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(54) **Process for obtaining synthesis gas either from solid fuels derived from urban solid waste, or from industrial solid waste.**

(57) A process is disclosed, by means of which synthesis gas can be obtained either from solid fuels derived from urban solid waste (RDF), or from industrial solid waste, characterized in that said solid fuels (RDF) or said industrial solid waste are gasified with essentially pure oxygen under a pressure comprised within the range of from 1 to 100 abs.atm, by co-currently feeding said reactants to a gasifier as adiabatic as possible, and that the gas leaving the gasifier is treated in order to remove the polluting, acidic gases, by means of a washing step.

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PROCESS FOR OBTAINING SYNTHESIS GAS EITHER FROM SOLID FUELS DERIVED FROM URBAN SOLID WASTE, OR FROM INDUSTRIAL SOLID WASTE

The present invention relates to a process for obtaining synthesis gas either from the solid fuels derived from urban solid waste, or from industrial solid waste.

The solid fuels derived from the urban solid waste (commonly denominated as "RDF", or, in Italy, as "CsdR"), are the lightest, combustible fraction of the urban solid waste, i.e., they are constituted by plastics, paper, wood, and textile materials (with the possible presence of organic matter). Said fuels have a net heat value comprised within the range of from 2,500 to 4,500 kcal/kg, according to the separation degree, as well as to their moisture content.

A general scheme of the process for producing said RDF comprises the following operations:

- trituration of the urban solid waste;
- magnetic separation;
- air sorting in order to separate the light fractions from the heavy fractions;
- drying of the light material;
- possible pelletizing of the resulting product.

Among the many factors of differentiation of RDF, besides the composition of the urban solid waste used as the starting material, there is the technology used in order to select the derived fuel.

The use of said RDF is for being burnt in boilers, and, above all, in cement factories.

The present Applicant has found now that said RDF or said solid industrial waste can be gasified under suitable conditions, in order to obtain synthesis gas.

The process according to the present invention for obtaining synthesis gas either from solid fuels derived from urban solid waste (RDF), or from industrial solid waste, is characterized in that said solid fuels (RDF) or said industrial solid waste are gasified with essentially pure oxygen under a pressure comprised within the range of from 1 to 100 abs.atm, by being co-currently fed to a gasifier as adiabatic as possible, and that the gas leaving the gasifier is treated in order to remove the polluting, acidic gases (HCl, H_2S), by means of a washing step.

Both in case of RDF, and in case of industrial solid waste, it is recommended that they should have a net heat value of at least 3,000 kcal/kg, and a moisture content lower than, or at maximum equal to, 30%.

Among the industrial solid waste which can be used, the exhausted tyres can be mentioned in particular; anyway, also other types of industrial waste can be selected.

As regards the gasification pressure, the preferred range is of from 15 to 50 abs.atm in case RDF are used, and of from 1 to 50 abs.atm in case industrial solid waste is used.

The temperature of the gasifier is defined both as a function of the moisture content of RDF or of the industrial waste, and of their heat value, and as a function of the amount and of the temperature of the oxygen fed to the process.

Oxygen, before being fed to the gasifier, can be pre-heated at a temperature equal to, or higher than, the temperature of the same gasifier.

Said oxygen can be produced, e.g., in an air fractionating facility, or in an equivalent facility.

In such case, using a portion of the synthesis gas obtained (such as, e.g., about 10%), in order to have the necessary power for managing said air fractionating facility, or an equivalent facility, can be advantageous.

The treatment of the gas leaving the gasifier in order to remove the acidic gases can be carried out, e.g., by means of a washing step with sodium hydroxide.

Furthermore, cooling the gas leaving the gasifier before such a treatment is carried out, can be advantageous.

Some examples are given now in order to better illustrate the invention without limiting it.

Example 1

A solid fuel derived from urban solid waste (RDF) was used, which had a net heat value of 3,900 kcal/kg, and contained 22.4% of moisture.

The gasification was carried out in a gasifier as adiabatic as possible, with 104 kg/hour of RDF and 48 kg/hour of essentially pure oxygen being co-currently fed to the process, under the following conditions:

- P = 50 abs.atm;
- average T = 1,000 °C

After the washing, 163 Nm^3/hour of synthesis gas was obtained, which had a net heat value of 2,969 kcal/Nm^3, as referred to dry gas.

