

ADDRESS NAVY DEPARTMENT,
BUREAU OF SHIPS

Section 341

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NAVY DEPARTMENT

BUREAU OF SHIPS

WASHINGTON 25, D. C.



14 December 1945

Subj: Microfilm of German Technical Documents - Introductory Statement for.

1. During the course of its field trips to examine German synthetic oil plants and to interrogate German technical personnel, the members of the Oil Team of the U.S. Naval Technical Mission in Europe obtained a number of technical documents for examination. Some of these documents were directly related to certain subjects in which immediate reports were desired and were incorporated in Technical Reports as microfilm appendices. Other documents, while probably of equal technical value were, due to limitations of time and translation facilities, saved for more detail study and examination. These latter documents have been indexed and microfilmed by the Bureau of Ships to preserve the technical information therein for future use and to make possible the dissemination necessary to give each activity an opportunity to study the particular topics of interest to it.

2. The documents in this series cover a variety of subjects. They are not arranged in any particular sequence, but have been separated arbitrarily into sections of a convenient size. An index to each section has been prepared and appears at the beginning of the appropriate section. In addition, the indexes of all sections have been photographed at the beginning of the first reel.

3. The contents of this film are not to be taken as a complete record of the information on any subject obtained by the U.S. Naval Technical Mission in Europe. Rather, reference should be made to the complete set of films which have been prepared by the Bureau of Ships if it is desired to review all the data available.

4. The Bureau of Ships, Research and Standards Branch, would appreciate receiving, for its technical files, a copy of any translations made of these data.

T. A. Solberg

T. A. Solberg
By direction of
Chief of Bureau

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In A Paper Bag Identified As
FT Flow Sheets and Equip. Details

1. Extract from "Treatises on coal /carbon/ Vol. 11" 41.
Investigations on the conversion of carbon monoxide and carbonic acid into methane with increased pressure. 4 pgs. 1931 Hydrogenation of carbon monoxide contained in coke gas into methane. Conversion of the carbon monoxide of a mixed gas (rich in carbon monoxide) into methane. Influence of various materials on the formation of methane.
2. Report on work on hydrocarbon synthesis Leuna Werke - Synthesis experiments with iron catalysts. 25 pgs including some graphs and tables March 1940, Dr. Wintzer.
3. Basis of the Oppau pressure conversion 6 pgs and 1 flow diagram. Oppau Co. 6 Jan. 1941.
4. Report on the hydrocarbon synthesis experiments in Leuna. Marked "Incomplete" in English on the cover. Feb. 1939. Covers laboratory work, some technical experiment theory, proposed projects and experimental oven construction types. 26 pages including some graphs calculations and illustrations.
5. Drawing # M3797 22 Nov. 1940. Flow diagram - arrangement for KW SY experimental installation Me458. Ammoniakwerk.
6. Drawing # M3369-1 30 May, 1940. Flow diagram: K.W. Sy experimental installation about 750 teta.

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7. Drawing # D Sam 103 undated 2 copies. Flow diagram: Medium pressure synthesis of hydrocarbons LURGI cycle process.
8. Drawing # D Sam 101 undated 2 copies Flow diagram: Medium pressure synthesis of hydrocarbons LURGI Cycle process, (gases rich in CO and using conversion gas).
9. Scale drawing # 45105 Test contact oven (Rheinpreussen) 28 Nov. 1944 Proposition I.
10. Scale Drawing # 45099 10 Nov. 1944 Test contact oven - Rheinpreussen.
11. Drawing # 200/57 26 June 1942, Contact oven installation.
12. Scale Drawing # 45179 29 June 1943. Arrangement of tubes in test contact oven.
13. Drawing # ODS/469 LURGI undated. Arrangement of iron catalyst experimental unit. Flow diagram.
14. Scale Drawing # M7445-2, 29 June, 1940. Ammoniakwerk Experimental installation for 750 Talo Ma458. Flow diagram.
15. Drawing # ODS666 15 May, 1944. LURGI Arrangement of complete cycle - Flow diagram.
16. Scale drawing # OFT/147. 7 May 1941 - LURGI contact oven 300 mm NW.

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17. Scale drawing #4588 15 Sept. 1941 External view of all the tubes and base with 61 holes.
18. Drawing # N2725-1 Scale drawing of a catalyst chamber. 16 May, 1939.
19. Scale drawing # 26136 Boiler support 11 June, 1942.
20. Drawing D Sam 104 Undated. Flow diagram. Medium pressure synthesis of hydrocarbons. LURGI cycle diagram.
21. Drawing # 71-120 (Krupp # 072530/1c) Fuel plant chamber with tubes 24 May, 1945.
22. Scale drawing # C670d. IG. Farben. Pressure converter. 28 Dec. 1943.
23. Scale drawing # C679 28 Nov. 1941. Pressure converter I.G. Farben. Evaporator.
24. Scale drawing # C671 24 Oct. 1941. Arrangement of auxiliary rings in evaporator. I.G. Farben.
25. Scale drawing # 684a I.G. Farben. 8 Dec. 1941. Experimental evaporator NW 250. Oxygen contact.

00203-00275

00203

1. "Production of acetophenone, synthetic resin AP, crotonic acid, crotonic acid butyl ester, and softening agent III, Hüls Chemical works, three pages with translation, and three drawings, 22 May, 1945.
2. "Flow diagram for manufacture of acetophenone synthetic resin," Hüls Chemical works, three charts, 22 April, 1945.
3. "Hydrogen apparatus," Hüls Chemical works, products of of the decomposition of raw gas" by an electric arc, 25 May, 1945.
4. "Ethylene apparatus," Hüls chemical works, an apparatus for producing pure ethylene from raw ethylene and hydrated ethylene, 25 May, 1945.
5. "Coke gas apparatus," Hüls Chemical Works, percentage decomposition of coke gas by an electric arc method, 25 May, 1945.
6. "Acetylene production, soot manufacture, and low pressure gas purification," Hüls Chemical Works, 4 pages, 25 May, 1945.
7. "Hüls Chemical Works," production chart showing raw materials, intermediate products and final products (buna and by-products).

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8. "The production of coke-electrodes for the aluminum industry," Leuna Werke, 2 pages, 21, 12, 1943A
9. "Soot production," Leuna werke, 5 pages with chart, 19 May, 1939. (2 copies).
10. "Cost estimate of a soot-production plant," Leuna Werke, 1 June, 1939.
11. "Over-all chart of hydrogen boxes 1-5, Hüls Chemical Works, Chart # 460-4a.
12. "Chart of the Hüls ethylene plant," Hüls Chemical works, Chart #4b, 4 Aug. 1943.
13. "Working plan of a nitrogen apparatus," I.G. Farben industries, Chart # ~~73~~, 47.5-4c, Linde air fractionization.
14. "Flow sheet of gas decomposition," Hüls Chemical works, Chart # 4, 21 April, 1945.
15. "Ethyl benzol production," Hüls Chemical works, two pages with chart # 12, 22 May, 1945.
16. "Styrol production," Hüls Chemical works, chart # 13, 21 April, 1945.
17. "Discription of acetylene hydrogenation Hü 662," Hüls Chemical works, 2 pages with chart # 6, 22 May, 1945.

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18.

"Tatarinow acetylene production," Leuna-werke,
2 pages, 15, Feb. 1944.

19.

Two graphs and miscellaneous reactions dealing with
acetylene production, Leuna-werke.

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Part 3

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① "Central heating and Ruhr foundry coke," Rheinisch-Westfälisches Kohlen-Syndikat, pamphlet of 48 pages.

② "The Ruhr Coal in the Bakery," Rheinisch-Westfälisches Kohlen-Syndikat, pamphlet of 24 pages.

③ "Ruhr Coal in gas production," Rheinisch-Westfälisches Kohlen-Syndikat, pamphlet of 46 pages with charts.

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1. "Entrance duct on the lower cover of a tar oven,"
Braunkohle-Benzin A. G., no. FA 322-2, Aug. 18, 1944,
scale drawing.
2. "Regenerator," Mannesmannröhren works, no. RW1769.1b
Nov. 23, 1935, scale drawing for Braunkohle-Benzin,
A.G.
3. "Tube bundle for 600 ϕ Regenerator," I.G. Farben
Industries, No. N564-2, June 7, 1937, scale drawing.
4. "Gas phase converter, 1000 ϕ 15 m. assembly,"
Mineralöl-Baugesellschaft, No. 2338-1, Dec. 8, 1937,
scale drawing.
5. "Gas pre-heater Ka.5," Technisches Büro, No. 1781,
Dec. 18, 1940, thermo-diagram.
6. "1000 ϕ gas phase converter," Gewerkschaft Mathias
Stinnes, No. 2228-1, Sept. 7, 1937, scale drawing.
7. "1200 ϕ 12 m. forging," I.G. Farben Industries, No.
N538-1, scale drawing.
8. "Angle Valve," Braunkohle-Benzin A.G., No. A1929-2
Feb. 24, 1944, scale drawing.
9. "16 ϕ stem for angle valve," Braunkohle-Benzin A.G.,
No. FA-1547-4, Jan. 30, 1945, scale drawing.

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10. "Angle valve 58 ϕ , water cooled," Braunkohle-Benzin, A.G., No. FA1522-4, Jan. 24, 1945, scale drawing.
11. "10 ϕ angle valve, water cooled," Braunkohle Benzin A.G., No. FA 1523-4, Feb. 7, 1945, scale drawing.
12. "10 ϕ Check valve," Braunkohle Benzin A.G., No. FA-1530-4, Jan. 24, 1945, scale drawing.
13. "Complete set of drawings on H.P. valve," I.G. Farben industries, No. NB 2827-2, Jan 21, 1945.
14. "Slime-free valve," Braunkohle-Benzin A.G., No. A1496-2, Mar. 31, 1943, scale drawing.
15. "Experiment valve for H-K Slime freeness," Braunkohle-Benzin A.G., No. A1494-2, Mar. 27, 1943, scale drawing.
16. "Expansion valve," Braunkohle-Benzin A.G., No. 181-2, May 7, 1935, scale drawing.
17. Diagram of the distribution of the reduction machine 500-2250," Braunkohle-Benzin A.G., No. A383-8, April 16, 1935., for Böhlen works.
18. Diagram of the reduction machine, Braunkohle-Benzin, A.G., No. A343-8, Nov. 5, 1936, for Böhlen works.
19. "Pressure Regulator, pistons 205 ϕ ," Leunawerke, No. 953(7), Aug. 29, 1938.

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20. Central reducer, tar and gasoline, for 300 atu working pressure," Braunkohle-Benzine A.G., No. IZM126-2, Sept. 26, 1940, scale drawing.
21. Gas cooler of two-chamber gas phase converter," Mineralöl - Baugesellschaft, No. 2273-1, Sept 25, 1937, scale drawing.
22. "Lower thrust expander," Braunkohle-Benzin A.G., No. A822-1, Sept. 20, 1943, scale drawing.
23. "Upper part hot separator," Braunkohle-Benzin, No. A832-1, Nov. 17, 1943, scale drawing.
24. "Shell for 600 ϕ regenerator," I.G. Farben Industries, No. N4022^I-2, Nov. 20, 1937, scale drawing.
25. "Bottom closure 600 ϕ regenerator," I.G. Farben Industries, No. N4563-2, June 22, 1937, scale drawing.
26. "Grids for catalyst," Braunkohle-Benzin A.G., No. A950^a-4, Nov. 16, 1944, scale drawing.
27. "Slurry phase inlet," Braunkohle-Benzin A.G., No. A975-4, Dec. 13, 1940, scale drawing.
28. "Lower oven cover," Braunkohle-Benzin A.G., No. A955-4, Sept. 25, 1940, scale drawing.
29. Drawing # N4265⁸-2 I.G. Farben. scale drawing - Bottom Head 600 ϕ Regenerator. 21 April, 1938.

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30. Drawing # RW 1769.3a Braunkohle-Benzin scale drawing
"upper oven cover" 14 Nov. 1938.
31. Drawing # R.W. 1769.4b Braunkohle-Benzin. Scale
drawing - Lower cover 21 Nov. 1938.
32. Drawing # 76-4 Braunkohle-Benzin scale drawing - 600 ϕ .
Funnel Neck. 29 Mar. 1935.
33. Drawing # 150-2 Braunkohle-Benzine scale drawing -
Lower Funnel Neck 600 ϕ 29 Mar. 1935.
34. Drawing # 206-2 Braunkohle-Benzin scale drawing -
Lube bundle 600 ϕ .
35. Drawing # 72-4 Braunkohle-Benzin scale drawing -
Lower tube sheet. 1 Mar. 1935.
36. Drawing # 75-4 Braunkohle-Benzin scale drawing -
Lower head and inlet and outlet tubes.
37. Drawing # 1138-4 Braunkohle-Benzin scale drawing -
Tube support, July 27, 1937.
38. Drawing # A36-16 Tube for tube bundles. Braunkohle-
Benzin, scale drawing, 6 May, 1935.
39. Drawing # A27-1, Braunkohle-Benzin, Regenerator
Assembly 600 ϕ , scale drawing, 24 May, 1935.
- 40-41-42 Unlabeled drawings.

00861-01225

NOTE BOOK

00861

Notebook containing "Experience Exchange" Conference Reports of the Ruhrchemie AK from the file of Dr. Braune on Fischer-Tropsch Synthesis.

