

Gelsenkirchen-Norst, July 7, 1942.

Comparison of Coal Hydrogenation Units with  
Respect to the Starting of the Hydrogenation Reaction.

The rate of temperature rise in the first reactor is of prime importance for good results in the operation of the hydrogenation units. The faster the reactor reaches its maximum temperature, the longer will be the residence time at this temperature and the higher the conversion of solid matter (coal throughput) and the lower the asphalt content.

The effect of distillation in the separator, due to temperature differences in the last reactors, is so great that no unambiguous conclusion can be drawn concerning the relation between the percentage of sludge separated and the start of the reaction.

The temperature rise in the second section of the preheater is quite considerable which indicates that an appreciable part of the total heat of reaction is liberated here which assists heating from the outside. The efficiency of the preheater which results in high inlet temperatures for the coal paste is an important factor for the satisfactory operation of the hydrogenation unit.

Gelsenkirchen-Horst, April 13, 1943. Shutdown and Inspection of Unit 706.

The unit was shut down on April 7, 1943 after an on-stream time of 483 days. The preheater hairpin tubes had been in operation for an average of 769 days. All preheater hairpin tubes were exchanged for reconditioned ones (cleaned and heat treated at Leuna).

Inspection showed a coke deposit in the third converter which filled about half of the converter diameter and extended to a height of about 1.5 feet; the deposit was located about 49 feet from the base of the converter. The reason for this deposit probably can be found in the temperature rise in the converter to a maximum of 27.5 mV (probably about 975°F.) on January 18, 1943. The lining was ruptured at the seams in various places.

A coke deposit filling almost the entire diameter of the liner and extending to a height of about 1.8 feet was found in the separator. The inlet funnel space was free from coke, with the exception of a piece extending into it from the top. The coke deposit has formed, therefore, in the "foam zone" which is not cooled by the hot recycle and it has grown further in the hot gas section.

The temperature during its formation must have been around 1238°F. according to the percentage of volatile matter in the coke (7.4%).

It is not impossible that elimination of water cooling, together with the strong reduction of the through-put to 16.5 tons of coal paste, together with power failure, have started coking.

Considerable deposits of coronens were found in the condensers, the headers and the separator lines, amounting to 80% of the diameter.

Gelsenkirchen-Horst, March 27, 1943

MEMORANDUM ON THE RELATION BETWEEN HIGH-PRESSURE OPERATION OF THE HYDROGENATION UNIT AND THE OPERATION OF THE SLUDGE CENTRIFUGES.

The effect on the centrifuge plant of different variables in the operation of the hydrogenation units can be summarized as follows:

(1) The addition of about 20% of coal from other sources to the regularly used coal was without effect on the centrifuging properties of the sludge.

(2) The effect of the partial pressure of hydrogen in the range of 540-570 atm. (7940-8375 psi.) on the asphalt content of the sludge was smaller than the effect of the residence time (throughput) and the quality of the recycled pasting oil. Consequently, there is no effect of the hydrogen pressure on the centrifuging operation.

(3) The number of flushings occurring in the centrifuge plant has no connection with the chemical reaction at high pressure. It can, however, be shown that their sudden increase is related to changes in the operation of the coal chambers. The change-over from pasting oil to coal paste or the injection of cold paste is especially noticeable, whereas reversal of this sequence was without effect probably because it could be carried out more rapidly. During uninterrupted operations no detrimental effect of the injection of cold paste could be noticed. Obviously, the content of solid matter is strongly reduced by an increase in flushings so that often overlapping of effects can be found.

