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(54) **Method for preparing a synthetic fuel and/or synthetic components for fuels, and the product obtained thereby.**

(57) A synthetic fuel and/or synthetic components for fuels are prepared from a mixture of polycarboxylic acids of suitable elementary composition, having a mean molecular weight of between 120 and 800 and an acidity of between 5 and 18 meq/g, by esterifying the polycarboxylic acids with one or more alcohols or one or more olefins.

This invention relates to a method for preparing a synthetic fuel and/or synthetic components for fuels, and the product obtained by said method.

- 5 Various methods are known in the art for preparing synthetic fuels, in particular starting from coal by hydroliquefaction or pyrolysis, or starting from synthesis gases.

However, all the known methods suffer from the drawback of involving high plant and/or operating costs.

- 10 Numerous methods exist for oxidising coal with oxygen, oxygen-containing gases or oxidising substances in an aqueous alkaline medium.

A large percentage of the product of this oxidation consists of polycarboxylic acid mixtures.

- 15 Examples of methods for producing polycarboxylic acids by oxidising coal include those described in French patent 1,347,213 and in German patents 841,140, 864,992 and 879,103.

The polycarboxylic acids obtained by known methods cannot be used as fuels because of their acidic nature, so that their use is practi-

- 20 cally limited to the chemical field.

It has been surprisingly found that polycarboxylic acids can be converted into fuels and/or components for fuels by transforming them into oleophilic compounds in a simple and economical manner.

Besides polycarboxylic acid mixtures obtained by oxidising coal,

- 25 polycarboxylic acid mixtures of different origin can obviously be used for transformation into oleophilic compounds provided that their elementary compositions, molecular weight and acidity lie within the

limits indicated hereinafter.

A first subject matter of the present invention is a method for transforming polycarboxylic acid mixtures into oleophilic compounds which can be used as synthetic fuel and/or synthetic components for
5 fuels.

The method for preparing a synthetic fuel and/or synthetic components for fuels according to the present invention starts with a polycarboxylic acid mixture obtained in any manner, and is characterised by the polycarboxylic acids having the following elementary composition:

10 carbon from 42% to 70% by weight
hydrogen from 1.5% to 6% by weight
oxygen from 14.0% to 52.7% by weight,
a mean molecular weight of between 120 and 800, and an acidity of between 5 and 18 meq/g, and preferably between 8 and 14 meq/g, the
15 polycarboxylic acid mixture being subjected to esterification with one or more alcohols or one or more olefins.

The esterification is preferably effected with alcohols comprising 1 to 10 carbon atoms, the alcohols being in H_2SO_4 solution at a concentration of between 5% and 20% by weight, or with olefins
20 comprising between 2 and 10 carbon atoms.

A second subject matter of the present invention is the synthetic fuel and/or synthetic components for fuels when obtained by the aforesaid method.

A third subject matter of the present invention is the fuel obtained
25 by mixing the synthetic fuel and/or synthetic components according to the invention with products chosen from:

a) medium petroleum distillate;

- b) medium distillate from coal hydroliquefaction;
- c) coal pyrolysis product, and in particular the mixture of benzene, toluene and xylenes;
- d) fuel oil of petroleum origin;
- 5 e) mixture of aromatic hydrocarbons;
- f) mixture of $C_1 - C_{10}$ aliphatic alcohols.

An example is given hereinafter in order to better illustrate the invention and the results obtainable, it being understood that the invention is not to be considered as limited thereby or thereto.

10 EXAMPLE

Coal oxidation products having the characteristics given in Table 1 were treated in the following manner:

30 g of product plus 170 cc of methanol and 2.7 ml of H_2SO_4 are heated under reflux for 4 hours.

15 The reaction mixture is poured into 200 ml of H_2O .

The methyl esters are extracted with ethyl ether, which is then removed by distillation. The resultant mixture was mixed with a medium distillate having the characteristics given in Table 2.

The characteristics of the fuel mixture obtained are given in
20 Table 3.

TABLE 1

Starting material characteristics

Elementary analysis (weight %)		Acidity	12.7 meq/g
5	C	50.20	
	H	3.12	$\bar{M}_n$ 170
	O	45.70	
	N	0.4	$\bar{M}_n$ = numerical molecular weight
	S	0.6	

TABLE 2

Medium distillate characteristics

10	ASTM colour		> 8
	Viscosity 20°C	(Cst)	8.3
	Viscosity 37.8°C	(")	4.7
	Ash	(Weight %)	0.0078
	Acidity	(mg KOH/g)	0.49
15	HCV	(kcal/kg)	11483

TABLE 3

Fuel mixture characteristics

20	Ester content	(weight %)	30
	ASTM colour		> 8
	Viscosity 20°C	(Cst)	18.7
	Viscosity 37.8°C	(")	8.7
	Ash	(weight %)	0.0077
25	Acidity	(mg KOH/g)	0.61
	HCV	(kcal/kg)	9300

CLAIMS:

1. A method for preparing a synthetic fuel and/or synthetic components for fuels from a polycarboxylic acid mixture obtained in any manner, characterised by the polycarboxylic acid mixture having
5 the following elementary composition:
carbon from 42% to 70% by weight
hydrogen from 1.5% to 6% by weight
oxygen from 14% to 52.7% by weight,
a mean molecular weight of between 120 and 800 and an acidity of
10 between 5 and 18 meq/g, the polycarboxylic acids being subjected to esterification with one or more alcohols or one or more olefins.
2. A method for preparing a synthetic fuel and/or synthetic components for fuels as claimed in claim 1, characterised in that the polycarboxylic acid mixture has an acidity of between 8 and
15 14 meq/g.
3. A method for preparing a syntehtic fuel and/or synthetic components for fuels as claimed in claim 1, characterised in that the esterification is effected with alcohols comprising from 1 to 10 carbon atoms, said alcohols being used in H_2SO_4 solution at a
20 concentration of between 5% and 20% by weight.
4. A method for preparing a synthetic fuel and/or synthetic components for fuels as claimed in claim 1, characterised in that the esterification is effected with olefins comprising between 2 and 10 carbon atoms.
- 25 5. A synthetic fuel and/or synthetic components for fuels when obtained by the method of the preceding claims.
6. A fuel obtained by mixing synthetic fuel and/or the synthetic

components for fuels, when obtained as claimed in claims 1 to 4,
with a product chosen from:

- a) medium petroleum distillate;
- b) medium distillate from coal hydroliquefaction;
- 5 c) coal pyrolysis product, and in particular the mixture of benzene,
toluene and xylenes;
- d) fuel oil of petroleum origin;
- e) mixture of aromatic hydrocarbons;
- f) mixture of C_1 - C_{10} aliphatic alcohols.