1. Session 14 - 2/7/38 Mostly on gas purification 11 pgs.
2. Session 13 - 1/7/38 Activity of catalyst 10 pgs.
3. Report by Dr. Weingawrtner on Gas Purification and life of catalyst Jan. 4, 1938 9 pgs (2 copies). (1 copy)
4. Report by Dr. Steinbrecher on "The Influence of Synthesis gas and its purity on the life of the catalyst (according to a laboratory investigation) 1/5/38; 6 pgs. (2 copies). (1 copy)
5. Report by Dr. Weingaertner "Gas Production in the Synthesis Process". 1/27/38; 9 pgs.
6. Session 12 12/6/37 9 pages Topics -
1- Gas Purification, 2- Catalyst Quality, 3- Chamber Discharge
4- Catalyst Distribution.
7. Session 11- 11/5/37 9 pgs.- Topics as in Session 12.
8. Session 10 - 10/1/37 6 pgs - Topics as above.
9. Session 9 - 8/27/37 7 pages Usual topics.
10. Session 8 - 7/30/37 10 pgs - Usual Topics plus an exact analysis of 4 F-T gasolines.
11. Session 7 7/2/37 9 pages Usual Topics.
12. Session 6 - 5/21/37 12 pgs - Usual Topics plus comparative monthly data sheets.
13. Session 5 - 4/23/37 13 pgs. Usual Topics A graph of -
"Influence of Oxygen Content on Gas Purification".
14. Session 4 - 3/22/37 8 pgs. Usual Topics Includes graphs.

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15. Session 3 - 2/5/37 9 pgs. Usual Topics.
16. Session 2 - 1/5/37 13 pgs. Usual Topics.
17. Session 1 - 11/27/36 7 pgs. and a second report of 19 pgs.
(3 duplicates) on the usual topics.

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The Wesseling Fuel Installation and its operation from 1941-1944.
A complete summary of Activities.

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NOTE BOOK

Patent Application of Ruhrchemie on the Subject of CO-Hydro-
genation -

A collection of patent application on the Fischer-Tropsch
Synthesis dating from 1941 through 1944. These patent application
are generally not available in the U.S. Some 80 patents are listed,
most of them are complete others merely listed with patent claim.

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BOOK OF STANDARDIZED
GLANDS & PACKINGS
FOR PUMPS AT LEUNA

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In A Paper Bag - Identified as

AVIATION GASOLINE - GENERAL ALKYLATION

AT-ET, DHD, KK.

1. Preparation of High Fuels from 5058/6434 Gasoline -190°C.
from Scholven - after the method of D.H.D. Aug. 28, 1942.
9 pgs. (High Pressure Experiment Lu 558).
2. The working up of Zeitzer TTH-Gasoline to High Performance
Fuel after the method of DHD Oct. 23, 1943. 8 pgs.
(High Pressure Experiment Lu 1).
3. Overall cost figures for automobile Gasoline and DHD
preliminary product from coal in a Lu-Op. Plant
11/4/42. 12 pgs.
4. Testing of DHD-catalyst on clay from Oppau and clay
from Dr. V. Funer. 2/4/1942. 16 pgs.
5. A letter dated June 3, 1942 concerns DHD Gasoline making.
Include two flow sheets of the methods.
6. Quality of DHD-Gasoline from "estnischen". Shale Oil
9/19/41
7. Possible operating Date and Capitalization of the DHD
Plant Jan. 30, 1943.
8. File Notice of a meeting in Berlin on 2/18/44 concerning
various problems of gasoline and lubricating oil. -
2/18/44.

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9. DHD-Balance Sheet 2/17/44.
 10. A chart showing yields and properties of aviation gasoline from different methods.
 11. Production of DHD-Gasoline from 5058 pre-hydrogenated Gasoline from Merseburg. Hydrogenation 11/1/41. I.G. Farben. Ludwigshafen) 9 pgs / 12 tables / 5 drawings.
 12. AT244 - Exchange of Experience conference - May 14 and 15, 1944 at Leuna. contains a summary of the conference on T-52 Process and 18 papers delivered at the conference. (204 pgs.)
 13. Scheme for the Redistillation of DHD Gasoline Drawing # M8626(2)-4 A flow sheet.
 14. AT-Catalyst Plant at Heydebreck Feb. 10, 1943 contains a report on production of active clay. 10 pgs.
 15. Flow Sheet of the AT (activated clay) plant - 1941.
 16. Report of visit to Leuna by V. Costeanu. 7/2/44. Contains report on the various process of making aviation fuel. The report includes flow sheets and drawing.
 17. File notice - Leuna works - May 2, 1944 - Auxiliary drying the dehydrogenation catalysts at the AT Plant with Isobutane.

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18. Productuon of high anti-knock isopariffin Fuels by means of alkylating alephatic Hydrocarbons - Dr. Pohl. Leuna 1/6/43. 33 pgs.-drawing and graphs.
19. HV-CRI - Catalysts for catalytic bracking - April 17, 1939 - I.G. Farben. 23 pgs.
20. Catalytic Gracking in Fixed Bed - Report on the K. K. Experimental Plant Me56 at Leuna - Dr. Pobloth. Sept. 1943 (Report # 414 of the Experimental Laboratory) 17 pgs. / flow sheets and diagrams.
21. Experiment and theory of Catalyst Regeneration by the Catalytic Cracking-Sluice Method - Otto. Aug. I, 1943. 33 pages plus 27 pgs. of flow sheet drawings.
22. Catalytic cracking - according to the conditions of June, 1942 - Leuna July 27, 1942. Investigation of catalyst regeneration in moving bid chamber and Fixed Bed Chamber - Otto.
23. Delivery Specification for "Arobin".
24. The determination of normal paraffins contact in Gasoline, Middle Oil and Parraffins - Dr. Leithe - Aug. 2, 1940 - Oppau 7 pgs / tables.
25. Kybol-Plant - June 2, 1942 Ludwigshafen Report covers the plants for the production of propyl-gasolines from propane and the making of Kybol from Ethylen and Propylene.

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26. Aromatization of Middle Oil from Bituminous Coal Liquefaction. April 10, 1941. 12 pgs.
27. Technical Possibilities of Increasing Aviation Gasoline Production - Sept. 23, 1943 Berlin 5 pgs.
28. Gas Explosions - W. Jost - A reprint from Zeitschrift J. Electrochemie 47, 680-87(1941).
29. Experiments on Flame Velocity I. concerning the theoretical calculation of Flame Velocity- W. Jost and L. V. Muffling. A reprint from "Zeitschrift & Physikalische Chemie (A)" 181 208-14, 1938.
30. The Physical-chemical Basis for combustion in Engines - W. Jost - Reprint from Vol. 9 May, 1939 of the German Academy of Air.
31. Calculation for a Benzol Hydrogenation Plant Me 958a - Leuna Aug. 22, 1942 Covers the reaction, equipment and calculation necessary for the process - 11 pgs. Flow sheets and diagrams included.
32. Alkylation of Kogasin - Cracked Products - June 8, 1943. 3 pgs.
33. Report on the experiment. Using a drying oven for dehydrogenation catalysts in Me 956. Leuna works 8/14/44. 6 pgs / drawing.

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34. Report on the Improvements in Dehydrogenation Chamber -
Leuna works Sept. 10, 1943. 3 pgs. / 2 drawings and
12 graphs.
35. Catalytic Studies - Position as of Feb. 1, 1944 Report
1104.
36. Graphs - Miscellaneous nature - 18 in all.
37. T52-B4 - Alkylation of Basic Butylaldehyde mixture -
A flow sheet.
38. T52-B3 - Alkylation with dehydrogenated N-Butylaldehyde -
Flow Sheet.

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DRAWINGS

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HIGH PRESSURE EQUIPMENT DETAILS

LEUNA

1. Heat Exchanger - Drawing #M710-1 Braunkohle-Benzin (#FA283-1) - Scale drawing of parts and assembly connections noted on drawing (no date).
2. Assembly of Cylindrical Evaporator Drawing #M3525A-1 Ammoniakwerk, Merseburg 11/28/1940. Scale drawing of parts including bolt and thread details (2 copies).
3. Intake Pressure Valve for Pump. Drawing #M3565-1. Ammoniakwerk, Merseburg 10/14/1940 - Scale drawing of parts.
4. High Pressure Contact Chamber - Drawing #M4746-1 Ammoniakwerk, Merseburg 12/10/1941 Scale drawing of chamber, cover, and casing. (2 copies).
5. Heat Exchanger - for methanol and Isobutanol. Drawing #M4941A-4 Ammoniakwerk, Merseburg 4/17/39 Scale drawing of heat exchanger.
6. Preheater for air and Fractionated Gas (1600 atmos.) Drawing #M5479b-1 Ammoniakwerk Merseburg 4/22/43 Scale drawing with complete details of a preheater.
7. Heat Exchanger (in methanol works) - Drawing #M5612-1 Ammoniakwerk Merseburg 8/14/44 - Scale drawing with complete details of a heat exchanger (2 copies).

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8. (Title not readable) Drawing #M5661a-2
Ammoniakwerk, Merseburg 2/10/39 Scale drawing showing
flanges and tube connection.
9. Separatory Arm with Column Head. Drawing #M5788a-2
Ammoniakwerk 3/14/39 - A scale drawing of arm and body
attachment.
10. Experiment Hydroforming Contract, Converter. (300 atmos.
operating pressure). Drawing #M5793-4 Ammoniakwerk,
Merseburg 3/15/40. Scale drawing (2 copies).
11. Stuffing Box Body for Old and New Slurry. Drawing
#M5892-2 Ammoniakwerk 2/15/39. A scale drawing.
12. Pressure Reduction Valve from 220-0 atmos.
Drawing #764292-2 Ammoniakwerk 9/22/39. A scale
drawing with complete details. (2 copies).
13. Immersion Type Preheater Drawing # 7211-2 Ammoniakwerk
4/29/40 A scale drawing (2 copies) Hair pin bends.
14. "D. H. D" Casing Drawing #M7545b-4 Ammoniakwerk
8/27/41 Scale drawing of casing.
15. High Pressure Diaphragm Valve Drawing #M9823-2
Ammoniakwerk 3/2/42 A scale drawing.
16. Contact Chamber with Coke Filter Drawing #M11649-2
Ammoniakwerk 9/25/43 A scale drawing (2 copies).

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17. High Pressure - Special Valve for reduction station
Drawing #M12037-2 Ammoniakwerk 1/24/44 A scale
drawing (2 copies).
18. Assembly of High Pressure Stuffing Box.
Drawing #M2541-2 Ammoniakwerk 6/22/36. A scale
drawing.
19. Oil Stuffing box with leather collar. Drawing #M10234-2
Ammoniakwerk 7/9/42 A scale drawing.
20. Stuffing Box Body. Drawing #M10907-2 Ammoniakwerk
9/30/1943 A scale drawing.
21. Nozzel - Drawing #M11754-2 Ammoniakwerk 11/2/43
A scale drawing.
22. Heat Exchanger without cooling coil. Drawing #M11776a-2
Ammoniakwerk 11/2/43.
23. High Pressure Diaphragm Valve (325 atmos).
Drawing #M12056-2 Ammoniakwerk 2/5/44 A scale
drawing with details of each part.
24. Stuffing box with X2 Packing. Drawing #M12806-2
Ammoniakwerk 2/4/45.
25. Gas (co) Purification and analysis. Drawing #M(Sk28-345)
-1 Ammoniakwerk 3/28/45 A flow diagram.
26. Gas (Co) Purification Drawing #M(SK26245)-1 Tracing
paper diagram for item #25.

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27. Tube Bundle for 500 atmos. Regenerator
Drawing #M12621-2 Ammoniakwerk 8/28/35. A scale drawing.
28. Insulation for Heat Exchanger (1000-atmos.)
Drawing #M1698-2 Ammoniakwerk 8/28/35. A scale drawing.
29. Bottom Throat of Hot Separator Drawing #M11663-2
Ammoniakwerk 9/17/43.
30. High Pressure Diaphragm Drawing #M12056-2
Ammoniakwerk 2/5/44. A scale detail drawing.
31. Cylinder and Head for Expansion Engine Drawing #M1567-1
Ammoniakwerk 5/14/36. A scale detail drawing.

- Part 1. Notes on the work conference of Synthesis plants in Berlin on 13 Sept. 1940. 164 pages.
Lectures by various technical people on aspects of synthesis including some tables. Dr. Feist.
- Part 2. Conference of 8 Nov. 1939. 16 pages. Coarse purification. Dr. Feist.
- Part 3. Industry Conference on 14 July 1939. 15 pages. Catalyst questions, Gas purification. Dr. Feist.
- Part 4. Industry Conference of 5 May 1939. 13 pages. Contact catalyst assemblies gas purification, date on emptying contact ovens. Dr. Feist.
- Part 5. Report on: Division of annual yield of hydro carbons in the gasoline synthesis for the establishment of the average monthly values. Dr. Schuff. 6 April, 1939. 5 pages.
- Part 6. Industry Conference on 3 March 1939. 9 pages. Delivery of catalysts, experimental catalysts, catalyst quality, yield. Contact extraction, contact investigation problems, corrosion questions, mechanical process of the synthesis ovens. Dr. Feist.

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- Part 7. Industry Conference on 6 Jan. 1939. 16 pages.
Report on burning of a storage tank, separation of mixed catalysts, new catalysts, comparison of mixed catalysts with Thorium catalyst contact. Dr. Feist.
- Part 8. Industry Conference on 4 Nov. 1938. 20 pages.
Extraction of catalysts. cost questions. Dr. Feist.
- Part 9. Industry Conference on 26 August 1938. 15 pages.
Monthly yield graph. Comparison of mixed catalysts and Thorium contact. Average monthly yield.
Physical characteristics of mixed catalysts.
Emptying the ovens. Regeneration with Oxygen or methods of extraction with Thorium and mixed catalysts
Catalytic requirement in Sept. 1938. Dr. Feist.
- Part 10. Industry Conference on 8 July 1938. 6 pages.
Catalysts - physical characteristics, reduction conditions, use in synthesis, regeneration, life cycle, emptying. Dr. Schuff.
Conference on 17 June, 1938. 23 pages - Gas purification synthetic production. Catalysts (Thorium-Manganese) Dr. Feist.
- Part 11. Industry Conference on 5 May 1938. 17 pages. Co-ThO₂-MgO Catalysts. Experimental catalysts with Co-Kgr - 1:1 ratio. General questions. Dr. Feist.

