WHAT IS CLAIMED IS:

1. A method for preparing p-xylene and co-producing propylene with a high selectivity, comprising the steps of:

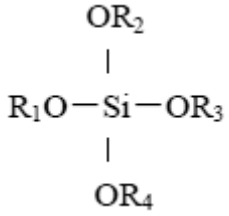
a) continuously bringing a raw material comprising toluene and at least one of methanol and dimethyl ether into contact with a catalyst in a reaction system to obtain a resultant;

b) separating the resultant into a C_6^+ component, a C_4-C_5 component, a C_3 component, and an ethylene-enriched C_2- component respectively;

c) returning the ethylene-enriched C_2- component to the reaction system to react the ethylene-enriched C_2 component with the raw material on the catalyst to produce propylene;

d) separating p-xylene from the C_6^+ component; and

e) separating propylene from the C_3 component, wherein the catalyst comprises a ZSM-5 and/or ZSM-11 molecular sieve that is hydrothermally treated under an atmosphere of saturated steam at 500-700°C for 3-6 hours and further subjected to a surface modification by contact with a siloxanyl compound having a formula as shown below:



wherein R_1, R_2, R_3, and R_4 are each independently a $C_{1\text{-}10}$ alkyl group.

2. The method according to claim 1, wherein the reaction system comprises a reactor or a plurality of reactors connected in series and/or in parallel.

3. The method according to claim 2, wherein the reactor is one or more selected from a fixed bed reactor, a fluidized bed reactor, and a moving bed reactor.

4. The method according to claim 1, wherein 1-10 wt % Si is loaded on the catalyst during the surface modification.

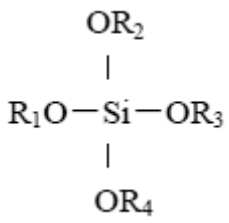
5. A method for preparing p-xylene and co-producing propylene with a high selectivity in a reaction system, wherein the reaction system comprises a first reaction zone and a second reaction zone, and the method comprises the steps of:

a) continuously bringing a raw material comprising toluene and at least one of methanol and dimethyl ether into contact with a catalyst I in the first reaction zone, and then into contact with a catalyst II in the second reaction zone to obtain a resultant;

b) separating the resultant into a C_6^+ component, a C_4-C_5 component, a C_3 component, and an ethylene-enriched C_2- component respectively;

c) returning the ethylene-enriched C_2- component to the second reaction zone, and reacting the ethylene-enriched C_2- component with methanol and/or dimethyl ether in the raw material within the second reaction zone on the catalyst II to produce propylene;

d) separating p-xylene from the C_6^+ component; and e) separating propylene from the C_3 component, wherein each of the catalyst I and the catalyst II independently comprises a ZSM-5 and/or ZSM-11 molecular sieve that is hydrothermally treated under an atmosphere of saturated steam at 500-700°C for 3-6 hours and further subjected to a surface modification by contact with a siloxanyl compound having a formula as shown below:



wherein R_1, R_2, R_3, and R_4 are each independently a C_{1-10} alkyl group.

6. The method according to claim 5, wherein the first reaction zone and the second reaction zone are in the same reactor.

7. The method according to claim 5, wherein the first reaction zone comprises a reactor or a plurality of reactors connected in series and/or in parallel; the second reaction zone comprises a reactor or a plurality of reactors connected in series and/or in parallel; and the first reaction zone and the second reaction zone are connected in series.

8. The method according to claim 5, wherein 1-10 wt % Si is loaded on the catalyst I and on catalyst II during the surface modification.

9. A method for preparing p-xylene and co-producing propylene with a high selectivity in a reaction system, wherein the reaction system comprises a first reaction zone and a second reaction zone, and the method comprises the steps of:

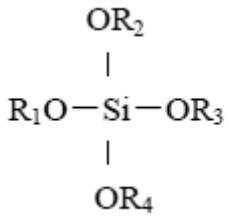
a) bringing toluene and a first portion of methanol and/or dimethyl ether into contact with a catalyst I in the first reaction zone to obtain a resultant A;

b) separating the resultant A into a C_6^+ component, a C_4-C_5 component, a C_3 component, and an ethylene-enriched C_2- component respectively from a separation system;

c) bringing the ethylene-enriched C_2- component and a second portion of methanol and/or dimethyl ether into contact with a catalyst II in the second reaction zone to obtain a resultant B comprising propylene, and feeding the resultant B into the separation system;

d) separating a p-xylene from the C_6^+ component; and

e) separating propylene from the C_3 component, wherein each of the catalyst I and the catalyst II independently comprises a ZSM-5 and/or ZSM-11 molecular sieve that is hydrothermally treated under an atmosphere of saturated steam at 500-700°C for 3-6 hours and further subjected to a surface modification by contact with a siloxanyl compound having a formula as shown below:



wherein R_1, R_2, R_3, and R_4 are each independently a $C_{1\text{-}10}$ alkyl group.

10. The method according to claim 9, wherein the first reaction zone comprises a reactor or a plurality of reactors connected in series and/or in parallel; the second reaction zone comprises a reactor or a plurality of reactors connected in series and/or in parallel; and the first reaction zone and the second reaction zone are connected in parallel.

11. The method according to claim 5, wherein 1-10 wt % Si is loaded on the catalyst I and on catalyst II during the surface modification.