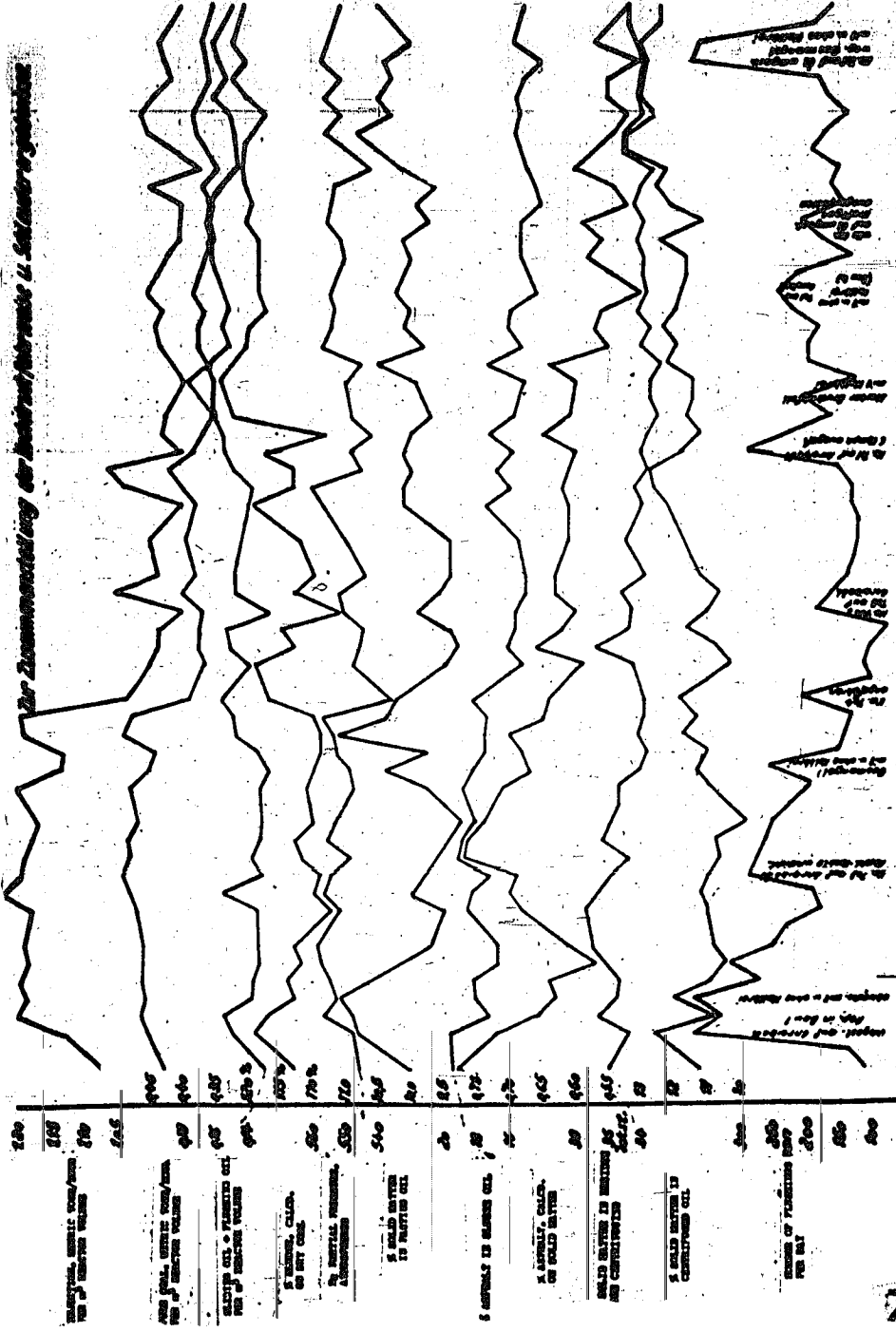
(4) The space velocity in the hydrogenation chambers has the greatest effect. At higher throughput rates better centrifuging results are obtained in spite of a higher asphalt content. Because of the higher temperature caused by the higher throughput rate the ratio of asphalt to solid matter or total heavy oil is higher. The cause for the improvement of the centrifuging results should not be with the asphalt or, at least, not immediately. It is not improbable that the quality of the heavy oil produced or a change of the colloid-chemical conditions are of importance.

(5) The effect of the asphalt content of the sludge is noticeably smaller. At the same high temperatures and high throughput rates of the chambers, however, a decrease in the asphalt content results in improvement of the centrifuging results and improvement in the quality of the pasting oil which further reduces the tendency to asphalt formation.