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Part 12. Industry Conference on 25 March 1938. 12 pages.
Delivery & quality of catalysts. Normal CoThO_2
catalysts. Co-ThO_2 -MgO catalysts. Dr. Feist.
The influence of Cobalt, Content and Keisel earth
content on the effectiveness of gasoline synthesis
catalysts. 12 pages. 2 graphs. Dr. Kolbel.
Report on Hydrogenation and its production value.
8 pages. Correspondence.
Basic Concept.- Catalysts and their characteristics.
2 pages.

I
02924-03506

02924

Report of the conference on lubricating material Part 2 - Ageing
Held in Berlin May-7-8, 1942. 269 pages.

The report consists of 15 individual reports and a discussion.

The reports deal mainly with ageing and testing of lubricating oils.

Property test of the synthetic lubricant code # SS 902-15Fr (final
stage). Lubricant tested in aircraft diesel engine. Jumo 205 D.

Dr. Scheibe, Dr. Rode, Date: 17 Mar: 1941 10 pages text 1 graph 3
illustrations 2 tables. Experimental report prepared under the
auspices of Junkers Aircraft and Motor Co.

"Lubricants technique" meeting of technical men on 29 June 1943.

Frictional problems 23 pgs. test 11 illustrations. Dr. Heidebroek,
Dr. Kraft. Report made for VDI technical group.

Report on "Lubricant technique" meeting of technical men. on

29 Feb. 1944. Chemical lubrication of aircraft engines. The

problem of stirring friction - 29 Feb. 1944. 32 pages including

9 pages illustrations. Dr. Heidebroek, Dr. Kraft. Report made for
VDI technical group.

1
INDEX 1

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02925

02925

Photographs of various instruments - mainly testing of fuels.

Testing synthetic lubricants in aircraft engines. Report

5 # 450 Dr. Lauer.

42 pages including 24 tables 27 Mar. 1941.

Report # 450 prepared under the auspices of Technical testing station Oppau.

A book issued by the German Institute for Air - 1940

89 pages - Containing articles by:-

- 1- M. Pier - "Concerning Aromatic Fuels".
- 2- W. Joet - Auto-Ignition of Fuel-Air Mixtures by Adiabatic Compression and its knock behavior in the Engine.
- 6 3- H. List - Work of the Institute of Fuel Boring Machines of the Technical High School.
- 4- E. Schmidt - Work of the Herman Göring Aircraft Engine Institute.
- 5- G. Danköbler - Physical Chemical Problem of combustion Happenings.

Knocking investigations on a one cylinder motor with special

consideration of knock retarding (delay) 42 pgs. test 35. Illus:

7 trations, diagrams and graphs. Dr. A. Süß.

Report prepared under the auspices of institute for chemical

Technology of Technical Schools. Mineral Oil Experimental Laboratory.

03507-04060

03507

① "The shape of contact chambers in catalytic Exothermic and endothermic reactions" By Dr. Wirth. April, 1942. Leuna (14 pages).

A report on the most efficient design of catalytic chambers (Fischer-Tropsch Synthesis) from the view point of heat transfer.

② "The calculation and evaluation of chambers for catalytic exothermic and endothermic reactions which occur within a narrow temperature range" By Dr. Wirth July 4, 1942. Leuna (20 pages) (2 copies).

The report concerns an evaluation of different methods of heat transfer arrangements. Besides a mathematical discussion, photographs of the different arrangements are included.

③ Investigation:- "The stability of various working material against carbon-monoxide corrosion" - Wyszomirski and van Rossum - July 30, 1943 Ammoniakwerk, Merseburg (8 pages).

A report on investigation of substitutes for manganese-copper alloy used in methanol synthesis equipment. Tables and graphs illustrate corrosion effect. The materials tested are listed only by Code number.

④ "Report concerning the session of the work society for Knock measurement," Technical testing place at Oppau, No. 161, July 15, 1941, deals chiefly with octane measurement and knock measurements thirty-nine pages with charts.

03508

- ⑤ "Experiments on the preparation of triptane and several other isoparaffins." Bueren, high pressure test 558, 30 Oct. 1940 - nine pages with reactions.
- ⑥ "Comparison investigations on I.G. test diesels", Köhler, technical testing place Op200, report no. 381, May 15, 1939, tests on I.G. test diesels and other motors, ten pages with charts.
- ⑦ "Overload capability of isooctane and aromatics", Pier, high pressure investigation Lu 558, Nov. 15, 1941. The difference in motor behavior between paraffin and aromatic high test fuel, eight pages with charts.
- ⑧ "Fuel Injection," German automotive Research, technical research reports, performance of different compressions of fuels, 1938-1944.
- ⑨ "Investigations of knocking Combustion." Heinz Rögener, Investigations of spontaneous combustion in the gas phase, thirty-three pages with charts.
- ⑩ "Fuel-test of the over-load process in BMW one cylinder motor", H. Schökel, INTAVA work society of Hamburg, Sept. 13, 1941, report no. K.199, testing of aircraft fuel WL814 in BMW over-load motor, three pages with charts.

03509

(11)

Brochure giving history and development of the Leuna Werke, in non technical language. Mostly descriptive in nature. 18 pages.

(12)

Preliminary cost report for Schwarzheide for May, 1944. dated 10 July, 1944. Gives production figures for Gasolines, oils, etc. - Dr. Kollmar. 5 pages.

(13)

Preliminary cost report for Schwarzheide for April, 1944. Give production figures for Gasolines, oils, etc. Dr. Kollmar. 8 pages, 1 graph.

(14)

Preliminary cost report for Schwarzheide for December 1943, Gives production figure for Gasolines, oils, etc. Dr. Kollmar. 6 pages, 1 graph.

(15)

Report on production of Böhlen Magdeburg, Zeitz, Schwarzheide, Werke, from Jan - March 1943. 26 June, 1943.

Production of gasolines, gases and oils, with master cost data.

(16)

Production reports on Schwarzheide, Böhlen, Magdeburg, Zeitz, from Oct. - Dec. 1943, and Jan - Dec. 1943.

Production of gasoline, gases, and oils, etc. with master cost and data.

03570

(17)

Production report on Schwarzerde Böhlen, Magdeburg Zeitz. July -
September, 1943.

Production and cost data on Gasoline Gases, and Oils, etc.

(18)

Construction and yield of Böhlen Werk gives cost, figures and
production of gasolines, oils, etc. 28 June, 1941. 25 pages, including
tables and graphs. Dr. Kollmar.

04061-04370

04061

I
"Exchange of Experiences" (USAC) November 1938" (39 Pages).

A report marked confidential concerns a conference on the Fischer-Tropsch Synthesis and related processes. Participants included representatives of Kellogg Co., Standard Oil, N. V. Bataafsche I. H. P., I. G. Farben and Ruhrchemie.

I
The table of contents lists Hydrocarbon Synthesis and Synthesis Gas production as the main topics which are further subdivided. Under Hydrocarbon Synthesis, "Details of the Synthesis Process"; Sulfur Purification, Reduction and manufacture of catalyst, are some subjects discussed. Methane cracking and the use exhaust gas from the Synthesis process as a source for Synthesis gas appears under Synthesis gas production.

Three flow sheets covering the overall installation, the catalyst production and the reduction installation are included in the reports.

"A contribution on the working of the Centrifuge" D. Backmann. (46 pages).

2
A technical paper appearing in the Verfahrenstechnik No. 2, 1940 by D. Backmann is divided into two parts: - 1 - Action with Dry Grinding Matter and - 2 - Action with wet working materials.

Besides a mathematical discussion of the action, a comparison with other methods are shown in charts and graphs. Literature references are given.

K
3
"Cost development work in Schwarzheide, " Kollmar, No. 112, Feb. 12, 1941 Cost ratios of the production of motor fuel from 1936-1940 at the

INDEX 1

040.62

2
Schwarzheide plant of Braun-Kohle-Benzol Co., 28 pages with charts.

"Development work Magdeburg," Kollmar, No. 323, June 28, 1941.

4 Costs and fuel production of the Magdeburg plant from 1936-1940.

Twenty-one pages with charts.

"Comprehensive survey of the entire 4 Brabag plants (1936-1940),"

5 Kollmar, No. 323, June 28, 1941. The cost profit and production situation, 17 pages with charts.

"Management report on the Blechhammer calculation plan 1944/1,"

6 May 11, 1944, monthly production figures of gasoline at the Leuna plant.

"Merseburg hydrogenation plant, situation at the monthly report,

7 February 1944, No. 3, forty-five pages of charts.

"Hydrogenation plant at Pölitz, management monthly report for

8 August 1944," Dr. Pier, thirty-four pages of production charts.

"Neopentane (tetramethylmethane) and triptane (trimethylbutane),"

9 Bueren, high pressure investigations, Lu 558, June 5, 1942, one page discussion of the synthesis of neopentane and triptane.

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04062

Schwarzeheide plant of Braun-Kohle-Benzin Co., 28 pages with charts.

"Development work Magdeburg," Kollmar, No. 323, June 28, 1941.

4

Costs and fuel production of the Magdeburg plant from 1936-1940.

Twenty-one pages with charts.

"Comprehensive survey of the entire 4 Brabag plants (1936-1940),"

5

Kollmar, No. 323, June 28, 1941, The cost profit and production situation, 17 pages with charts.

"Management report on the Blechhammer calculation plan 1944/1,"

6

May 11, 1944, monthly production figures of gasoline at the Leuna plant.

"Merseburg hydrogenation plant, situation at the monthly report,

7

February 1944, No. 3, forty-five pages of charts.

"Hydrogenation plant at Pölitz, management monthly report for

8

August 1944," Dr. Pier, thirty-four pages of production charts.

"Neopentane (tetramethylmethane) and triptane (trimethylbutane),"

9

Buären, high pressure investigations, Lu 558, June 5, 1942, one page discussion of the synthesis of neopentane and triptane.

3

04063

10 "Measurement of the indexes of high speed motors," Kurt Schnauffer,
Rundschau, July 26, 1930, one page with graphs.

"The power in the tool-machine", Schesinger, Rundschau, July 26,
1930, one page with charts.

11 "Suden motor fuel plants, aktiengesellschaft," monthly production
report No. 6 for Jan. 1943.

INDEX 3

Part 15 04371

Lubricant - Rotation experiments on BMW-801 One cylinder motor.

① Dr. Burkart. 4 pages text including 5 illustrations. A research paper (#117) under the auspices of the Institute of Aviation and Truck engines.

② Knocking limits and their variability through the influence of production factors. Dr. Burkart 3 May, 1943. 45 pages text including 34 illustrations. A research paper #134 under the auspices of the Institute of Aviation and Truck Engines.

"Synthesis of a DVL (German Institute for Air) Power (Combustion)

③ Material - Testing Method" - Dr. Burkart 10/17/44. 8 pages of text and 12 pages of illustrations and drawing. A research paper (report #151) under the auspices of the institute of Aviation and Truck Engines.

④ "Reaction Kinetics - Investigation of Knocking" - W. Jost. A reprint from Zeitschrift für Elektrochemie 47, 262-264.

⑤ "Measurement of Oscillating Compression - Indicative of high speed motors according to the Condensation Method" - K. Schnauffer - A reprint from Archiv für Technisches Messen 1931-T83 (2 pages).

⑥ Reaction Kinetic Investigation of Knocking II. The auto-Ignition of Hydrocarbon-Air mixtures and knocking in the Otto-Engine" - H. Teichmann. A reprint from Zeitschrift für Elektrochemie 47, 297-307 (1941).

⑦ The "Knocking" of combustion Engines - K. Schnauffer Report #251, of the German Institute for Air Travel - Engine A reprint from the DVL yearbook 1931 (4 pages).

04372

Measurement of incandescent combustion temperatures in high speed combustion engines Kurt Schnauffer.

⑧ 26 August 1933.

Five pages, thirteen sketches and graphs.

"Lubricating Properties of Eleven Aviation Motor Oils" - R. Halder.

⑨ Report #567 of Technical Testing Oppau. 4/20/44. I. G. Farben, Ludwigshafen 9 pages and 20 graphs.

The testing of Lubricating Material in small apparatus in regard to Lubricating Quality - R. Halder. Report #597 Technical Testing Oppau. ⑩ 3/8/43. I. G. Farben. Ludwigshafen. 17 pages, plus 4 graphs.

Influence of rotating lubricating oils masses on the knocking condition of the motor (a preliminary report) 20 Aug. 1942. 7 pages text 6 illustrations Dr. Burkart.

⑪ A research paper (#125) prepared under the auspices of the Institute of Aviation and Truck engines.

Investigation of the soiling of a lubricant red ring L45 with the help of long runs on a BMW-801, one cylinder motor - running with and without lubricant centrifuge. Dr. Burkart.

⑫ 9 pages text including 12 illustrations 17 March 1942.

A research paper (#115) prepared under the auspices of the Institute of Aviation and Truck Engines.

⑬ Influence of the release valve on the knocking condition of the BMW 801.

04373

One cylinder motor.

- (13) 5 pages test including 3 illustrations. Dr. Burkart. 10 April, 1943.
A research paper (#131) prepared under the auspices of the Institute of Aviation and truck engines.

- (14) Experiences with Lubricating material - Ram testing method on Ring
Piston Retention - W. Lauer. Report #505 Technical Testing Methods
Oppau. - July 1, 1942. I. G. Farben, Ludwigshafen. 21 pages - 3 graphs.

