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 ~~and/or,~~ 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, ~~or any combination thereof, preferably each independently selected from the group consisting of polyethers, polyamides, or a combination~~and combinations thereof.

3. The process according to ~~any one of the preceding claims~~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, ~~or any combination~~and combinations thereof.

4. The process according to ~~any one of the preceding claims~~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, ~~or any combination~~and combinations thereof.

5. The process according to ~~any one of the preceding claims~~claim 1, wherein the dendritic polymer and the hyperbranched polymer each independently has a degree of branching of ~~about~~ 0.3-1~~, preferably about 0.4-1;~~.

~~more preferably, the dendritic polymer has a degree of branching of about 1 and the hyperbranched polymer has a degree of branching of about 0.4-0.9, even more preferably about 0.4-0.8.~~

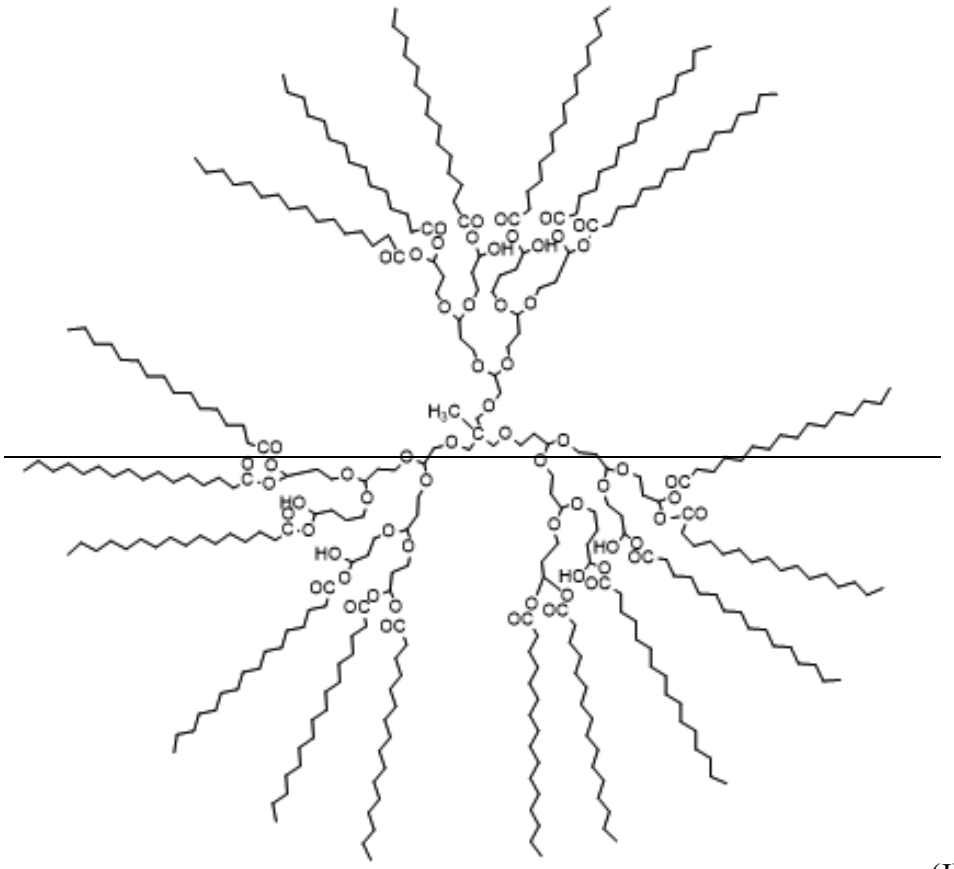
6. The process according to ~~any one of the preceding claims~~claim 1, wherein the dendritic polymer and the hyperbranched polymer each independently has a weight average molecular weight of ~~greater than about 1000, preferably~~ from ~~about~~ 2000 to ~~about~~ 30000~~, more preferably from about 2000 to about 25000~~.

