CLAIMS

1. A system (100) of converting solid waste of plastics/rubber into hydrocarbon fuel, said system (100) comprising:

(i) a thermal cracking reactor (110) for cracking the solid waste and a catalyst having a particle size in the range of 0.1mm – 10mm and the ratio of catalyst to solid waste to being 0.01:1 to 0.05:1 as feed at a temperature in the range of 300 - 400 °C to obtain a catalytic thermal cracking product containing a gaseous hydrocarbon stream and a coke residue; and

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(ii) a condenser (120) for receiving said gaseous hydrocarbon stream and cooling said gaseous hydrocarbon stream to obtain an at least partly condensate stream containing a liquid hydrocarbon oil of smaller molecules and non-condensable gaseous hydrocarbons,

(iii) an oil storage tank (142) which is in operative communication with the condenser (120) to receive condensate stream from the condenser (120);

wherein said thermal cracking reactor (110) having an operative top side-wall (103) and an operative bottom side-wall (105) is positioned in horizontal and comprising a feed inlet (104) at one end and a gas outlet (116) at an opposite end on said operative top side-wall (103), a residue outlet (118) at said operative bottom side-wall (103), and an agitator device (106) used to push downwards the feed entering the reactor (110) at the fed inlet (104) along the operative longitudinal axis of the reactor (110) so as to enable completion of gasification of the hydrocarbons in the solid waste.

2. The system of Claim 1, wherein the oil storage tank (142) comprises a scrubbing unit in operative communication with the oil storage tank (142) for receiving and non-condensable gaseous hydrocarbons for purifying. wherein

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the oil storage tank (142) comprises a burner chamber (134) for receiving purified non-condensable gaseous hydrocarbons for burning.

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3. The system of Claim 2, wherein the scrubbing unit is a sodium hydroxide scrubbing unit (143).

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4. The system of Claim 2, wherein the scrubbing unit is a calcium hydroxide scrubbing unit (144).

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5. The system of Claim 2, wherein the scrubbing unit is a water scrubbing unit (145).

6. The system of Claim 2, wherein burner chamber (134) is in operative communication with the scrubbing unit (145) for receiving purified non-condensable gaseous hydrocarbons for burning.

7. A method for converting solid waste of plastics/rubber into hydrocarbon fuel using the system as claimed in Claim 1, said system (100) comprising the steps of:

(i) feeding the solid waste being shredded into a particle size of less than 20 mm together with a catalyst into a thermal cracking reactor (110) which is horizontally positioned, wherein the cracking reactor (110) is provided with an operative top side-wall (103) and an operative bottom side-wall (105), a residue outlet (118) at said operative bottom side-wall (103), having a feed inlet (104) at one end thereof and a gas outlet (116) at the opposite end of the operative top side-wall (103), and an agitator device (106) centrally positioned between the side-walls (103, 105) along the operative longitudinal axis of the reactor (110);

(ii) subjecting the solid waste in the reactor to thermal cracking at a temperature in the range of 300 - 400 °C to obtain a catalytic thermal cracking product containing a gaseous hydrocarbon stream and coke residue;

(iii) receiving the gaseous hydrocarbon stream in a condenser (120) and discharging the coke residue from step (ii) at the residue outlet (118);

(iv) cooling the gaseous hydrocarbon stream in the condenser (120) to obtain an at least partly condensate streaming containing a liquid hydrocarbon oil of smaller molecules and non-condensable gaseous hydrocarbons;

(v) collecting the condensate stream in an oil storage tank and conveying the non-condensable gaseous hydrocarbons to scrubbing unit to purify the non-condensable gaseous hydrocarbons; and

(vi) passing the purified non-condensable gaseous hydrocarbons to a burner chamber (134) for burning.

8. The method of Claim 7, wherein the catalyst is selected from the group consisting of aluminum silicate, barium silicate, beryllium silicate, calcium silicate, iron silicate, magnesium silicate, manganese silicate, potassium silicate, sodium silicate, zirconium silicate, copper silicate, tin silicate, iron silicate, lead silicate, tungsten silicate, cesium

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silicate lithium silicate, aluminum, bismuth, copper (cuprum), iron (ferrum), lead, magnesium, manganese, nickel, tin (stannum), tungsten, zinc, aluminum oxide, bismuth oxide, copper (cuprum) oxide, iron (ferrum) oxide, lead oxide, magnesium oxide, manganese oxide, nickel oxide, tin (stannum) oxide, tungsten oxide, zinc oxide, aluminum carbonate, calcium carbomate, sodium carbonate, bismuth carbonate, copper (cuprum) carbonate, iron (ferrum) carbonate, lead carbonate, magnesium carbomate, manganese carbonate, nickel carbonate, tin (stannum) carbomate, tungsten carbonate, zinc carbonate, silicon carbide, calcium carbide, natural and synthetic zeolite, alumina, fuller's earth, bauxites, metal borates, metal borides, ZSM-5, FCC Y-catalyst, NiMo over γ-alumina, NiW loaded on amorphous silica-alumina, cobalt loaded active carbon (Co-AC), DHC-8 (commercial silica-alumina catalyst), HZSM-5, activated red mud, calcined kaolin, Eckalite-1, Silton CPT-30, Silton MT 100, Mizukasieves Y-420, Re Y-zeolite, acidic alumina, Na Y-zeolite, and H Y-zeolite.

9. The method of Claim 8, wherein the catalyst has a particle size in the range of 0.1 mm to 10mm and the ratio of the catalyst to the solid waste is in the range of 0.01:1 to 0.05:1 and is a mixture containing at least one metal silicate, at least one metal oxide, at least one zeolite type compound, and at least one additive.

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