- (15) Lubrication Testing by Wear Measurements - R. Holder Report #548 of
technical testing Oppau, 6/29/43. I. G. Farben, Ludwigshafen. 13 pages
plus 3 graphs.

- (16) Contribution on "External Hydrodynamic" Lubrication - I. Morghen Sept 1,
1944. 29 pages plus graphs and tables.
Research paper under the auspices of the German Institute for air.

- (17) Sulfur content and Lubrication Quality of Aviation Motor Oils -
A. V. Philippovich July 28, 1943. 12 pages plus tables and graphs.
A research paper under the auspices of the German Institute for air.

- (18) Testing of high anti-knock synthetic combustion materials. F. Seeber
Institute for propellant research of the German Research Foundation
for air travel.
Thirteen pages, thirteen charts and one page of graphs.

04374

- (19) "Overload Limit Curves Issued by "Technical Testing Oppau - I. G. Farben. Ludwigshafen. Contains all the graphs from different reports on knock of engines and the overloading of fuels from various aspects (31 pages).
- (20) Determination of Inhibitors "R" and "S" in Lubricating Oils - I. Morghen Aug. 3, 1943. 5 pages. Research paper under auspices of the German Institute for air.
- (21) "Reaction Kinetics considerations of knocking in motors" - W. Jost and L. von Miiffling. A reprint from "Zeitschrift für Elektrochemie" 45 93-99 (1939).
- (22) "Liquified Gases" - F. Rosendahl. A reprint from Oel u Kohle #5, Feb. 1, 1942. Use of low-carbon hydrocarbons as internal combustion fuels - 7 pages and charts.
- (23) Indication of Lubricating Film Destruction by Measurement of the electrical transmission Resistance between piston ring and cylinder - R. Poppinga Feb. 15, 1940 27 pages plus graphs and drawings.
- (24) "Anti-knock qualities of triptane in I. G. test motor and with overloading" Fuel test no. 283, Technical testing center at Oppau - Four pages with charts.
- (25) "Lubricating Oil Additions to Hinder Ring Sticking" - (Anti Ring Sticking-Dopes). Report #A IV. A report in three parts: 1- The developmental work of shell between 1935-38 on various addition (9 compounds listed) to lubricating oil; 2-Report of the Testing Station at Delft; 3-"Vultol" -

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(25)

Its manufacture and motor behavior; and 4- An appendix consisting of graphs on the data. Total of 23 pages plus 13 graphs.

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DRAWINGS

Part 16

04822

UNDER GROUND PLANT KUKU

1. No number, title or date - Conveyor System for Coal unloading.
2. Arrangement for Oxygen Holders Drawing #M12744-2 Ammoniakwerk, Merseburg Dec. 1, 1944. A scale drawing of underground arrangement of Oxygen Chambers.
3. Arrangement for Methanol Synthesis Drawing #M12741-2 Ammoniakwerk, Merseburg 11/3/44. A scale drawing of underground arrangement for Methanol synthesis.
4. Linde - Oxygen Installation Drawing # M12733-2 Ammoniakwerk, Merseburg Nov. 23, 1944. Layout for manufacture of Oxygen (9000 m³/h).
5. Linde - Oxygen Installation Duplicate of item # -4--.
6. Conveyor System for coal feed Drawing # M12732-2 Ammoniakwerk, Merseburg Nov. 23, 1944. A layout diagram to scale.
7. Methanol-Tank Storage Drawing # M12718-2 Ammoniakwerk, Merseburg Nov. 15/44 - Layout.
8. Gas Generating Installation (Co /H₂) Drawing # M12717-2 Ammoniakwerk, Merseburg 11/15/44 Layout for gas generation from coke.

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9. Arrangement for Copper Lye Regeneration Installation
Drawing # M12715-2 - Ammoniakwerk, Merseburg 11/15/44
Scale drawing of underground arrangement.
10. Contract Chamber Arrangement - Nitrogen Installation
Drawing # M12714-2 Ammoniakwerk, Merseburg 11/14/44.
11. Arrangement of a CO₂ - Hydraulic Wash
Drawing # M12711-2 Ammoniakwerk, Merseburg 11/14/44.
12. Arrangement of Stalls (3) and Sections in each Stall.-
Project ku Drawing # M12617-2 Ammoniakwerk, Merseburg
9/25/44.
13. Methanol Synthesis - Chamber Arrangement
Drawing # M10234-4
14. Arrangement for Water Works - Pressure Filtration
Installation - Drawing # M1021⁴8a-4 Nov. 9, 1944.
15. Methanol Synthesis Chamber (Standing) Arrangement
Drawing # M10236-4 Ammoniakwerk, Merseburg 11/23/44.
16. Isobutyl Distillation Installation Arrangement
Drawing # M10235-4 Ammoniakwerk, Merseburg 11/23/44.
17. Summary Arrangement of a Methanol and Nitrogen
Installation - Drawing # M101²²2-4 Ammoniakwerk,
Merseburg 11/2/1944.
18. Arrangement of a Power(Electric) Works
Drawing # M6284-1 Ammoniakwerk, Merseburg 11/16/44
(2 copies)

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19. Arrangement of a methanol Synthesis Installation -
Drawing # M6283-1 Ammoniakwerk, Merseburg
11/15/44 (2 copies).
20. Summary Layout of Water Works, Power Station;
Ammonia Synthesis, Methanol Synthesis and Isobutyl
Installation. Drawing # M5693-1 Ammoniakwerk,
Merseburg 11/24/44. (2 copies).
21. Pipe Channels, Cable Conduits and foundation for
Machinery and apparatus - Drawing # M5686-1
Ammoniakwerk, Merseburg Nov. 16, 1944.
22. Double Chambers for Hydrogenation - Project Ku -
Drawing # M5685-1 Ammoniakwerk, Merseburg
11/16/44 (2 copies).

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Part 17

04851

IN ENVELOPE MARKED HYDRO PRINTS

1. Drawing # A958-4 Scale drawing Gasoline oven cooling gas baffles. Undated.
2. Scale drawing # 2341-1 Mineralöl Baugesellschaft. Isobutin Gas Phase Converter. 8 Dec. 1937.
3. Scale Drawing # 2988-2 Mineralöl Baugesellschaft. Cool gas inlet to converter and heat exchanger. 14 Jan. 1938.
4. Scale drawing # 2523-2 Mineralöl Baugesellschaft. Lower head to TTH converter. 12 Aug. 1937.
5. Scale drawing # 2713-2 Mineralöl Baugesellschaft. Electric Preheater. 22 Nov. 1937.
6. Scale drawing # FA 373 Siegener Maschinenbau Cooler between steps II and III. 6 Sept. 1935.
7. Scale drawing # FA 374-2 Siegener Maschinenbau cooler between steps I and II. 26 Sept. 1935.
8. Scale drawing # FA 372-2 Siegener Maschinenbau Cooler between steps III and IV. 6 Sept. 1935.
9. Scale drawing # A857-8 Braunkohle Benzin - Globe return valve NW 30 with insert. 16 Jan. 1942.

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10. Scale drawing # A847-8 Braunkohle Benzin Glöve return valve - NW 30 13 Dec. 1941.
11. Scale drawing # A1494-2 Braunkohle Benzin Experimental Valve for HK (mud free valve) 27 March, 1943.
12. Scale drawing # A1707-2 Braunkohle Benzin - Experimental Quantity Measurer. 2 Mar. 1943.
13. Flow sheet # 1632c Coal stall # 4 with fittings and control equipment. 3 Feb. 1945.
14. Flow sheet Tar chamber # 2 Böhlen 14 April, 1939.
15. Flow sheet # 1669 Construction Office. Gas washing Gasoline chamber /stakk/.1 12 Feb. 1945.
16. Flow sheet # 10016 Construction Office Tar chamber /stall/3. 13 Feb. 1945.
17. Flow sheet # 1613b construction office Gasoline chamber /stall/ 12. 13 Feb. 1945.
18. Flow sheet # 1797a Construction Office Gasoline chamber /stall/ 10. 13 Feb. 1945.
19. Flow sheet # M 4336-2 TTH research with circulated contact /catalyst/ preheater 11. 20 Dec. 1937.
20. Scale drawing # N4295d-1 I.G. Farben. Forging shell 1000 Min. Ø 18 m long. 29 July, 1941.

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21. Scale drawing #2264-1 Mineralöl Baugesellschaft.
Assembly of Gas converter. 23 Sept. 1937.
22. Scale drawing # A 951-4 Braunkohle Benzin Cooling
gas fittings. 28 Nov. 1944.
23. Flow sheet # 1801a Gas preheater 23 Aug. 1941.
24. Scale drawing # 25a-4 Braunkohle Benzin Thermocouple
well tar converter. 7 Aug. 1943.
25. Scale drawing # 2512-1 Mineralöl Baugesellschaft.
Pipe lines for TTH converters. 10 Feb. 1938.
26. Flow sheet # N 7775-2 I.G. Farben. Slump phase
with gas preheater 10 Nov. 1939.
27. Scale drawing # 671-1 Braunkohle Benzin Assembly
of Tar Converter 1000 ϕ X 18 m. 5 Jan. 1936.
28. Scale drawing # 2287-1 Mineralöl Baugesellschaft.
Assembly 600 ϕ Converter. 5 Oct. 1937.
29. Scale drawing # N 4043 I-2 I.G. Farben cold separator
body. 8 Nov. 1937.
30. Scale drawing # N 4278c-2 I.G. Farben. Cold separator
assembly. 22 Apr. 1937.
31. Scale drawing # 3289-2 Mineralöl Baugesellschaft.
gas cooler. 7 Apr. 1938.

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32. Scale drawing # 2616-1 Mineralöl Baugesellschaft.
Arrangement of lines to centrifuge 15 Mar. 1938.
33. Scale drawing # 2397-1 Mineralöl Baugesellschaft -
Intermediate Expansion for TTH and Gas Phase.
23 Dec. 1937.
34. Scale drawing # 2398-1 Mineralöl Baugesellschaft -
Intermediate Expansion for TTH and Gas Phase.
22 Dec. 1937.
35. Scale drawing # A706-1 Braunkohle Benzin Cooling
gas lines and funnel neck. 6 May, 1942.
36. Scale drawing # 22-2 Braunkohle Benzin. Shell
600 ϕ converter. 22 Nov. 1934.

04891 - 05086

04891

Problems of the Organic Section. Dec. 1938 - Dec. 1939.

64 pages text and tables.

① A notebook containing problems of the Organic Section which are divided into: 1. Alcohols from Carbon monoxide: 2. Fatty acids from alcohols and aldehydes and 3, Lubricating Oil-Polymerization of Olefins.

The research carried on and the present status of the work are summarized.

"High Pressure Synthesis Chamber with Steam Cooling" (author not given).

② 46 pages of text and 43 pages of diagrams and graphs. Dated June 1944.

The problem of heat transfer and calculation of heat transfer coefficients using published theoretical and experimental data for a methanol converter using steam.

③ Formula book for the compounding of various calypsol greases in code.

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IN ENVELOPE MARKED "HYDRO PRINTS"

1. Drawing # 7280-1 Braunkohle Benzin Pipe lines for TTH
25 May, 1939.
2. 2 Drawings # 433-2 Braunkohle Benzin. Flow Sheet with
valves for tar (Olie) 6 Feb. 1936.
3. Scale drawing # 3524-2 Mineralöl Baugesellschaft.
TTH lean gas expansion and cooling. 9 May, 1938.
4. Drawing # 189-2 Braunkohle Benzin. Flow Sheet.
3 May, 1935.
5. Drawing # 99-1 Flow sheet. Böhlen 1 June, 1935.
6. Drawing # 2109-2 Gas flows for tar hydrogenation.
Mineralöl Baugesellschaft. 19 Mar. 1937.
7. Drawing # 5713/202,203 Overall layout for high pressure
installation in Lützkendorf (phase) 15 Jan. 1941.
8. Drawing # 4629/201,203. Overall layout for high pressure
installation in Lützkendorf (gas phase) flow sheet
25 Feb. 1939.
9. Drawing # Me888 Sump phase distillation flow sheet
15 Jan. 1944.
10. Drawing # M8915-4 Ammoniakwerk, Merseburg. Flow sheet
of wash oil installation with large reducing machine
5 March 1943.

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11. Drawing # M7756a-4 Ammoniakwerk, Merseburg. Flow sheet of refractory column 14 Nov. 1941.
12. Thermo diagram # M5216b-1 8 June, 1944.
13. Drawing # M12010b-2 Ammoniakwerk, Merseburg. Sump phase distillation flow sheet 7 Mar. 1944.
14. Drawing # M3593b-1 Distillation Gas phase flow sheet. 19 April, 1944.
15. Drawing # 319. Braunkohle Benzin Heat Control Circuit diagram. 20 April, 1944.
16. Drawing # 1939-a Gas preheater coal Chamber 15 23 Nov. 1939. Ammoniakwerk, Merseburg.
17. Drawing # 1943 Gas preheater Coal chamber 18 Ammoniakwerk, Merseburg. 12 Jan. 1943.
18. Drawing # 1671a Gasoline chamber 1. Gas Preheater. 12 Feb. 1941.
19. Drawing # 10048. Gas preheater Gasoline chamber 2. 14 Nov. 1944.
20. Drawing # 1900a Gas preheater, Gasoline chamber 9 18 Oct. 1944.
21. Drawing # 1867b Gas preheater, Gasoline chamber 10. 16 Nov. 1943.

