CLAIMS

What is claimed is:

1. A method for maximizing production of ethylene or propylene, characterized by comprising:

S1, pretreating a raw material, mixing the pretreated raw material with superheated steam in a mixer, and feeding the well-mixed raw material and superheated steam into a catalytic cracking reactor, wherein the raw material is converted into waste residue and high-temperature oil and gas in the presence of a catalyst;

obtaining light distillate oil, heavy distillate oil, and a gaseous product by cooling and purifying the high-temperature oil and gas using a two-stage prewashing column; wherein the two-stage prewashing column comprises a section for preheating and a section for desuperheating;

S2, hydrogenating the heavy distillate oil in step S1, reforming alkene components in the light distillate oil and separating benzene-toluene-xylene (BTX) components in the light distillate oil as one of products; and

feeding alkane components in the light distillate oil to a steam cracking device;

S3, recycling the products formed by hydrogenating and the products formed by reforming, and the steam-cracked distillate oil obtained in step S2 to the catalytic cracking reactor in step S1, and once more carrying out a selective catalytic cracking reaction in the catalytic cracking reactor, wherein a mass ratio of a total amount of the recycled products to an amount of a fresh raw material is 10-60:100; and

S4, feeding the gaseous product in step S1 to the steam cracking device, and collectively separating methane, ethane, ethylene, propane, and propylene, wherein ethylene and propylene are used as the products; and returning the ethane, the propane, and other alkanes to the steam cracking device;

wherein by the above steps, the raw material is finally converted into the products comprising methane, the ethane, ethylene, propylene, and BTX, wherein the total yield of ethylene and propylene is 45-75 m% of the raw materials, the yield of the arene BTX is 15-30 m% of the raw materials, and the majority of the remainder is methane;

wherein the raw material comprises mixed waste plastic from city or crude oil;

wherein in the case that the raw material comprises mixed waste plastic from city, the pretreating comprises: at least shredding or removing iron from the mixed waste plastic from city; feeding the waste plastic to a melting vessel, and melting the waste plastic in the

melting vessel with superheated steam to a liquefied substance and collecting the liquefied substance at the bottom of the melting vessel, wherein the waste plastic is melted into the liquefied substance under a temperature of 150-250°C and a pressure of 0.01-0.5 MPa; and finally feeding the liquefied substance of the waste plastic to the two-stage prewashing column, and preheating with the high-temperature oil gas as a heat source, mixing the preheated liquefied substance of the waste plastic as the raw material with the superheated steam to obtain a mixture, and feeding the mixture to the catalytic cracking reactor;

wherein in the case that the raw material comprises crude oil, the pretreating comprises at least one of: electric desalination, atmospheric fractionating, and butane deasphalting, wherein after the crude oil is atmospherically fractionated, topped oil enters the steam cracking device to yield abundant ethylene, a first fraction of atmospheric distillation and a second fraction of atmospheric distillation are treated by fixed bed hydrocracking to obtain a jet fuel, and a remaining bottom fraction of atmospheric distillation is totally fed into the catalytic cracking reactor.

2. The method for maximizing production of ethylene or propylene according to claim 1, wherein a temperature of the liquefied substance of the waste plastic, through the section for preheating and the section for desuperheating, progressively rises plate by plate and reaches 250-320°C when reaching a column reactor, and the preheated liquefied substance of the waste plastic enters the catalytic cracking reactor through a mixer for catalytic cracking, and part of the liquefied substance is cyclically returned to the melting vessel.

3. The method for maximizing production of ethylene or propylene according to claim 1, wherein prior to being fed to the catalytic cracking reactor, the bottom fraction of atmospheric distillation is subjected to the butane deasphalting and is modified, to remove impurities comprising heavy metal, asphalt, and colloid from the crude oil; and the butane deasphalting is carried out under a temperature of 100-200°C and a pressure of 2.0-6.0 MPa.

4. The method for maximizing production of ethylene or propylene according to claim 1, wherein the superheated steam is replaceable by another superheated inert medium.

5. The method for maximizing production of ethylene or propylene according to claim 1, wherein a temperature at the top of the two-stage prewashing column is 100-200°C and

a pressure at the top of the two-stage prewashing column is 0.05-0.30 MPa; a temperature in the column reactor is 250-320°C, and in the section for desuperheating, the high-temperature oil gas is cooled from a superheated state to a saturated state and dust carried by the oil gas is washed away, and the heavy distillate oil is obtained in the column reactor, the oil gas at a top of the column reactor is cooled and enters a three-phase separator, the light distillate oil is discharged from the bottom of a tank, non-condensable gas are discharged from the top of the tank.

6. The method for maximizing production of ethylene or propylene according to claim 1, wherein in step S1, the catalytic cracking reactor operates under conditions of: a reaction temperature of 300-600°C, a reaction pressure of 0.05-0.5 MPa, a catalyst-oil weight ratio of 6-12, and a space velocity of 0.1-30 h^{-1}; the catalyst in the catalytic cracking reactor comprises a molecular sieve catalyst, wherein the molecular sieve catalyst is one of molecular sieves of ZSM5, ZSM35, BETA, and USY, or a modification thereof; and the catalytic cracking reactor is one selected from a fixed fluidized bed or a circulating fluidized bed or a combination thereof.

7. The method for maximizing production of ethylene or propylene according to claim 1, wherein in step S2, the reformation is carried out in an oligomerization reactor under conditions of a reaction temperature of 40-200°C, a reaction pressure of 0.5-6.0 MPa, and a space velocity of 0.1-6 h^{-1}.