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*Die Zusammenstellung der Industrie/Aktienwerte u. Sekundärproduktions*

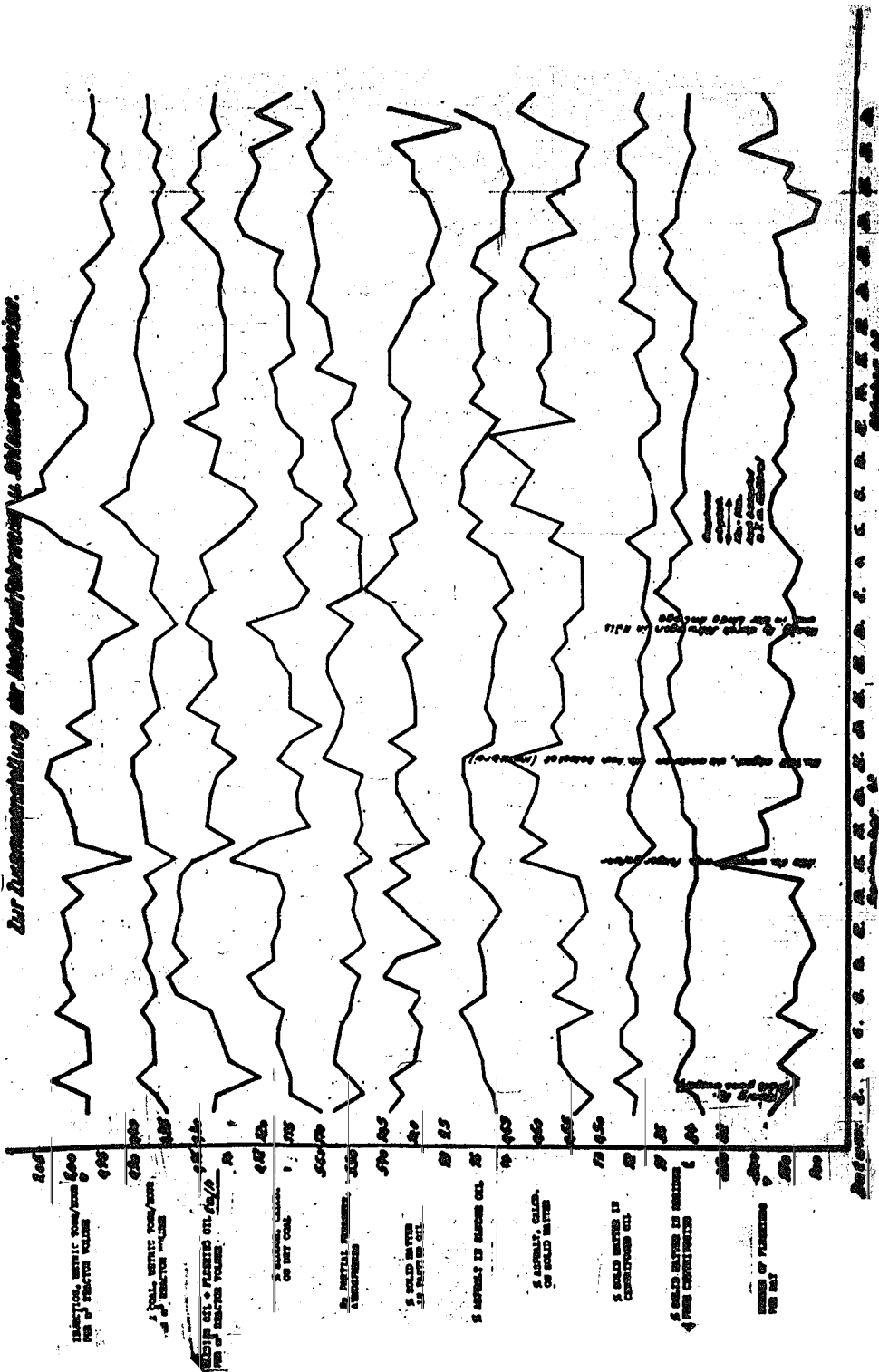
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Zur Zusammenstellung der Metallaufarbeiten u. Schlackenaufarbeiten



