

# Standard Oil Company (Indiana)

## INFORMATION DIVISION TRANSLATION T47-13

API-TOM Reel 40, Frames 212-215

Target 3453-30/501-23 Item 23

To: Prof. Martin et.al.

Concerns: Purification of Primary Naphtha from Alcoholic Constituents by Passage of the Vapor Over Alumina and Jointly the Preparation of Oils.

In connection with the report of Diplom.-Ing. Clar of June 1, 1942 concerning the preparation of oil from primary products of the naphtha - pressure synthesis by pretreatment over aluminum hydroxide, I present attached a sketch for the execution of the technical arrangements. At full charge of 25000 t. cycle naphtha per year = 3 t/hr = 4.2 cbm, a catalyst space of 4.2 cbm is required. The temperature in the catalyst space must be regulable between 240 and 320°C. As catalyst an aluminum hydroxide comes into question. The preparation of the catalyst could be undertaken in the catalyst works of the I.T. plant, since the aluminum oxide must have the same nature as the aluminum oxide for the hydration, in any case: as far as measurements have been carried out until now. The charging of the product should appropriately flow by way of a heat exchanger. The product can then be drawn off by way of a cooler and water separator. 40-50 l. of water per hour fall into the water separator. One should figure on a settling time of ca. 2 hours in the separator since the naphtha must be used very dry for the oil synthesis. Since the catalyst chamber standing available in practice is intrinsically larger than is required for the process, one will fill it approximately with only about 4-5 cbm. According to the existing determinations, a longer stay in the empty space does not harm the naphtha, since the temperature here amounts to only 300°. The catalyst chambers can go for about 10 to 15 days without requiring to be burnt out. After this time about 5 to 6% of carbon calculated on the catalyst have deposited. With this carbon formation, the catalyst becomes inactive. A certain difficulty exists in the burning out of the catalyst. If the catalyst were burned with air without further ado, there would be obtained (mathematically) a temperature increase of about 1900°, thus up to 2200°C. It therefore becomes expedient to carry away the resulting heat with large amounts of flue gas. For this reason I propose the following arrangement:

The flue gas is conducted through catalyst chamber 2, by the ventilator, 1, while catalyst chamber, 3, is in operation for the dealcoholization. The flue gas leaving chamber 2 goes through an after-burning chamber, 4, in which incompletely burned portions of the catalyst coating are after-burned, whereby an additional firing with gas is provided. The gas, so purified of tarry constituents goes through the automatically adjustable throttle damper 5 to the ventilator 1. A branch stream goes before the throttle damper to the spray cooler, 6, and is here cooled with direct sprayed water. The amount conducted through 6 is controlled by means of a temperature regulator to the adjustable throttle damper. The open air suction nipple 7 sits in front of the ventilator. Here a certain amount of fresh air is sucked in, which serves to supplement the combustion air. The amount of fresh air is controlled through the temperature in the catalyst chamber, in that this temperature opens the exhaust valve 8, out of which the combustion

gas can escape. This arrangement should provide every desired safety. If one counts upon a permissible temperature rise of 80°C, the necessary amount of air is obtained from the following considerations:

There is 4.2 cbm of catalyst in the oven. At a pouring density of about 0.5 that corresponds to 2.1 tonnes catalyst. At 6% carbon deposit the amount of carbon eliminated amounts to about 120 kg. If one figures the amount of carbon with a heat of combustion of 9000 heat units, one gets a total heat of combustion of 1,080,000 heat units, which have to be carried away with air. At the permissible temperature rise of 80°C, one cubic meter of air can transport  $0.35 \times 80 = 28$  heat units, consequently about 40,000 cbm of air are required for 1,080,000 heat units. If one calculates 50 hours regeneration time,  $40,000:50 = 800$  cbm air per hour are to be circulated. The circulatory oxygen concentration results automatically in this arrangement by means of the temperature detector built into the reaction chamber.

(In original two rough flow diagrams follow.)

"Reinigung des Primärbensins  
von alkoholischen  
Bestandteilen durch Überleiten der Dämpfe  
über Tonerde und anschliessend die  
Herstellung von Qian".  
Ruhrochemie Aktiengesellschaft  
Oberhausen-Holten  
June 4, 1942  
2 pages, 2 illustrations.

Requested by R.F. Marchner  
Translated by H.J. Cohen and C.C. Miller -  
Feb. 8-13, 1947