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22. Drawing # 1916 Gas preheater Gasoline chamber 11
12 Nov. 1942.
23. Drawing # 1918a Gas preheater, Gasoline chamber 13.
6 April, 1944.
24. Drawing # 1875b - Gas preheater Gasoline chamber 12,
25 Jan. 1943.
25. Drawing # 1893c Gas preheaters, Gasoline chamber 16,
23 Aug. 1944.
26. Drawing # 10023a Gas preheater Tar chamber 3,
27 June, 1944.
27. Drawing # 1672 Gas preheater Kal Thermo sketch.
24 June, 1943.
28. Drawing # 1831b Gas preheater. Ka4 Thermo sketch.
7 Aug., 1943.
29. Drawing # 1946 Gas preheater Kal2 Thermo sketch
25 Jan. 1945.
30. Drawing # 1807b. Gas preheater Ka 15. Thermo sketch.
18 December, 1942.
31. Drawing # A2041-16 Braunkohle Benzine. Specification
sheet - "Cold gas tubes to tar oven" 7 Feb. 1945.

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32. Drawing # a669c Flow Sheet - Gasoline Chamber. 3 Feb. 1945,
33. Drawing # 1854 d Flow sheet. Gas preheater with control equipment.
34. Drawing # N 9561c-2 Flow sheet - Chamber layout for synthesis No. III. Experimental synthesis. I.G. Farben. 30 Jan. 1940.
35. Drawing # 7982f-2 Flow sheet and connection diagram for synthesis I I.G. Farben 22 Dec. 1939.
36. Drawing # 8204c-2 Flow sheet and connection diagram for synthesis II - Cooler preheater, etc. 28 Dec. 1939.
37. Drawing # FZe 5030-2 Preliminary diagram T.H.H. Layout - Preheaters and heat transfers 22 Feb. 1937.
38. Prospectors Drawing # M1859-1 Basic Flow Sheet, of sump oven chambers. 16 June, 1931.
39. Prospectors Drawing # M1860-1 Basic Flow sheet of gasoline chamber. 17 June, 1931.
40. Prospectors Drawing # M4185-2 Basic Flow sheet. "Obtaining gasoline from ground oil and tar". 17 June, 1931.
41. Prospectors Drawing # M4186-2 Basic Flow sheet. Gasoline from coal.

05133-05134

05133

NOTE BOOK

A note book entitled - "Brabag" - Communications issued by Braunkohle-Benzin A.G. from the files of Dr. Hausmann. The notebook contains 243 pages and is divided into 16 sections, which deals mainly with Petroleum (natural and synthetic) and related processes.

The communications are short abstracts of the literature and patents on the interests as shown in the 16 sections and cover the years 1939-1944. Some references to German journals are included which are not generally available in the U.S. during the war years.

A copy of the above - substituting - Dr. Vollmer - for Dr. Hausmann.

2 copies of notebook

2 ✕ Vollmer

1 ✕ Dr. Hausmann

05835-06270

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NOTE BOOK

1. A notebook containing form sheets and standards for nuts, bolts, screws and flanges, etc. issued by Braunkohle-Genzin A.G. Dated 1940.
2. "Hydrogenation Installation". Data and Reports on Hydrogenation Plants at low temperature. Reports also concern themselves equipment such as heat exchangers, preheaters and gaskets. Drawings are included. These reports concern the Leuna works and are dated from 1936 through 1939.
3. "Exchange of Experiences" Conferences contained in a notebook from the file of Dr. Braune dated from 1941 through 1944.

This book contains "Exchange of Experience" Conferences among the Ruhrchemie people and subsidiaries.

 - 30(a) Report on Conference in Essen Jan. 12, 1944
21 pages - Various problems concerning the Fischer-Tropsch Synthesis.
 - 30(b) Report on Explanation of Explosion in the Blast Main of the Water gas plant. Report dated Nov. 29, 1943. 2 pages.
 - 30(c) Report on the Conference on the Synthesis work at Essen, Jan. 8, 1943. The report has pages 12 through 49 missing out of a total of 78 pages.

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3ad

Report on the Cobalt Situation in Essen. May 4, 1943.
6 pages.

3ae

Report on addition to the report date 3/26/1943 in
Bergkamen. Report of Dr. B. Löpmann on the Improvements
in Synthesis Plants methods and to increase Production
and catalyst life. 9 pages.

3af

Report on Exchange of Experience on the Synthesis Work.
"The lengthening of the catalyst life by the method of the
Essen-Coal Chemical Works." 17 pages.

3ag

Report of Exchange of Experience Conference at Essen
4/17/42. 13 pages.

3ah

Report on a Conference of the Synthesis works at Essen -
Oct. 3, 1941. A 78 page report divided into 7 sections.
1- New methods in purification;
2- Influence of higher sulfur content on the synthesis;
3- H_2S production in Synthesis gas from the sulfur in the
cooling water.
4-5. The development of middle pressure synthesis of
Olefins.
6- CO and H_2 balance as an aid in synthesis control.
7- Developmental work on the subject of Iron Catalyst.

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Report on the Conference held 7/31/41 in Essen concerning experiences with calcined Kieselguhr Catalyst and supply of purification material (7 pages).

3*aj*

Report on the catalyst carrier of the Ruhr works Mar. 24, 1941 at Essen. (6 pages).

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HIGH PRESSURE EQUIPMENT DETAILS

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1. Paste Pump-Flushing Oil Convection KP4W Drawing # M1175-4
Ammoniakwerk 5/22/35 A scale drawing.
2. Top closure for Regenerator Drawing # M3961a-2
Ammoniakwerk 9/10/37. A scale drawing.
3. Cylinder for Expansion Engine - Drawing # M1585-1
Ammoniakwerk 4/12/37. A scale drawing.
4. Stuffing Box 700 Atmos. Expansion Engine
Drawing # M1568-1 Ammoniakwerk 8/14/37. A scale
drawing.
5. Plunger and Parts for Paste Pump. Drawing # M5041-2
Ammoniakwerk 7-28-38. A scale drawing.
6. Suction and Discharge Valve Assembly and Parts
Drawing # M3565-1 Ammoniakwerk 10/14/1940.
7. Hairpin Tube Exchanger. Drawing # M3036-8 7/4/40.
8. Stuffing Box for Paste Pump Drawing # M5892-2.
Ammoniakwerk, 2/15/39. A scale drawing.
9. Assembly of high Pressure Packing on Paste Pump.
Drawing # M2541-2 Ammoniakwerk 6/11/36. A scale
drawing.
10. Lantern Rings for Paste Pump. Drawing # M10234-2
Ammoniakwerk, 7/9/42. A scale drawing.

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11. Stuffing Box with X_2 Packing - Drawing # M12806-2
Ammoniakwerk 2/1/45. A scale drawing.
12. Middle Oil - Washing Layout - Drawing # M3794-16
Ammoniakwerk A flow diagram.
13. Compressor Room - Gas layout. Drawing # M7098a-2
A Flow Sheet.
14. Butane Separation Layout. Drawing # M6706e-2
Nov. 7, 1942. A flow sheet.
15. Scheme for Middle Oil Refining Drawing # M10318a-2
Ammoniakwerk 8/6/42 - A flow sheet.
16. Scheme for Middle Oil - after carbonization
Drawing # M9402a-4 Ammoniakwerk 6/25/43. A flow
diagram.
17. Scheme for Working up of Residue - Drawing # M10751a-2.
Ammoniakwerk 10/25/42 - A flow sheet.
18. Scheme for Recovery of Phenol - Drawing # M6267a-2
Ammoniakwerk 7/29/39. A Flow Sheet.
19. Me890 - Distillation - Drawing # M9934-2 3/11/42
A Flow Sheet.
20. Light Gasoline Purification - Drawing # M7098a-2
1/26/44 A Flow Sheet.

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21. — Scheme for Hydrogenation of Phenol Residue -
Drawing # M6119-1; 3/1/44. A flow sheet.
22. Regeneration Chamber - Drawing # M3411d-1
Ammoniakwerk 6/6/40. A scale drawing.
23. Gas Converter (Blending Chamber for Me) -
Drawing # M3334-1 Ammoniakwerk 5/22/40 - A scale
drawing.
24. Iron Regenerator (151 Tubes (Kogasin Converter),
Drawing # M3332-1 Ammoniakwerk 5/7/40 - A scale
drawing (2 copies).
25. Hot Separator Assembly Drawing # M3203-1 Ammoniakwerk
3/2/40 A scale drawing.
26. Hair Pin Heat Exchanger (cooler) for Kogasin Hydro-
genation Drawing # M3004-8. A sketch.
27. Plate (made of Mn Cu) for 800 Atmos. Methanol
Regenerator. Drawing # M1983-4 Ammoniakwerk
5/13/36. Drawing show pipe arrangement.
28. Stuffing Box. Drawing # M1568-1 Ammoniakwerk
5/14/34 - A scale drawing.
29. Cylinder for Expansion Engine (200 Atmos.)
Drawing # M1585-1 Ammoniakwerk 4/12/37.
30. Jet Head for Splitting Chamber Drawing # M1581-1
Ammoniakwerk 4/22/37 A scale drawing.

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31. Mixing Head for Splitting Chamber (Ethylene Recovery)
Drawing # M1580a-1 Ammoniakwerk 4/17/37 A scale
drawing.
32. Autoclave 730 Atmos. Capacity 25 liters.
Drawing # M1870-1 Ammoniakwerk 11/10/37 A scale
drawing (2 copies).
33. Cylinder and Cover for Expansion Engine Drawing # M1567-1
Ammoniakwerk 5/14/36. A scale drawing (a note
on drawing says: "void" 5/29/37).
34. Aldehyde Generator (Acetylene-Aldehyde Installation)
Drawing # M1431-1 Ammoniakwerk 2/19/37 Scale
drawing of various cuts and views (2 copies).
35. Bell Bottom Column for Alkali Wash Installation
Drawing # M1378-1 Ammoniakwerk 1/20/37. Scale
drawing.
36. 500 Atmos. methanol Chamber with 3 cold gas conduits.
Drawing # M1370-1 Ammoniakwerk 1/14/37. Scale
drawing.
37. Map Leuna Works Ammoniakwerk, Merseburg. A map in color
showing layout of plants.
38. Map Topographical map of the country around and including
Leuna and Merseburg.

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1. "1000 Atmos. Shell." Drawing #N42950-1 I. G. Farbenindustrie; Ludwigshafen. 7/29/41. Scale drawing of a high pressure converter shell including details of bolt and thread connections.
2. "Heat Exchanger" Drawing # 2287-1. Mineralöl Baugesellschaft 10/5/1937. Details of Insulation Material included.
3. "Arrangement of Gas Towers for Sludge Water" Drawing # 3417-2 Mineralöl-Baugesellschaft 4/8/38. A scale tracing showing detail arrangement.
4. "End Assembly - 600 Atmos. Pressure Vessel" Drawing # N4562-2 I. G. Farben., Ludwigshafen. 7/16/37. A scale drawing giving detail assembly of all parts including insulation and gaskets.
5. "Casing for Regeneration Column 600 Atmos" - Drawing # N4022I-2 I. G. Farben., Ludwigshafen. 11/20/37 A scale drawing of shell. Details of bolts and threads.
6. "Pivot Enlargement for Angle Valve 90-325 Atmos" Drawing # FA1568-4 Braunkohle - Benzin A. G. 1/29/45 A scale tracing showing details of stem and pivot for angle valve.

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7. "Housing for 120 Atmos. Angle Valve" Drawing # FA-1457-4
Braunkohle-Benzin A-G 1/23/45. A scale tracing
showing details of casing for angle valve.
8. "Hot Separator for 300 Atmos. working Pressure" -
Drawing # 56-1 Braunkohlen-Benzin A.G. 6/20/35
A scale drawing of various parts including bolts and
threads.
9. Shell (Similar to Item -1-) Drawing # N4297a-1
I. G. Farben. 8/5/41. A scale drawing of parts and
connections.
10. "Variation-Refrigeration System under Funnel (Hot
Separator). Drawing # A706-1 Braunkohle-Benzin A.G.
5/6/42. Scale drawing of parts.
11. Flange - Drawing # 1485-4 Mineralöl-Bangesellschaft
9/11/40. Scale drawing of flange for high pressure
vessel.
12. Cover for Vessel - Drawing # 14308-2 Mineralöl-
Bangesellschaft 9/16/40. Scale drawing of cover for
high pressure vessel (Top view).
13. "Heat Exchanger 600 Atmos." - Drawing # 2287-1. Same
as item # 2, but on tracing paper.

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14. An untitled, non-dated drawing in scale with penciled corrections showing a converter.
15. Isobutyl Converter drawing in scale showing front and top views of a contact chamber - Drawing # A.F.T. 2553 6/28/39.
16. Flow Sheet - Hydrogenation of Heavy Tar Oil - Drawing # 189-2 Braunkohle-Benzol A.G. 5/3/35.
17. Flow-Sheet - Light Oil Separation. Drawing # ATL1010-8. A flow diagram showing details of control and regulation for Butane and Propane separation.
18. Flow-Sheet - Gasoline Distillation. No drawing number, nor organization. Dated Nov. 20, 1942. A flow sheet of Gasoline distillation including instrumentation.
19. Flow-Sheet - Similar to item -18-.
20. Flow-Sheet - For oil distillation. Drawing # 1712. Contact Hydrogenation Work. Dec. 27, 1939. Flow diagram showing Tar Oil distillation into various fractions with emphasis on temperature control.
21. Flow-Sheet - Ammonia Synthesis III Drawing # M2720d-1 5/9/39.
22. Flow Sheet - Light Oil Distillation Drawing # S-76 1/6/43. Böhlen Saxon Works.

