We Claim:

1. A method of preparing a renewable polyisobutene polymer, comprising:
   a) providing an olefin mixture comprising isobutene and one or more linear butenes, wherein said olefin mixture is obtained from a renewable hydrocarbon source;
   b) contacting said olefin mixture with an adsorbent microporous material having an effective pore opening of 5Å to 5.4Å, wherein the linear butenes are selectively adsorbed to the microporous material;
   c) isolating the isobutene from contact with the microporous material; and
   d) polymerizing said renewable isobutene to obtain said renewable polymer.

2. The method of claim 1, wherein the step d) comprises polymerisation of isobutene in the presence of an additional monomer to form a co-polymer of isobutene.

3. The method of claim 2, wherein the co-polymer is butyl rubber.

4. The method of any one of claims 1 to 3, further comprising:
   i) providing an alcohol mixture comprising one or more butanols obtained from athe renewable hydrocarbon source;
   ii) contacting said alcohol mixture with a dehydration catalyst, thereby forming the olefin mixture comprising one or more linear butenes and isobutene.

5. The method of any one of claims 1 to 4, wherein said polymerization is carried out under cationic polymerization conditions.

6. The method of any one of claims 1 to 5, wherein the olefin mixture is contacted with the microporous material for about 1 hour to about 24 hours.

7. The method of any one of claims 1 to 6, wherein the microporous material comprises aluminium oxide-silicate.

8. The method of any one of claims 1 to 6, wherein the olefin mixture is in a liquid state.

9. The method of any one of claims 1 to 6, wherein said olefin mixture is in a gas state

10. A renewable polymer made by the method of any one of claims 1 to 9.

11. A polyisobutene polymer comprising isobutene units derived from a renewable hydrocarbon source and having a total biobased content greater than 0%.

12. The polymer according to claim 11 comprising a total biobased content of greater than 20%, preferably greater than 40%, more preferably greater than 60%, even more preferably greater than 80%.

13. A method of preparing high purity renewable isobutene comprising:
    a) providing an olefin mixture comprising isobutene and one or more linear butenes, wherein said olefin mixture is obtained from a renewable hydrocarbon source;
    b) contacting said olefin mixture with an adsorbent microporous material having an effective pore opening of 5Å to 5.4Å, wherein the linear butenes are selectively adsorbed by the microporous material; and
    c) isolating said renewable isobutene from contact with the microporous material.

14. The method of claim 13, further comprising:
    iii) providing an alcohol mixture comprising one or more butanols obtained from athe renewable hydrocarbon source;
    iv) contacting said alcohol mixture with a dehydration catalyst, thereby forming the olefin mixture comprising one or more linear butenes and isobutene.

15. The method of claim 13 or 14, wherein the one or more butanols are prepared by fermentation of corn biomass.

16. The method of any one of claims 13 to 15, wherein the olefin mixture is contacted with the microporous material for about 1 to about 24 hours.

17. The method of any one of claims 13 to 16, wherein the microporous material comprises aluminium oxide-silicate.

18. The method of any one of claims 13 to 16, wherein said olefin mixture is in a liquid state.

19. The method of any one of claims 13 to 16, wherein said olefin mixture is in a gas state.

20. A high purity renewable isobutene prepared by the method of any one of claims 13 to 19.

21. A method for preparing one or more oligomeric isoalkenes comprising:
   a) contacting a reaction mixture comprising said isoalkenes with an adsorbent microporous material under conditions suitable for oligomerization of isoalkenes, the adsorbent microporous material having an effective pore size, based on critical diameter of alkenes, which preferentially adsorbs linear alkenes and excludes isoalkenes, and
   b) isolating the oligomeric isoalkenes from contact with the microporous material.

22. The method of claim 21, wherein the adsorbent microporous material has an effective pore opening of about 3Å to about 10Å.

23. The method of claim 21 or 22, wherein the isoalkene is isobutene.

24. The method of any one of claims 21 to 23, wherein the oligomeric isoalkenes comprises at least one of diisobutenes and triisobutenes.

25. The method of any one of claims 21 to 24, wherein the microporous material comprises aluminium oxide-silicate.

26. The method of any one of claims 21 to 25, wherein the isoalkenes are contacted with the adsorbent microporous material for more than 24 hours.

27. The method of any one of claims 21 to 26, wherein the reaction temperature is between 15 °C and 250°C.

28. The method of any one of claims 21 to 26, wherein the oligomerization is carried out at room temperature.

29. The method of any one of claims 21 to 28, wherein the pH of the adsorbent microporous material is between 8 and 11, as measured by aqueous slurry.

CLAIMS

1. A method of preparing polyisobutene polymer from a renewable hydrocarbon source, the method comprising:

obtaining an alcohol mixture comprising one or more butanols from the renewable hydrocarbon source; and

contacting the alcohol mixture with a dehydration catalyst to form an olefin mixture comprising one or more linear butenes and isobutene;

contacting the olefin mixture with an adsorbent microporous material having an effective pore opening of 5Å to 5.4 Å for about 6 to about 24 hours in an enclosed container to selective adsorb the linear butenes to the microporous material;

isolating the isobutene from the micro porous a material and adsorbed linear butenes; and

polymerizing the isobutene to obtain the polyisobutene polymer.

2. A method of preparing polyisobutene polymer from a renewable source, the method comprising:

a) obtaining an olefin mixture comprising isobutene and one or more linear butenes from a renewable hydrocarbon source;

b) contacting the olefin mixture with an adsorbent microporous material having an effective pore opening of 5 Å to 5.4 Å for about 6 to about 24 hours in an enclosed container to selectively adsorb the linear butenes to the microporous material;

c) isolating the isobutene from the microporous material and adsorbed linear butenes; and

d) polymerizing the isobutene in the presence of an additional monomer to obtain a co-polymer of isobutene as the polyisobutene polymer.

3. The method of claim 2, wherein the co-polymer is butyl rubber.

4. The method of claim 2, wherein the polymerization is carried out under cationic polymerization conditions.

5. The method of claim 2, wherein the olefin mixture is contacted with the microporous material at room temperature, without pre-treatment of the microporous material.

6. The method of claim 5, wherein the microporous material comprises aluminium oxide-silicate.

7. The method of claim 5, wherein the olefin mixture is in a liquid state.

8. The method of claim 5, wherein the olefin mixture is in a gas state.

9. A method of preparing high purity renewable isobutene, the method comprising:

obtaining an alcohol mixture comprising one or more butanols from a renewable hydrocarbon source;

contacting the alcohol mixture with a dehydration catalyst to form an olefin mixture comprising one or more linear butenes and isobutane;

contacting the olefin mixture with an adsorbent microporous material having an effective pore opening of 5 Å to 5.4 Å for about 6 to about 24 hours in an enclosed container to selectively adsorb the linear butenes to the microporous material; and

isolating the renewable isobutene from contact with the microporous material and adsorbed linear butenes.

10. The method of claim 9, further comprising producing the alcohol mixture containing the one or more butanols by fermentation of corn biomass.

11. The method of claim 9, wherein contacting the olefin mixture with the microporous material comprises:

placing the microporous material and the olefin mixture in a container; and

contacting the olefin mixture and microporous material at ambient temperature for about 6 to about 24 hours.

12. The method of claim 11, wherein the microporous material comprises aluminium oxide-silicate.

13. The method of claim 11, wherein the olefin mixture is in a liquid state.

14. The method of claim 11, wherein the olefin mixture is in a gas state.