A stream of 17 Nm^3/hour was diverted from the produced stream of 163 Nm^3/hour of gas in order to generate the necessary electric power for operating the air fractionating facility.

Example 2

Exhausted tyres were used as the industrial solid waste, which had a net heat value of 6,000 kcal/kg, and showed an accidental moisture content of 15%.

The gasification was carried out in a gasifier as adiabatic as possible, with 102 kg/hour of exhausted tyres and 69 kg/hour of essentially pure oxygen being co-currently fed to the process, under the following conditions:

- P = 1 abs.atm;
- average T = 1,200 °C

After the washing, 195 Nm^3/hour of synthesis gas was obtained, which had a net heat value of 2,824 kcal/Nm^3, as referred to dry gas.

A stream of 25 Nm^3/hour was diverted from the produced stream of 195 Nm^3/hour of gas in order to generate the necessary electric power for the operations of the air fractionating facility.

Example 3

A solid fuel deriving from urban solid waste (RDF) was used, which had a net heat value of 3,950 kcal/kg, and contained 7% of moisture.

The gasification was carried out in a gasifier as adiabatic as possible, with 127 kg/hour of RDF and 47 kg/hour of essentially pure oxygen being co-currently fed to the process, under the following conditions:

- P = 15 abs.atm;
- average T = 1,220 °C

After the washing, 162 Nm^3/hour of synthesis gas was obtained, which had a net heat value of 2,596 kcal/Nm^3, as referred to dry gas.

A stream of 19 Nm^3/hour was diverted from the produced stream of 162 Nm^3/hour of gas in order to generate the necessary electric power for operating the air fractionating facility.

Claims

1. Process for obtaining synthesis gas either from solid fuels derived from urban solid waste (RDF), or from industrial solid waste, characterized in that said solid fuels (RDF) or said industrial solid waste are gasified with essentially pure oxygen under a pressure comprised within the range of from 1 to 100 abs.atm, by being co-currently fed to a gasifier as adiabatic as possible, and that the gas leaving the gasifier is treated in order to remove the polluting, acidic gases, by means of a washing step.

2. Process according to claim 1, wherein in case of solid fuels derived from urban solid waste (RDF), the pressure is comprised within the range of from 15 to 50 abs.atm.

3. Process according to claim 1, wherein in case of industrial solid waste, the pressure is comprised within the range of from 1 to 50 abs.atm.

4. Process according to claim 1, wherein oxygen, before being fed to the gasifier, is pre-heated at a temperature equal to, or higher than, the temperature of the same gasifier.

5. Process according to claim 1, wherein oxygen fed to the gasifier comes from an air fractionating facility, or from an equivalent facility.

6. Process according to claim 5, wherein the necessary power for the operations of said air fractionating facility, or of said equivalent facility, is produced from a portion of the synthesis gases obtained.

7. Process according to claim 1, wherein the solid fuels derived from urban solid waste (RDF) or the industrial solid waste have a net heat value of at least 3,000 kcal/kg, and a moisture content lower than, or at maximum equal to, 30%.

8. Process according to claim 1, wherein the industrial solid waste is constituted by exhausted tyres.

9. Process according to claim 1, wherein before the treatment of the gas leaving the gasifier a cooling thereof is carried out.

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 90 20 0063

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	GB-A-1 555 703 (STEAG) * Page 1, lines 1-36; page 2, lines 14-119; page 3, lines 72-115 *	1,2,3,5,9	C 10 J 3/16 C 10 J 3/14 C 10 J 3/26
A	DE-A-2 309 248 (KOPPERS) * Pages 3-4; page 14 *	1,4,5	
A	DE-C- 740 734 (KOPPERS) * Page 3, lines 70-86 *	1,4	
A	DE-C- 816 284 (VOGOGAS) * Page 2, lines 45-78 *	5,6	
A	FR-A- 681 147 (NATTA)		

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

C 10 J

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	27-04-1990	WENDLING J.P.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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