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CATALYST PREPARATION AND TESTS
HYDROGENATION

1. Fuel Oil Investigation - Chamber 804 July 15, 1941 -
Sept. 21, 1941 72 pg. of text, drawings and tables.
2. Preparation of Tungstun disulfide X-Ray diffraction
photographs included.
3. Preparation of catalytically active Tungstun Sulfide
5/22/43 2 pgs.
4. Towards a basic investigation of catalysts - a plan for
the studying of catalysts (WS2 included) 6/2/43 2 pgs.
5. Adsorption of Hydrogen on Tungstun Sulfide Meier Oct. 25,
1943.
6. Cost Figures and Raw Material for Various Catalysts -
6/3/44 Catalyst the WS2 catalyst given major attention.
7. Tungstun Requirements for Gasoline catalysts July 21, 1943.
8. Gasoline making from Split and Reithbrook gasoil with certain
catalysts - Rotter - June 3, 1942.
9. Aromatization Catalyst for 600 atmos - Using 6/3/44 catalyst
Aug. 14, 1941.

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10. Charging of the alumina - W-Ni-Prehydrogenation catalyst 8376 (= 7846 W250) for various Products Sept. 8, 1942.
11. Experiment in a liter chamber towards Splitting of Stripped Heavy oil from Bituminous coal at 250 atmos with solidly arranged regenerated catalysts. Oct. 15, 1943.
12. Charging of the alumina - W-Ni-Prehydrogenation catalyst 8376 (= 8376 W250) for various products. Sept. 5, 1942.
13. Development of Poison Resistant Catalysts and the Gas phase hydrogenation. Oct. 16, 1942. 7 pgs.
14. Further development on 7846-catalyst 5/3/41 5 pgs.
15. Catalyst needs - Sept. 1943 Luena 10/18/43. A chart.
16. A letter with the subject: - Beds of Hydrogenation Catalysts 3/30/43.
17. Residue Gasoline Quality through Aromatization catalyst on Fuller's Earth and Silicate - Reitz April 9, 1941.
18. Catalyst 7846 for Prehydrogenation of "Scholven" middle oil - Gunther April 8, 1941.
19. Influence of Sulphur in the Injection products of the 6434 chamber on the K-worth of the Regenerators - April 17, 1939. 14 pgs.

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20. Notice: - Erection of a Filter Station for Middle Oil -
12/12/41

21. Development of the Slurry Phase to 1933 - Oct. 22, 1942,
(2 copies).

22. Development of the Slurry Phase since 1933 - Oct. 23, 1942.

23. Flow Sheet of Catalytic Hydrogenation - Drawing #1675-4.

24. Gas Preheater - Drawing #1677a-4.

25. Sketch: - Sulfur in the Hydrogenation Plants - a table.

26. Overall costs for Fuel Oil / 170 or Gasoline from
Watarnstedter Tar in Plant Lu-Op. 11/9/42.

27. Sources of fuel supply 11 August 1938.

28. Table 1-5: - High Pressure Hydrogenation and Synthesis.

29. Relation between coal analysis and hydrogenation capacity.
Jan. 17, 1944.

30. Curves of Kal2 using G434 Catalyst.

31. Filtration of anhydrous coal - Apr. 16, 1941.

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32. Concerning the Hydrogenation capacity of coals - Grassel
Oct. 16, 1942.
33. Working up of various coals to Gasoline and Middle Oil;
and Gasoline and fuel oil 1/31/44.
34. Preparation Example of Wilhelm - Gas phase catalyst
5/23/45.
35. Notice: - Water injection by Nozzle in the Peg. II of the
5058 Prehydrogenation chamber. Sept. 11, 1940.
36. Slurry Phase at Wesseling 2/6/44.
37. Summary of Questions and answers on sulfurization of
Middle Oils. Nov. 1, 1943.
38. Notice: - Concerning the transfer of Reaction Heat by ex-
ternal pipe contact oven whose cooling tubes are 10°
horizontal and no side arms are necessary.
39. Properties of Intermediate Products of the Hydrogenation
Plant and Petroleum Jan. 27, 1944.
40. Heat Produced in coal hydrogenation Oct. 17, 1942.
41. Designs of Dr. Keinghardt and Dr. Schumk retained.
April 8, 1938.

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- 42. Condition of chamber 5 as of 4/17/40.
- 43. Hydrogenation of Bituminous Coal - Extract - (Heavy Oil - Experiment - Report III F. Winkler 7/29/37.
- 44. Exchange of Experience - Conference - Sediment in the Slurry phase chamber - Jan. 28, 1943.
- 45. Weight Balance of the coal hydrogenation - 4/20/42.
- 46. Centrifugal machine - Köhler.
- 47. Form change of the Packing NW120 from N5-Material by inner pressure and by pronounced screws - 7/12/36.
- 48. 6434 Catalyst in circulating Gases - Schwab (2 copies).
- 49. 6434 and Sulfur containing b-middle oil
- 50. New Gasoline making catalyst - Mar. 11, 1943.
- 51. Dehydrogenation of 5058/7846 Gasoline and 6434 Gasoline from Upper silesian coal K197 May 6, 1941.
- 52. Experiment 38.
- 53. Miscellaneous Data sheets and drawings. (5).

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DRAWINGS FOR OXYGEN PLANT - EQUIPMENT
(SCALE DRAWINGS) AND GRAPHS

1. Document on the acceptance for setting up 2 stationary Walle heat steam boilers with manufacturing No. 3528/3529.
Details on 2 boilers. 5 drawings, of Böhlen installation.
Installation made 1935.
2. 2 Prospectors drawings for Winterhall A. G. Litzendorf. Fischer Tropsch installation. 19 Dec. 1938.
3. Map showing gas distribution in middle Germany. 6 May, 1942.
Drawing #So56A.
4. 2 scale drawings giving plant layout for Ruhrchemie AG at Oberhausen-Holten. 29 Dec. 1939 (#ZA1.76) and 1 June, 1943.
(enlarged office).
5. Graph # EW VIII 287 - Compressed air graph Böhlen 19 July, 1940.
6. Graph # EW VIII 290 - Nitrogen graph Böhlen 19 July, 1940.
7. Graph # EW VIII 288 - Low pressure Air graph - Böhlen 19 July 1940.
8. Graph # EW VIII 289 - Acid graph - Böhlen 19 July 1940.
9. Scale Drawing #201011 - Pump Assembly. LURGI. 10 April 1942.
10. 18 blank production log sheets.
11. Scale drawing - tube diagram for stationary 2 stage 4 crankshaft oxygen compressor Part 2 28 Jan. 1942.

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12. Scale drawing - tube diagram for stationary 2 stage. 4 crankshaft.
Oxygen compressor Part 1. 28 Jan. 1942.
 13. Scale drawing - Basis diagram for stationary 2 stage Oxygen
compressor 31 July 1941.
 14. Scale drawing - lubrication arrangement 24 May 1941.
 15. Scale drawing - arrangement of flow off control 5 Mar. 1941.
 16. Scale drawing - Water cut-off, 21 Aug. 1942.
 17. Scale drawing - acetylene cut-off, 30 Dec. 1938.
 18. Scale drawing - lubricant cut-off, 2nd part. 8 June 1941.
 19. Scale drawing High Pressure pre cooler. 14 Nov. 1942.
 20. Scale drawing - lubricant cut-off. 3 June 1941.
 21. Scale drawing of stuffing box on Ammonia Compressor.
19 May 1938.
 22. Graph - pressure drop in fresh air circuit. Nov. 1938.
 23. Graph - resistance curve of Nitrogen regeneration at various
performance leveles. 19 Nov. 1941.
 24. Graph for measuring oxygen quantities. 21 Dec. 1940.

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1. "Butane Separation, Scholven, Isomerism scheme," Friedrich Uhde, No. BUS-800Z, Sept. 30, 1940. Flow sheet.
2. "Heat exchanger, C-104," Friedrich Uhde, No. Ze6104, Oct. 17, 1938, scale drawing.
3. "Heat exchanger, C-08, C-103," Friedrich Uhde, No. Ze603, Oct. 11, 1935, scale drawing.
4. "Pre-heater", Friedrich Uhde, No. ATL 6020-2, Sept. 3, 1941, scale drawing.
5. "Pre-heater," Friedrich Uhde, No. ATL 6018-1, Nov. 6, 1941, scale drawing.
6. "Pre-heater," Friedrich Uhde, No. ATL 6015-2, Aug. 5, 1941, scale drawing.
7. "Steam Circulator for Column V", Friedrich Uhde, No. ATL 6511-9, July 14, 1941, scale drawing.
8. "Steam Circulator for Column III A," Friedrich Uhde, No. ATL 6021-5, Sept. 22, 1941, Scale drawing.
9. "Heat Exchanger," Friedrich Uhde, No. ATL 6013-2, Aug. 5, 1941, scale drawing.
10. "Pre-heater," Friedrich Uhde, No. ATL 6010-2 Oct. 25, 1941, scale drawing.
11. "Steam Circulator for Column IV", Friedrich Uhde, No. ATL 6515-4, Sept. 22, 1941, scale drawing.

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12. "Conduit and armature list, Page I", Friedrich Uhde, No. ATL-9524-5, Feb. 25, 1942.
13. "Steam Circulator for Column II", Friedrich Uhde, No. ATL-9524-5, Feb. 25, 1942.
14. "Conduit and armature list, Page III," Friedrich Uhde, No. ATL 9526-5, April 27, 1942.
15. "Column IV", Friedrich Uhde, No. K12804a, July 18, 1941, scale drawing.
16. "Column II", Friedrich Uhde, No. K12791b, July 26, 1941, scale drawing.
17. "Heat exchanger, C-03, C-103", Friedrich Uhde, No. 2e, 603, Oct. 11, 1938, scale drawing.
18. "Column I, ATL 5004-E", Friedrich Uhde, No. K12790d, July 23, 1941, scale drawing.
19. "Column IIIa", Friedrich Uhde, No. K12803b, Aug. 14, 1941, scale drawing.
20. "Column V", Friedrich Uhde, No. K12805a, July 7, 1941, scale drawing.
21. "Steam Circulator for Column I", Friedrich Uhde, No. ATL 6506-9, July 2, 1941, scale drawing.
"Report concerning the manner of operation of the Bitterfeld protection columns in comparison with other structural types", Eberhardt, Report Collection of Research Laboratories, No. 480, Feb. 1944, Sixteen pages with charts.

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"Development of a base for great liquid refraction," Dr. Wirth,
Jan. 19, 1942, development of tunnel and rod bases at the Leuna
works.

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I
SYNTHETIC LUBES

1. Specification for working Oil and Motor Oil for the Army.
June 1944.
2. Specification for Aircraft Motor Lubricating Oil S3 and U2.
3. R-Oil Plant - Flow Sheet 11/23/40.
4. Production of Aircraft Motor Oil by Mixed Polymerization-
Leuna - Mar. 27, 1943.
5. Solidification Point of Oil and Oil Mixtures DVL Investigation #786.
6. Reaction: K-Xanthogenate / Phosphorrichloride; Phosphorpentachloride;
Phosphoroxychloride. R. Rüttinger. Leuna works. Aug. 29, 1944. 12 pgs.
7. Ester Oil III - Expansion Plan - Drawing #M447-8. Sept. 19, 1942.
8. Flow-sheet of Lubricating Oil Plant. Drawing #AS1263. Lurgi.
9. Scheme for the Distillation Plant - Drawing #D.O. 8770. Lurgi.
10. Viscosity index tables in centistokes.
11. Concerning the efficiency of Jet Impulse. 6/29/1943.
12. Flow Sheet of SS-oil Production.
13. 100 Hour Test on Lubricating Material SS1593 in Motor Juno 205D.
6/19/42. (2 copies).
14. Aircraft Pressure Oil Do2000. 11/9/44. Production of Do2000 and use.
15. Minutes on the survey of motors Z11, F154, J 112. After 100 hours
test with Lubricating Material "SS90225F". 9/2/41.

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16. Testing of Lubricating Material SS902, F25S in Motor Juno 205D.
2/19/42.
17. 100 Hour Test on the cold starting oils SS902/25F in motor 211F.
Sept. 18/1941.
18. Report on - 100 Hour Aircraft Test on the Cold Starting Oils
SS902 15 Fr in motor As10C/3. 8/12/41.
19. Parts of a Book on Lubricating Oil Testing.
20. Conference of the "Lubricating Technical" work group -
7/18/44. Paper delivered.
21. Notice: - Conference on 8 and 9 of July, 1941 concerning setting
up a plan for Lubricating oil production. 3 pgs.
22. Improvement of Storage qualities through Lubrication Additions -
R. Glocker. 10 pages.
23. Development and Experiment on cold withstanding Torpedo - Oils -
July 31, 1940. 33 pgs.
24. Report of Conference - on Lubricating Material for Torpedo Machine -
Mar. 6, 1940. 3 pgs.
25. Short Report # 372 on an investigation of the corrosion Preventative
Hö 1/136 Na - W. Lauer - Aug. 20, 1943. I. G. Farben. 8 pgs.
26. Technical Specifications for the Corrosion Preventative - "Schutzöl 39"
Reich Air Ministry TL 147-900. May, 1939. 4 pgs.
27. Investigation on the Boiling and Ageing Behavior of Lubricating Oils -
O. Wedmair and L. Nenninger. Yearbook 1941 - German Air Institute. II 460-469.