7. The process according to ~~any one of the preceding claims~~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.

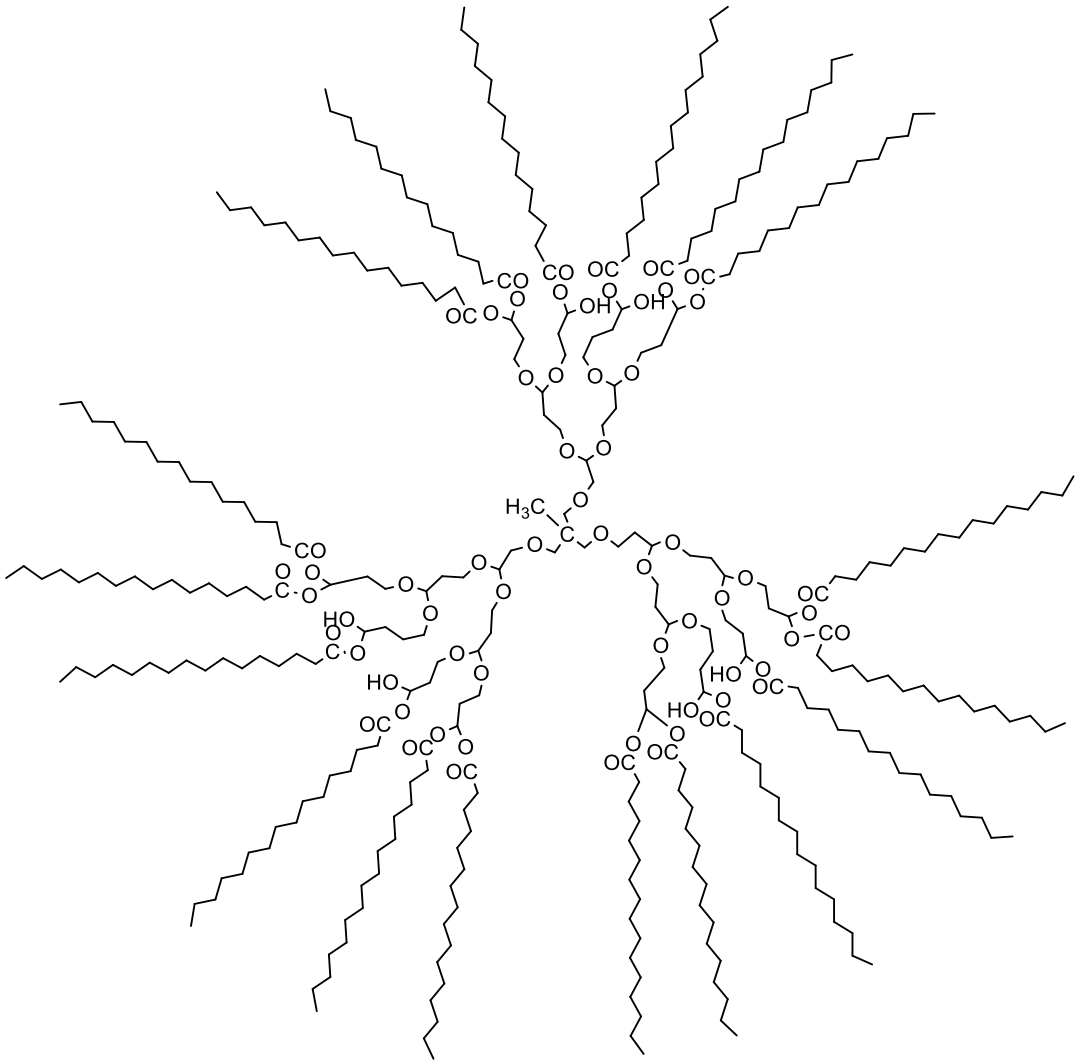
~~preferably, the palmitate-terminated hyperbranched polyglycidyl ether (PHPG) has a weight average molecular weight of greater than about 1000, more preferably about 1000-30000, further preferably about 2000-20000, and particularly preferably about 5000-15000; and/or~~

~~preferably, the palmitate-terminated hyperbranched polyglycidyl ether (PHPG) has a degree of branching of about 0.3-1, more preferably about 0.3-0.9, even more preferably about 0.4-0.9, and particularly preferably about 0.4-0.8.~~

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



~~(I).~~



(I).

9. The process according to ~~any of the preceding claims~~claim 1, wherein the ~~catalytic cracking catalyst comprises an acidic zeolite catalyst, preferably a catalytic cracking catalyst comprising a Y zeolite and/or a shape selective zeolite,~~ ~~more preferably, the~~ shape selective zeolite is selected from the group consisting of ZSM-5 zeolite, ~~βzeolite, or any combination~~β zeolite, and combinations thereof.

10. The process according to ~~any one of the preceding claims~~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 ~~greater than about 0.00001 : 1, preferably about~~ 0.00001 : 1 to ~~about~~ 0.01~~ : 1, more preferably about 0.0001 : 1 to about 0.005~~ : 1.

11. The process according to ~~any one of the preceding claims~~claim 1, wherein the catalytic cracking conditions include:

a reaction temperature of ~~about~~ 450-700 °C~~, preferably about 550-650 °C;~~;

a weight hourly space velocity of ~~about~~ 1-50 h^{-1}~~, preferably about 5-40 h^{-1}~~; and

a catalyst-to-oil ratio of ~~about~~ 1~~-~~ : 1 to 20~~, preferably about 1-15.~~ : 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.

~~12. The process according to any one of the preceding claims, wherein 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, or any combination thereof.~~

~~13. A catalyst system for catalytic cracking reactions, comprising a radical initiator and a catalytic cracking catalyst, wherein the radical initiator comprises a dendritic polymer and/or a hyperbranched polymer, and wherein the catalytic cracking catalyst comprises an acidic zeolite catalyst, and is preferably a catalytic cracking catalyst comprising a Y zeolite and/or a shape selective zeolite;~~
~~wherein the ratio of the total weight of dendritic polymer and hyperbranched polymer contained in the radical initiator to the weight of the catalytic cracking catalyst is greater than about 0.00001 : 20, preferably about (0.00001-0.01) : (1-20), more preferably about (0.0001-0.005) : (1-20).~~

~~14. The catalyst system according to claim 13, wherein the radical initiator is as defined in any one of claims 2 to 8, and/or~~

~~the shape selective zeolite is selected from the group consisting of ZSM-5 zeolite, β~~

~~zeolite or any combination thereof.~~