer with methanol to form an isomerized-higher-molecular-weight-ethylene-oligomer-based methyl ether; and

recovering the isomerized-higher-molecular-weight-ethylene-oligomer-based methyl ether; and

a sixth step comprising collecting the methyl t-butyl ether.

2. The process of claim 1, wherein the second step further comprises:

recovering unconverted ethylene;

alkylating n-butylene with isobutane to form gasoline alkylate; and

recovering the gasoline alkylate.

3. The process of claim 1, wherein the second step further comprises:

recovering unconverted ethylene;

dimerizing combinations of at least three ethylene molecules to form a higher molecular weight ethylene oligomer; and

recovering the higher molecular weight ethylene oligomer.

4. The process of claim 3, wherein the fifth step further comprises:

etherifying a higher molecular weight ethylene oligomer with methanol to form a higher-molecular-weight-ethylene-oligomer-based methyl ether; and

recovering the higher-molecular-weight-ethylene-oligomer-based methyl ether.

5. The process of claim 3, wherein the third step further comprises:

recovering unconverted n-butylene;

isomerizing a higher molecular weight ethylene oligomer; and

recovering the isomerized higher molecular weight ethylene oligomer.

6. The process of claim 5, wherein the fifth step further comprises:

etherifying an isomerized higher molecular weight ethylene oligomer with methanol to form an isomerized-higher-molecular-weight-ethylene-oligomer-based methyl ether; and

recovering the isomerized-higher-molecular-weight-ethylene-oligomer-based methyl ether.

7. The process of claim 1, wherein the third step further comprises:

recovering unconverted *n*-butylene;

alkylating isobutylene with isobutane to form gasoline alkylate; and

recovering the gasoline alkylate.

8. The process of claim 1, wherein the optional fourth step further comprises:

recovering unconverted methane.

9. The process of claim 1, wherein cracking raw material comprising ethane or propane to form ethylene further comprises recovering residual uncracked raw material.