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28. Influence of Motor Lubricating Oil on the cold starting of Aviation Motors - Baier - 24 pgs. June 29, 1942.
29. Molecular-physical Problems of Lubrication. K. L. Wolfe 8/25/42. 4 pgs.
30. Report concerning the organisation of the Lubricating Material commission on 12/15/42 in Leuna. 14 pgs.
31. Concerning the Polymerization of chemically pure unsaturated Hydrocarbons to Lubrication Oils - A. W. Schmidt and V. Schoeller - Reprint from Brennstoff-Chemie. Vol # 20 pg. 235-246, Vol 21 pgs. 247-258, 1942.
32. Concerning the Influence on Hardness to Scratch-Measurements on metals because of absorbed Lubricating material - Dr. Bochmann and L. Fiedesko 8/28/1944.
33. Tests of SS 902 oil in Brama 323P & HM 504.
34. Lubrication as Interfacial Phenomenon - Kluge - Report of the Physical-Technical Reich Institute. 12 pgs.
35. Notice: - Concerning the conference on SS900 Oil Plants at Leuna - July 25, 1941. 5 pgs.
36. Lubricating Oil-Synthesis from Olefins with addition of various quantities of Poly-styrol - Christmann. July 26, 1938. 4 pages.
37. Lubricating Oil Synthesis from Olefins with addition of various quantities of Polystyrol. July 19, 1938 .
38. Synthetic Aviation Lubricating Oil from (alpha) olefins C6-C18.

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H. Suida and J. Haura. April 10, 1942. 25 pgs.

39. Production of Hot Vapor Cylinder Oil and Paraflow from Chlorparaffin. 10/26/1942.

40. Notice: -Lubricating Oil Investigation on T.T.H.
-Lubricating Oil - Becker Leuna-Works Nov. 19, 1937.

41. Paraffination of TTH-Strip offs. Quantity and Quality of the resultant Lubricating Oils. It's Refinement and its behavior in use - Hohn 15 pages.

42. High Vacuum Distillation of Synthetic Lubricating Oils and Numeral Oil Raffinate - E. H. Kadmer. Aug. 1944. 21 pages.

43. Product - Ester - Lubricating Oil Nov. 5, 1942. 1 page.

44. File Notice - Production of Synthetic Lubricating Oil SL Leuna - Jan. 22, 1942 2 pages and flow sheet.

45. Report - Production of aviation Oil through mixed polymerization. Leuna Mar. 29, 1943. 9 pages.

46. Lubricating Oil from Kogasin and Tar Distillation Products - Part VIII - H. Kälbel and A. Mensel 3/21/40; Part XI over Catalyst. 10 pages and 14 pages.

47. Lubricating ability - Research Program - 11/4/41. A list of compound to be investigated. 2 pages.

48. High Vacuum distillation of Motor Oil of the Army for purpose of establishing constitution - E. Kadmer. Oct. 1944. 7 pages and graphs.

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49. Lubricating Oil from TTH-Paraffin by means of thermal Splitting and Polymerisation of the liquid Split Products. Leuna - Sept. 6, 1940. 5 pages.
50. Lubricating Compound Mar. 10, 1944. A patent application O. F. 14651 I. G. Farben.
51. Lubricating Compound - Feb. 23, 1944. A patent application O.F. 14614 I. G. Farben. (2 pages).
52. Lubricating Compound - Feb 24, 1944. A patent application O.F. 14620 2 pages. I. G. Farben. (2 copies).
53. Lubricating Oil Plant at Lützkendorf. March 23, 1943, 3 pages concerns aviation oil and the paraaffination Situation.
54. The Relation between Lubrication and wear by the Lubrication Slide Method - E. Heidtrock May 1944 - 21 pages and drawings.
55. File notice - Concerning the Principle of Lubricating Oil - Mixed Polymerization. Leuna Jan. 12, 1942 (2 pages).
56. File Notice of a conference held 11/20/42 in Ludwigshafen on the production of Aviation Oil. 4 pages.
57. Report on Polymerization - Flow sheets given - 1st. page missing.
58. Lubrication Plan for the "Steinkohlenbergwerk Rheinpreussen. Jan. 1939. Contains specifications of Greases and oils.
59. The 1st. Session of the Lubrication Commission at Leuna 12/15/42 18 pages.

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60. Specification for Aviation Motor Lubricating Oils -
Til47-650 Dec. 1944. Ministry for air (2 copies).
61. Synthetic Special Oil - Leuna Feb 5, 1942. The physical
properties of two special oils.
62. Sulfur-Ester and Lubricating Oil-Inhibitor - Leuna, Nov. 5, 1942 -
Preparation of the material.
63. A contribution towards the elucidation of the constitution
of Mineral Lubricating Oils - E. H. Kadmer - Report #18
of the German Institute for Fuels. 38 pages.
64. Lubricating oil for TL-Equipment - Socks - Nov. 16, 1944 -
5 pages text, 5 pages tables and curves.
65. Investigation of Pumping Qualities of Motor Oils - Report #572 -
Halder - I. G. Farben July 20, 1944. 8 pages plus drawing and
graphs.
66. The Chemical Technologie of Lubricating Oil - Dr. Zom.
March 1938 I. G. Farben 109 pages.

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Part 28

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- 1- ANIC - An illustrated story of the Italian Hydrogenation Plants at Bari and Livorno 2 copies.
- 2- Offer on an Installation with a years production of 180,000 tons of aviation Gasoline and 30,000 tons of Liquid Gas from Brown Coal through Catalytic Pressure Hydrogenation for the Union of Socialist Soviet Republic - Dec. 1939 Number 340. I. G. Farben AG. A complete Estimate - with flow sheets, material Requirements and cost figures. - 3 pages.
- 3- Same as above except ^{from hard coal} - Number 338 and Nov. 1939.
- 4- Preliminary Report on the building of the High Pressure Chamber according to the Fuel Oil Investigation Aug-Oct 1941. 29 pages - of text drawing, photographs and flow sheets. Oct. 13, 1941.
- 5- Decline of the many layer body - Report on a conference held in Berlin. Sept. 2, 1938 13 pages.
- 6- Establishing the manufacturing Process of the necessary High Pressure Hollow Chambers. A report of a conference held in Berlin 8/18/38. 5 pages.
- 7- Investigation of many bed chamber and one bed chamber - Measurement and comparison of the Heat transfer ability - Dec. 29, 1938 6 pages.
- 8- Preliminary Report on the many bed chamber May 25, 1938 23 pages of text drawing, graphs and photographs.

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9. Report on the Repairs to Chamber 5 - Böhlen Report #20/44.
Braunkohle-Benzin AK June 15, 1944. 5 pages.
10. Report on the Repairs to Chamber 5 - Böhlen Report #36/43.
10/18/43.
11. Report on the Repairs to Chamber 5 - Dentloff Report #31/43.
9/15/43.
12. Report on the Repairs to Chamber 5 - Dentloff Report #25/43.
July 20, 1943.
13. Report on the Repairs to Chamber 5 - Dentloff Report #12/43.
March 17, 1943.
14. Report on the Repairs to Chamber 5 - ^{Böhlen}~~Böhlen~~ Report #4/44.
Jan. 31, 1944.
15. Rebuilding of the Gasoline-Chamber #5. Dec. 5, 1941.
16. From the Braunkohle-Benzin AK - Magdeburg Works - as a
remembrance - A collection of early and pioneer articles on
Hydrogenation. Photographs and flow sheets included.

08706-08378

08106

1. Kaiser Wilhelm Institute for Coal research. Report on the status of research. "Further development of gasoline synthesis from Carbon Monoxide and Hydrogen, especially in the field of direct synthesis from iso-paraffin. Dec. 1942. Secret". 5 pgs. text. 5 graphs. 5 tables.
2. Report on Aviation gasoline and its production. M. Pier. 25 pgs. including graphs and tables. Undated.
3. Report on resin formation and prevention in gasolines during storage and artificial aging. Referred to in colloquium 31 Jan. 1942. 20 pgs. including some illustrations and graphs. High pressure research Lu 558 27 Jan. 1942.
4. Tables of known hydrocarbons. I. G. Farben. 1 December, 1936. 34 tables and 3 supplementary tables in folio. 4 pgs. text.
5. Gas constant tables 4th edition data based on 0°C 760mm Hg. Leunawerke 6 July, 1932.
6. Research reports on fuel structure work done at the govt. research office. Vol. III May, 1942. Munich Chemical technology institute. 112 pgs. including graphs and illustrations.
7. Assembly of 56 photos with explanation showing damage resulting from bombing attack of 28 May 1944. 18 loose pictures no explanation. Leunawerke (in the vicinity of Merseburg).

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08379 - 08498

Part 30

08379

1. The preparation of dicarboxylic acid by electrolysis.
2. Preparation of antioxidants for lubricating oils.
3. Preparation of higher boiling aromatic hydrocarbons.
4. Miscellaneous data on cyclohexane oxidation.

PART 1

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In A Paper Bag Identified As
FT Flow Sheets and Equip. Details

1. Extract from "Treatises on coal /carbon/ Vol. 11" 41.
Investigations on the conversion of carbon monoxide and
carbonic acid into methane with increased pressure. 4
pgs. 1931 Hydrogenation of carbon monoxide contained in
coke gas into methane. Conversion of the carbon monoxide
of a mixed gas (rich in carbon monoxide) into methane.
Influence of various materials on the formation of methane.
2. Report on work on hydrocarbon synthesis Leuna Werke -
Synthesis experiments with iron catalysts. 25 pgs in-
cluding some graphs and tables March 1940, Dr. Wintzer.
3. Basis of the Oppau pressure conversion 6 pgs and 1 flow
diagram. Oppau Co. 6 Jan. 1941.
4. Report on the hydrocarbon synthesis experiments in Leuna.
Marked "Incomplete" in English on the cover. Feb. 1939.
Covers laboratory work, some technical experiment theory,
proposed projects and experimental oven construction
types. 126 pages including some graphs calculations and
illustrations.
5. Drawing # M3797 22 Nov. 1940. Flow diagram - arrangement
for KW SY experimental installation Me458. Ammoniakwerk,
6. Drawing # M3369-1 30 May, 1940. Flow diagram: K.W. Sy
experimental installation about 750 tata.

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7. Drawing # D Sam 103 undated 2 copies. Flow diagram: Medium pressure synthesis of hydrocarbons LURGI cycle process.
8. Drawing # D Sam 101 undated 2 copies Flow diagram: Medium pressure synthesis of hydrocarbons LURGI Cycle process. (gases rich in CO and using conversion gas).
9. Scale drawing # 45105 Test contact oven (Rheinpreussen) 28 Nov. 1944 Proposition I.
10. Scale Drawing # 45099 10 Nov. 1944 Test contact oven - Rheinpreussen.
11. Drawing # 200/57 26 June 1942, Contact oven installation.
12. Scale Drawing # 45179 29 June 1943. Arrangement of tubes in test contact oven.
13. Drawing # ODS/469 LURGI undated. Arrangement of iron catalyst experimental unit. Flow diagram.
14. Scale Drawing # M7445-2, 29 June, 1940. Ammoniakwerk Experimental installation for 750 Talo Ma458. Flow diagram.
15. Drawing # ODS666 15 May, 1944. LURGI Arrangement of complete cycle - Flow diagram.
16. Scale drawing # OFT/147. 7 May 1941 - LURGI contact oven 300 mm NW.

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17. Scale drawing #4588 15 Sept. 1941 External view of all the tubes and base with 61 holes.
18. Drawing # N2725-1 Scale drawing of a catalyst chamber. 16 May, 1939.
19. Scale drawing # 26136 Boiler support 11 June, 1942.
20. Drawing D Sam 104 Undated. Flow diagram. Medium pressure synthesis of hydrocarbons. LURGI cycle diagram.
21. Drawing # 71-120 (Krupp # 07z530/lc) Fuel plant chamber with tubes 24 May, 1945.
22. Scale drawing # C670d. I.G. Farben. Pressure converter. 28 Dec. 1943.
23. Scale drawing # C679 28 Nov. 1941. Pressure converter I.G. Farben. Evaporator.
24. Scale drawing # C671 24 Oct. 1941. Arrangement of auxiliary rings in evaporator. I.G. Farben.
25. Scale drawing # 684a I.G. Farben. 8 Dec. 1941. Experimental evaporator NW 250. Oxygen contact.

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Sonderabdruck aus den „Abhandlungen zur Kenntnis der Kohle“, Bd. 11

41. Untersuchungen zur Umwandlung von Kohlenoxyd und Kohlensäure in Methan bei erhöhtem Druck.

Von Franz Fischer und Helmut Pichler.

Einleitung	Seite 386
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Vor einiger Zeit haben wir über Arbeiten berichtet¹⁾, die sich mit dem „Einfluß des Druckes auf einige Umsetzungen des Wassergases“ befassen. Es wurde die vorhandene Literatur weitgehend berücksichtigt und u. a. die Druckabhängigkeit des Gleichgewichtes $\text{CH}_4 + \text{CO}_2 = 2 \text{CO} + 2 \text{H}_2$ behandelt. Dieses liegt bei Atmosphärendruck bei hohen Temperaturen (900°) vollständig auf der Kohlenoxydseite, bei niedrigeren Temperaturen (400°) auf der des Methans. Druckverminderung bringt, wie dies auch theoretisch ermittelbar ist, eine Verschiebung nach der rechten Seite, während hoher Druck das Gegenteil, nämlich Methanbildung auch bei 600–700° noch bewirkt.

In vorliegender Arbeit sind einige Versuche zusammengestellt, bei welchen Kohlenoxyd bzw. Kohlensäure bei hohen Drucken in Methan umgewandelt wurde, bei Temperaturen, bei welchen Kohlenoxyd bei Atmosphärendruck auch theoretisch nicht mehr restlos in Methan umgewandelt werden kann. Die Abb. 6 der genannten Veröffentlichung zeigte, in welchem Maße der Druck mit der Temperatur gesteigert werden muß, wenn man ein Kohlenoxyd-Wasserstoffgemisch in Methan und Kohlensäure umwandeln will. Das Arbeiten bei hohen Temperaturen könnte den Vorteil besitzen, daß man zur schnellen Gleichgewichtseinstellung keine oder aber weniger empfindliche Katalysatoren verwenden könnte, als bei der normalen Temperatur von rund 300°.

Versuchsordnung.

