

ALIEN PROPERTY CUSTODIAN

METHOD OF MANUFACTURING FATTY ACIDS, ALDEHYDES, CETONES AND ALCOHOLS

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The present invention relates to the performing of various methods, among which methods of fermenting, besides others that described in the French Patent Application No. 12722 filed January 16, 1941 utilizing the known treatment (alkalines or terreous alkalines and acids) of cellulose-like substances, in view of obtaining an ensemble of products (fatty acids, alcohols, cetones, aldehydes, lignin, coal and combustible gas) with a maximum of profit.

A course to be followed for the treatment of the cellulose-like substances by the method is given hereafter by way of example but not for limitation:

(1) The cellulose-like substances are attacked by an alcali, for instance the lime. This attack can be made either at ordinary pressure, at temperatures less than 100° C or under pressure. The duration of the operation depends from conditions of pressure and temperature and varies from a few hours for the treatment under elevated pressure to a few days for the ordinary pressure.

This first treatment can be preceded by an extraction, under vapor pressure or by solvents, of certain essences (tannins, resins, gums, etc.) contained in the cellulose-like substances. These extracts can be concentrated and find known utilizations as chemical products or be subjected to a fermentation (lacto-butyric and cellulolytic) alone or mixed with the other fermentable substances derived from the cellulose in conformity with another patent specification.

(2) That portion (cellulose) which is not dissolved by the preceding treatment is separated by filtration, treatment in a hydro-extractor or any other known separating means.

(3) The cellulose thus separated can be sugared by means of concentrated or dilute acids at atmospherical pressure in a simplified cheap apparatus of easy construction (wood-trough for instance) or at elevated temperature and pressure and by known methods (filtering apparatus or rotatable digester).

(4) The saccharifying finished one neutralizes by a suitable agent, for instance carbonate of calcium or of baryum and filters for separating the musts from the precipitated sulphate.

(5) To the sugared musts are added substances conveyed in their soluble conditions at the first operation, containing in solution, among other substances, the sugarates and lignates of lime, then submitted to the lacto-butyric and cellulolytic fermentation (see French Patent Application No. 12722 of January 16, 1941) in view of the

manufacture of organic acids. This fermentation sensibly increases the profit as to weight and economy of the treatment of the cellulose-like substances. It is to be noted that this fermentation can be preceded by the ethylic or acetone-butyric fermentation in clear or troubled musts for submitting hereafter the residues of distillation to the lacto-butyric and cellulolytic fermentation.

During this fermentation important quantities of carbonic acid and hydrogen are gained.

(6) The residual lignin is subjected to the pyrogenation or to the alkaline fusion by known processes.

(a) The pyrogenation of 100 kg of lignin has given the following products:

- 56 kgs 500 of coal
- 14 kgs 400 of tar
- 0 kg 910 of acetic acid
- 0 kg 280 of cetone
- 10 kgs of water
- 17 kgs 910 of gas composed of—
 - 3 kgs 020 of CO₂
 - 10 kgs 170 of CO
 - 4 kgs 300 of CH₄
 - 0 kg 420 of C₂H₆

(b) The alcalin fusion of the lignin at 300° C with potash or soda transforms a great portion to ulmic acid—very interesting as manure—and in various organic acids. Here a few profits obtained from 100 parties of lignin treated with either by the soda or by the potash:

	By the soda	By the potash
Ulmic acid.....	40, 4	38, 6
Volatil acid.....	8, 4	8, 9
Adipic acid.....		1, 2
Oxalic acid.....	3, 7	
Succinic and phenol carbonic acid.....	11, 6	10, 1
Products insoluble in alcohol.....	16, 2	7, 7
Volatile oils.....		0, 6
Carbonic acids.....	16, 9	

(c) The lignin is firstly subjected to an alkaline hydrolysis and converted in the soluble condition, in the form of soda lignate. After concentration salted lime is added and dry distillation at 400° is performed. The lignin resulting from one ton of wood will give the following products:

- Methyl alcohol..... 9 kgs
- Cetones..... 22 kgs 500
- Aceton oils..... 7 kgs

(d) A modification of the process described in (c) consists in treating the lignate of soda at

a temperature of 250-300° C in a closed vessel and to recover the volatile products, the tars and the acetate of lime.

Thus the lignin derived from one ton of wood furnishes:

	Kgs
Methyl alcohol -----	10 to 15
Tar -----	125
Soda acetate -----	80 to 125

Another method of operating can consist in 10
subjecting, for instance, the cellulose-like sub-
stances to a hydrolysis acid by known means; the
sugars converted in their soluble condition and
the insoluble extract of the hydrolysate can form
the object of diverse fermentations. 15

With this method of operating besides of sugars
and their derivates, the destruction products of
the sugars (furfurol, acetone, acetates, humates
and formation of lime) are obtained. The prod-
ucts of the diverse fermentations furnish ethylic,
butylic, isopropylic alcohols, the cetones, the hy-
drogen and carbonic acid.

It should be noted that the hydrogen of fer-
mentation can, besides other matters, serve for
the hydrogenation, by known means, of aldehydes
and cetones and, especially, to the hydrogenation
of the furfurol.

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