Claims

1. Method for processing solid recovered fuel pellets (117) made from municipal solid waste (103), comprising the following steps:

a) torrefaction of the pellets (117) at a torrefaction temperature of 250 to 300°C generating charred pellets (201) and torrefaction gas (202);

b) milling the charred pellets (201) in a first milling step to coarsely milled charred pellets (207);

c) removing metal residues (206) from the coarsely milled charred pellets (207);

d) milling the coarsely charred pellets (207) to finely milled charred pellets (209);

e) gasifying the finely milled charred pellets (209) to raw syngas (301) in an entrained flow gasifying process;

f) performing CO shift reactions to the raw syngas (301) creating shifted syngas (501);

g) removing carbon dioxide and hydrogen sulfide from the shifted syngas (501) creating a syngas; and

h) generating a product gas stream (601) rich in hydrogen by purifying the syngas,

wherein in step h) hydrogen is separated from the syngas creating the product gas stream rich in hydrogen (601) and a purge gas (602), wherein the torrefaction gas (202) generated in step a) is thermally cracked for the generation of a torrefaction syngas (401), said torrefaction syngas (401) being mixed with the raw syngas (301) generated in step e) as well as the purge gas (602) generated in step h) before step f).

2. The method according to claim 1, wherein in step b) the charred pellets (201) are milled to a particle size of 10 mm and less**.**

3. The method according to one of the preceding claims, wherein in step c) the metal residues (206) are removed using an eddy current technology.

4. The method according to one of the preceding claims, wherein in step d) the coarsely milled charred pellets (207) are milled to a particle size of 500 µm [micrometer]and less.

5. The method according to one of the preceding claims, wherein in step g) carbon dioxide (CO_2) and hydrogen sulfide (H_2S) are removed from the syngas by adsorption.

6. The method according to one of the preceding claims, wherein in step h) hydrogen is separated from the syngas using a pressure swing adsorption system creating the product gas stream rich in hydrogen (601) and a purge gas (602).

7. The method according to claim 6, wherein a part of the purge gas (602) is used as fuel gas.