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W. H. Sternberg
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IS GAS CIRCULATION OR FOAMING REACTORS BEST SUITED FOR THE SYNOL METHOD?

By Dr. Michael

Small scale experiments have shown that the synol catalyst operates very well in gas circulation reactors. Quantitatively the uniformity of the product has not as yet been fully reached, but it is certain to be reached in the future. The time of residence in the reactor can be further reduced (under otherwise similar conditions which is some 30 percent greater than a direct pass reactor), which can be obtained by a more rapid passage or by a cold circuit which will eliminate the high boiling constituents. The space yield of the circulating reactors should be equal to those of the direct pass reactor. Power required for the circulation is equal to 0.2 - 0.3 kw/kg of the products formed, with an efficiency of 50 percent.

We cannot recommend, however, the re-circulation reactors for a large scale test, because it doubtlessly

fails to guarantee perfect flow conditions. This problem is not of such critical importance when operating at lower temperatures than at temperatures above 300°C; one must nevertheless assume that a local super-heating will take place even at lower temperatures after some time. The stage converter described in the report of June 26, 1939 (T-434), and consisting of several systems connected in series in a vertical cylinder embodies circulation through returning the gas from the bottom system to the upper one. Unfortunately this arrangement has never been tested, we can count on no known difficulties on the strength of our past experiences, but designing without a previous test is always risky.

We may claim the reverse for the foaming process, namely that no risk is connected with carrying it over into large scale operations, but the past experiments have not as yet produced products sufficiently similar with the synol products. The fact that operations cannot be conducted at 195°C and the temperature must be raised to 210°C to obtain a satisfactory yield must be considered as of smaller importance, because no excessive temperatures are possible in the liquid phase, such as one may deal with in the vapor phase, and which probably always occur locally, as proven by the higher gasification

obtained in the vapor phase than in the liquid phase. One might therefore consider it possible that liquid phase operations at 210°C will result in chemically comparable conditions with vapor phase operations at 195°C.

The foam plate reactor is constructively so simple, that the simplicity can hardly be improved. It consists essentially of an outside liquid phase circuit to produce cooling and an upward flow of the liquid inside the reactor which will maintain the catalysts in suspension. It is therefore of no importance whether the space-time yield is 0.15 or more Since this will require an increased number of empty cylinders it will effect the total costs but very slightly.

The question whether the foam process can produce a high grade of synol product should be answered in the near future.

/s/ Michael

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