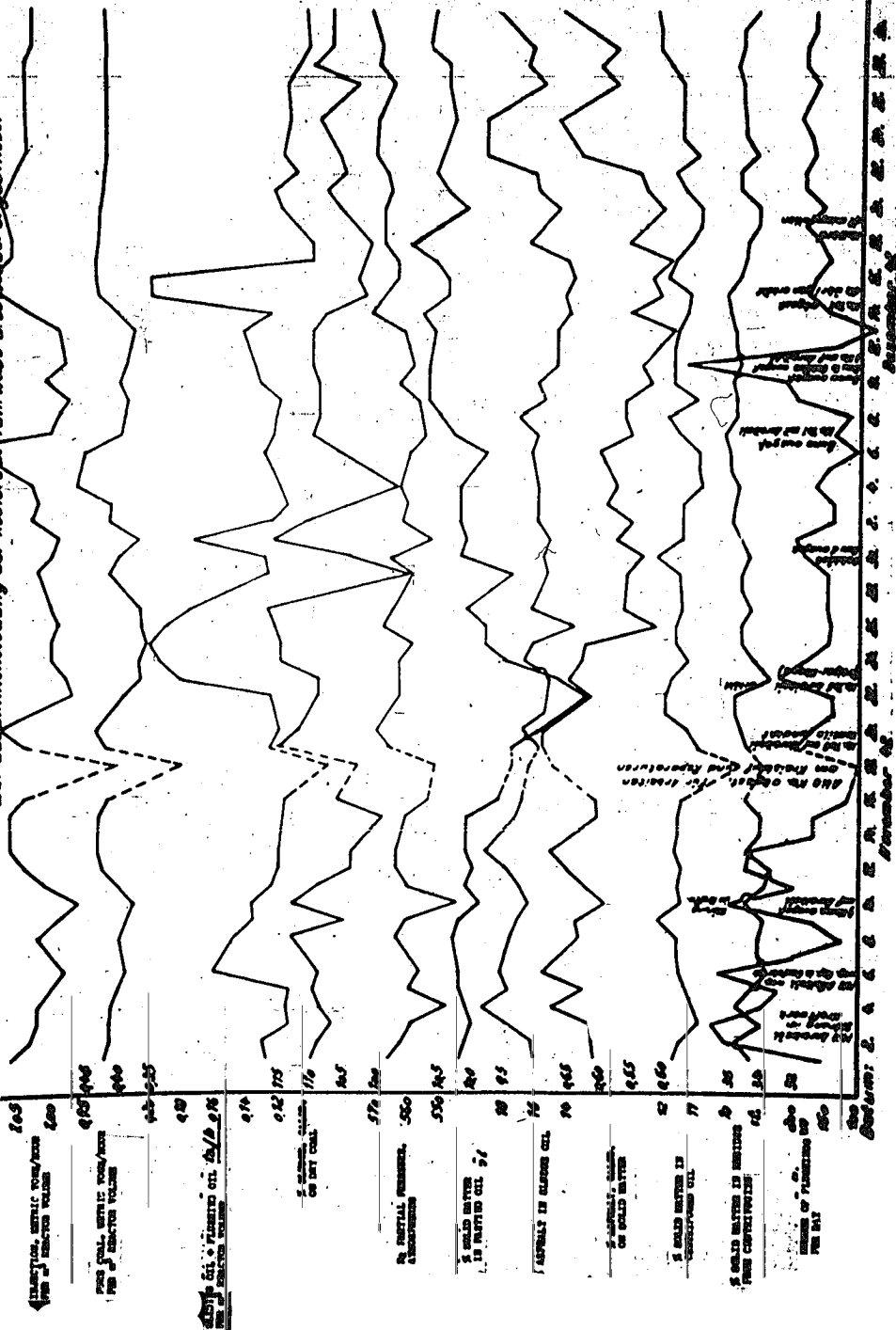
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Zur Zusammenstellung der Neutronen-Fahrweise u. Schwadernergebnisse.



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