CLAIMS

1. A method for steam and catalytic cracking of hydrocarbons, the method characterized by the steps of:

supplying a catalyst feed, where the catalyst feed comprises a fluid and a heterogeneous catalyst, the heterogeneous catalyst operable to catalyze cracking of the hydrocarbons on surfaces of the heterogeneous catalyst, the hydrocarbons comprising a crude oil feed;

supplying steam, where the steam is operable to effect steam cracking of the hydrocarbons, and where the steam is operable to decrease coking of the heterogeneous catalyst, the amount of steam supplied to effect steam catalytic cracking resulting in a product stream comprising ethylene and propylene with total yield of ethylene and propylene together at about at least 20% from the crude oil feed; and

mixing the hydrocarbons, the catalyst feed, and the steam to produce light olefins by steam cracking and catalytic cracking simultaneously, while operating at a temperature to produce light olefins, and residence time to prevent secondary reactions responsible for consumption of the light olefins, where the heterogeneous catalyst flows downwardly by gravity.

2. The method according to claim 1, where the step of mixing the hydrocarbons further comprises the step of operating a downflow reactor in a temperature range between about 500 °C to about 700 °C.

3. The method according to claim 1, further comprising the step of removing hydrocarbons adsorbed to the heterogeneous catalyst by applying steam after the step of mixing the hydrocarbons, the catalyst feed, and the steam to produce light olefins.

4. The method according to claim 3, further comprising the step of recycling the steam used in the step of removing hydrocarbons adsorbed to the heterogeneous catalyst for use in the step of supplying steam.

5. The method according to claim 1, further comprising the step of regenerating the heterogeneous catalyst through combustion of coke disposed on the heterogeneous catalyst.

6. The method according to claim 1, where the catalyst feed is characterized by new, unused heterogeneous catalyst and regenerated catalyst.

7. The method according to claim 1, where a yield of light olefins from the hydrocarbon inlet stream is at least about 30%.

8. The method according to claim 1, where the step of supplying steam comprises supplying steam feed at greater than about 3% by weight of the hydrocarbons.

9. The method according to claim 1, where the step of supplying steam is characterized by supplying steam feed at between about 5% by weight and about 15% by weight of the hydrocarbons.

10. The method according to claim 1, where the step of supplying steam comprises supplying steam feed at about 10% by weight of the hydrocarbons.