C L A I M S

1. A process for upgrading refinery residue feedstock, said process comprising the steps of:

a) introducing the refinery residue feedstock into a fluidized bed reactor as a solid, the refinery residue feedstock selected from asphalt, vacuum residue, coke from a gasifier, residue from an ethylene cracker, and petroleum coke obtained from a delayed coker unit;

b) heating the refinery residue feedstock to a devolatilizing and thermal cracking temperature in the fluidized bed reactor to produce a product stream comprising gaseous hydrocarbons and solid coke;

c) subjecting the gaseous hydrocarbons to catalytic hydroprocessing in the presence of molecular hydrogen in the fluidized bed to increase the hydrogen to carbon ratio and lower the average molecular weight of the gaseous hydrocarbons;

d) separating the gaseous hydrocarbons from step c) from the solid coke from step b) to produce a gaseous product stream and a solid coke product stream; and

e) subjecting the gaseous hydrocarbons from step d) to further processing to produce at least one of: C1-C3 hydrocarbons, liquefied petroleum gas, naphtha range hydrocarbons, and middle distillate range hydrocarbons, wherein the further processing consists of at least one of: condensation of gaseous hydrocarbon and distillation, hydroprocessing of condensed hydrocarbons in a hydroprocessing unit, and fluid catalytic cracking of condensed hydrocarbons in a fluid cracking unit.

2. The process of Claim 1, wherein the fluidized bed reactor in step b) is a bubbling fluidized bed reactor.

3. The process of Claim 1, wherein the fluidized bed reactor in step b) is an entrained fluidized bed reactor comprising the solid refinery residue feedstock and the solid coke entrained in a stream of gas containing molecular hydrogen.

4. The process of Claim 1, wherein the fluidized bed reactor of step a) operates at a total pressure of from 2 barg to 100 barg and the devolatilizing temperature in step b) is from 300°C to 600°C.

5. The process of claim 2, wherein the weight-hourly space velocity of the refinery residue feedstock is from 0.05 to 25 kilograms of feedstock per kilogram of catalyst per hour in the bubbling fluidized bed.

6. The process of claim 2, wherein the fluidized bed reactor comprises at least one catalyst comprising at least one active metal selected from the group consisting of: group VB, group VIB and group VIII of the periodic table supported on metal oxide selected from: alumina, silica, titania, silica-alumina, ceria, zirconia, crystalline aluminosilicates and combinations thereof.