Claims

1. A catalytic cracking process for producing light olefins, comprising a step of contacting a cracking feedstock with a catalytic cracking catalyst in the presence of a radical initiator for reaction under catalytic cracking conditions to obtain a product comprising light olefins, wherein the radical initiator comprises a dendritic polymer, a hyperbranched polymer or a combination thereof, the catalytic cracking catalyst comprises a Y zeolite, a shape selective zeolite, or a combination thereof, and the cracking feedstock is selected from the group consisting of hydrocarbons having 4-14 carbon atoms, naphtha, light cycle oil, vacuum gas oil, vacuum residuum, and combinations thereof.

2. The process according to claim 1, wherein the dendritic polymer and the hyperbranched polymer are each independently selected from the group consisting of polyolefins, polyetheresters, polyethers, polyurethanes, polyamides, polysilanes, and combinations thereof.

3. The process according to claim 1, wherein the radical initiator comprises a polymer selected from the group consisting of hyperbranched polyglycidyl ethers, terminal group-modified hyperbranched polyglycidyl ethers, dendritic polyamide-amines, hyperbranched polyamide-amines, and combinations thereof.

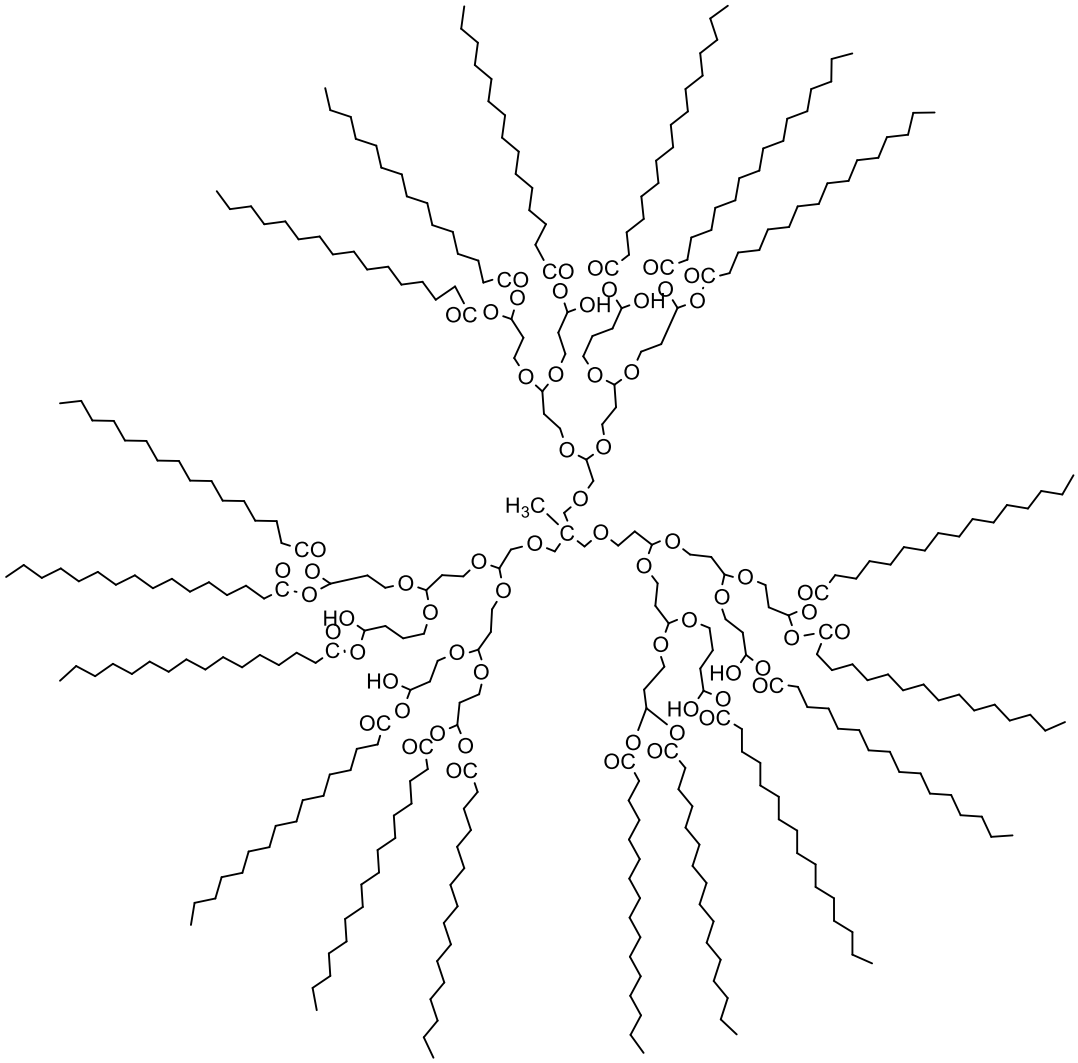
4. The process according to claim 1, wherein the radical initiator comprises a terminal group-modified hyperbranched polyglycidyl ether, the terminal group of which being selected from the group consisting of ester groups having 2-10 carbon atoms, amine group, mercapto group, and combinations thereof.

5. The process according to claim 1, wherein the dendritic polymer and the hyperbranched polymer each independently has a degree of branching of 0.3-1.

6. The process according to claim 1, wherein the dendritic polymer and the hyperbranched polymer each independently has a weight average molecular weight of from 2000 to 30000.

7. The process according to claim 1, wherein the radical initiator comprises a palmitate-terminated hyperbranched polyglycidyl ether (PHPG) having a weight average molecular weight of 1000-30000 and a degree of branching of 0.3-1.

8. The process according to claim 7, wherein the palmitate-terminated hyperbranched polyglycidyl ether (PHPG) has a structure represented by formula (I):



(I).

9. The process according to claim 1, wherein the shape selective zeolite is selected from the group consisting of ZSM-5 zeolite, β zeolite, and combinations thereof.

10. The process according to claim 1, wherein the ratio of the total weight of dendritic polymer and hyperbranched polymer contained in the radical initiator to the weight of the cracking feedstock is 0.00001 : 1 to 0.01 : 1.

11. The process according to claim 1, wherein the catalytic cracking conditions include:

a reaction temperature of 450-700 °C;

a weight hourly space velocity of 1-50 h^{-1}; and

a catalyst-to-oil ratio of 1 : 1 to 20 : 1.

12. The process according to claim 1, wherein the radical initiator comprises a palmitate-terminated hyperbranched polyglycidyl ether (PHPG) having a weight average molecular weight of 2000-20000, and a degree of branching of 0.3-0.9.