Die Versuche wurden in einem V, A-Stahlrohr von 2 m Länge und 1,5 cm leichter Weite ausgeführt. Es ruhte zur Beheizung in einem 1,5 m langen elektrischen Ofen. Bei einer Reihe von Versuchen war das Rohr mit Stoffen gefüllt, welche die Umsetzung katalytisch beeinflussen sollten. Die Temperaturmessung erfolgte außen am Metallrohr mit Platin-Platin-Rhodium-Thermoelementen.

Die Gase, deren Kohlenoxyd in Methan umgewandelt werden sollte, wurden auf Stahlflaschen aufgepreßt und aus diesen für die Versuche entnommen.

Hydrierung des im Kokereigas enthaltenen Kohlenoxyds zu Methan.

Tafel 1 bringt Versuche, bei welchen Kokereigas (2,2 % CO_2 ; 1,8 % s. K. W.; 0,7 % O_2 ; 4,9 % CO ; 55,2 % H_2 ; 24,0 % CH_4 ; 0,0 % C_2H_6 ; 11,2 % N_2) bei 70–80 at Druck und 700° erhitzt wurde.

¹⁾ Brennstoff-Chem. 12, 385 (1931) ds. Bd. Nr. 40.

Tafel 1. Anfangsgas: Kokereigas; Druck 70—80 at; Temperatur 700°.

l/Std.	Zeit Std.	CO ₂	sKW	O ₂	CO	H ₂	CH ₄	C ₂ H ₆	N ₂
0	3	0,0	0,2	0,5	1,5	39,6	44,4	0,0	13,8
1	1	2,1	0,3	0,3	3,3	47,9	32,6	0,5	13,0
1	18	0,0	0,0	0,2	0,6	37,7	47,3	0,0	14,2
5	5,5	0,7	0,0	0,0	3,5	49,5	33,3	1,2	11,8

Bei Versuch 1 wurde mit ruhendem Gas, bei Versuch 2 und 3 mit 1 l/Std., bei Versuch 4 mit 5 l/Std. (hinter der Apparatur entströmendes Reaktionsgas) gearbeitet. In der Spalte Zeit ist die Versuchsdauer angegeben, nach welcher die Gase zur Analyse entnommen wurden. Aus der Tafel ist die Zusammensetzung der Reaktionsgase zu ersehen. Bei Versuch 1 sind Kohlensäure und Kohlenoxyd unter Bildung von Methan verschwunden. Diese Umwandlung ist bei Versuch 3 am vollständigsten. Bei Versuch 4, bei 5 l/Std. Gasdurchsatz ist sie noch nicht beendet.

Die Versuche zeigen, daß bei der Verwendung hoher Temperaturen und der dann durch die Gleichgewichte bedingten hohen Drucke Kohlenoxyd und Kohlensäure auch ohne Verwendung aktiver Katalysatoren zu Methan hydriert werden können.

Umwandlung des Kohlenoxyds eines kohlenoxydreichen Mischgases zu Methan.

Tafel 2 bringt Versuche analog jenen der Tafel 1. Das zur Umsetzung gelangende Gas war ein Gemisch von Kokereigas und Wassergas im Verhältnis 1:1. Der Kohlenoxydgehalt betrug 21—22 %. Die Versuche 2 und 3 wurden mit ruhendem Gas, Versuch 1 mit 1/2 l/Std.

Tafel 2. Anfangsgas: Kokereigas + Wassergas (1:1); Anfangsdruck 80 at; Temperatur 700°.

l/Std.	Zeit Std.	CO ₂	sKW	O ₂	CO	H ₂	CH ₄	C ₂ H ₆	N ₂
1/2	18	3,4	0,0	0,2	10,4	12,0	52,8	3,6	17,6
0	3,3	4,8	0,4	0,3	13,9	23,8	44,0	0,0	12,8
0	60	0,0	0,0	0,2	1,2	16,6	62,0	0,0	20,0

Durchsatz ausgeführt. Bei Versuch 3 wurden bei 200° 80 at Mischgas aufgepreßt. Während der 20 Minuten dauernden Anheizung auf 700° stieg der Druck auf 114 at, um dann während der 60 Stunden des Versuches bis auf 42 at abzufallen. Da die abgelesene Temperatur der Höchsttemperatur entsprach, die beiden Enden des Druckrohres aber sich auf Zimmertemperatur befanden, darf die Druckänderung nicht als Maß für die Umsetzungen herangezogen werden. Auch bei den Versuchen mit kohlenoxydreichem Anfangsgas wurde entsprechend dem vorhandenen Wasserstoff, im leeren Druckrohr das Kohlenoxyd zu Methan hydriert. Neben den Reaktionsgasen entstand eine alkalische wäßrige Flüssigkeit mit phenolartigem Geruch.

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Franz Fischer und Helmut Pichler,

Einfluß verschiedener Stoffe auf die Bildung von Methan.

Tafel 3 bringt eine Versuchsreihe, bei welcher die Umsetzungen in Anwesenheit verschiedener Stoffe durchgeführt wurden.

Tafel 3.

Nr.	Füllung	at	Temp.	Zeit	l/Std.	CO ₂	sKW	O ₂	CO	H ₂	CH ₄	C ₂ H ₆	N ₂
1	NH ₃ -K.	100	700	3,3	0	8,4	0,1	0,2	15,9	22,6	39,7	—	13,1
2	Silicagel	80	700	1	3	6,6	0,0	0,5	14,4	45,5	22,9	0,5	9,6
3	"	80	750	3	3	9,4	0,0	0,5	10,3	33,9	33,8	0,0	12,1
4	"	80	750	27	3	9,2	0,0	0,0	10,6	31,2	37,8	0,0	11,2
5	"	80	650	29	3	9,6	0,0	0,5	10,5	30,9	37,0	0,0	11,5
6	Drahtstifte	75	730	3	3	5,4	0,0	0,5	7,4	36,7	35,5	0,9	13,6
7	"	75	660	5	3	7,3	0,0	0,3	8,1	34,0	37,9	0,0	12,4
8	"	75	700	20	3	5,9	0,0	0,0	7,5	23,2	50,0	0,0	13,4
9	Bauxit	65	700	3	3	19,4	0,0	0,2	14,8	42,4	9,6	0,0	13,6
10	"	65	700	5	3	19,4	0,0	0,4	4,7	42,3	22,7	0,8	9,7
11	"	65	700	21	3	14,9	0,0	0,0	5,9	51,6	19,0	1,0	7,6
12	"	65	700	27	3	14,4	0,0	0,4	5,8	35,5	33,3	0,0	10,6
13	"	65	700	48	3	14,3	0,3	0,4	7,0	33,6	32,7	0,0	11,7
14	Silberasbest	70	500	3	3	4,3	0,1	0,2	21,8	49,6	13,6	2,4	8,0
15	"	70	500	5	3	5,7	0,0	0,1	19,7	48,1	15,7	2,2	8,5
16	"	70	600	—	3	10,3	0,1	0,0	12,1	40,3	26,3	1,5	9,4
17	"	70	700	—	3	11,6	0,0	0,2	9,8	30,1	38,7	0,0	9,6
18	Mo	70	600	—	3	15,1	0,2	0,0	2,1	20,0	50,3	0,0	12,3
19	"	70	700	—	3	14,6	0,1	0,0	3,5	28,3	42,4	0,0	11,1
20	"	70	600	—	1	1,7	0,5	0,0	0,4	38,6	46,8	0,0	12,0
21	"	70	600	—	3	1,6	0,1	0,1	1,5	—	—	—	—

Bei Versuch 1 war das Rohr mit einem Eisenkontakt gefüllt, wie er für die Synthese von Ammoniak verwendet wird. Des weiteren wurden Silicagel, Eisendrahtstifte, Bauxit, auf Asbest niedergeschlagenes Silber und Molybdän in Pulverform auf ihre Eignung als Reaktionsbeschleuniger untersucht. Das Anfangsgas enthielt bei den Versuchen 1—19 2 % Kohlensäure, 22—24 % Kohlenoxyd und 52—55 % Wasserstoff neben Methan und Stickstoff. Die Strömungsgeschwindigkeit war 3 l/Std., die Temperaturen betrugen 500—700°. Bei den Versuchen 1—17 konnte keine nennenswerte katalytische Begünstigung der Methanbildung festgestellt werden. Bei Verwendung von Silber ist die Bildung von Äthan zu erwähnen. Am günstigsten waren die Ergebnisse derjenigen Kontaktversuche, bei denen Molybdän Verwendung fand. Bei Versuch 20 und 21 enthielt das Anfangsgas 1—2 % Kohlensäure, 16 % Kohlenoxyd und 67 % Wasserstoff. Bei 600° und 70 at wurden bei 3 l/Std. im Endgas noch 1,5 % Kohlenoxyd und bei 1 l/Std. nur mehr 0,4 % Kohlenoxyd gefunden. Die Geschwindigkeit der Methanbildung ist nicht wesentlich größer als bei den Versuchen im leeren Rohr.

Reduktion von Kohlensäure zu Methan.

In das V₂A-Rohr wurden 30 at Kohlensäure und 128 at Wasserstoff gepreßt. Der Anfangsdruck bei Zimmertemperatur betrug also 150 at. Nach 1 Stunde Anheizen war die Temperatur 600°, der Druck 300 at.

Es wurde nun 16 Stunden diese Temperatur beibehalten, in welcher Zeit der Druck auf 85 at (bei 600°) abfiel. Das Reaktionsgas wurde abgelassen, in einem Gasometer aufgefangen und analysiert. Es setzte sich zusammen aus 2,6 % CO_2 , 0,1 % sKW., 0,0 % O_2 , 8,0 % CO , 13,7 % H_2 , 60,2 % CH_4 , 0,0 % C_2H_6 und 15,4 % N_2 .

Der größte Teil der angewandten Kohlensäure wurde in Methan umgewandelt.

Hydrierung von Magnesit.

Das V_2A -Rohr wurde mit erbsengroßen Magnesitkörnern gefüllt, 150 at Wasserstoff aufgepreßt und auf 600° erhitzt. Nach 1 Stunde betrug der Druck 255 at. Entsprechend den Umsetzungen fiel der Druck langsam ab. Nach 45 Stdn. betrug er noch 210 at. Das hierauf abgelassene Reaktionsgas enthielt 41,6 % CO_2 , 0,0 % sKW., 0,3 % O_2 , 30,3 % CO , 11,0 % H_2 , 8,0 % CH_4 , 1,7 % C_2H_6 und 7,1 % N_2 . Der angewandte Wasserstoff genügte nicht für die Hydrierung der gesamten Kohlensäure des Magnesits. Er wurde jedoch wie bei den Kohlenoxyd- und Kohlensäure-Wasserstoffversuchen für die Bildung von Kohlenwasserstoffen verwendet. Das Endgas enthielt außer Methan auch Äthan. Die beiden Gase bildeten sich ungefähr im Verhältnis 5:1.

Zusammenfassung.

Es wurde gezeigt, daß Kohlenoxyd und Kohlensäure bei hohen Temperaturen und Drucken auch ohne Anwendung aktiver Katalysatoren in Methan umgewandelt werden.

Mülheim-Ruhr, 1931.

Berichtsammlung des Versuchs-Laboratoriums

Bericht Nr. 497

497

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Bericht über Arbeiten

zur

Kohlenwasserstoff-Synthese.

eingetragen 15. 11. 1911

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Erklärung einiger in Text öfter gebrauchter Bezeichnungen.

1. Technisch reiner Wasserstoff

Analysen	CO ₂	O ₂	H ₂	CO	CH ₄	N ₂
	0,5		95,2	1,0	1,0	2,6
2. Wassergas	4,5		51,6	42,6	0,2	1,1
2a. Ideales Wassergas			50	50		
3. Synthesegas		1,6	71,0	26,6	0,4	0,4
3a. Ideales Synthesegas			66,7	33,3		

4. Spezifische Ausbeute = g Pr./m³ ideales Wassergas
Synthesegas

5. Umsatzausbeute = g Pr./m³ umgesetztes ideales Wassergas
Synthesegas

6. Raumausbeute = kg Pr./m³ Kontaktraum und Tag

7. Belastung = Liter Gas/Liter Kontakt und Stunde

8. Flüssigausbeute = Ausbeute an Produkt > C₅/m³ Idealgas

9. Gasol = < C₅ = C₃ + C₄

Dr. Wts./Kr.

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Leuna-Werke, am 3. April 1940
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Kohlenwasserstoff-Synthese-Versuche mit Eisenkontakten.

Bei den Versuchen zur Kohlenwasserstoff-Synthese mit Eisenkontakten wurden serienmäßige Kontaktversuche nicht angestellt, sondern mit zur Kohlenwasserstoff-Synthese von anderer Seite her entwickelten Kontakten und einem hier zur Verfügung stehenden Eisenschmelzkontakt wurde der Einfluß des Kontaktes, der Fahrtemperatur, der Gasszusammensetzung und der Fahrgeschwindigkeit auf die Art und Menge des anfallenden Syntheseprodukts festgestellt. Zur Verwendung kam ein für die Kohlenwasserstoff-Synthese aus $\text{CO} + \text{H}_2$ von Dr. Linckh entwickelter Eisenschmelzkontakt, ein für die Kohlenwasserstoff-Synthese in Gasphase nach Michael entwickelter Eisensinterkontakt und der in Leuna verwandte Ammoniak-Kontakt. Reduziert wurden die Kontakte bei verschiedenen Temperaturen von $450 - 850^\circ$ mit einem technischen Wasserstoff drucklos. Je nach Temperatur betrug die Reduktionszeit 5 - 15 Tage.

Qualitativ ist bemerkenswert, daß jeweils auf dem Kontakt an der Seite des Gas-eintritts eine gewisse Menge Ruß mit ca. 15 - 20% Fe_2O_3 vermischt zu finden war. Die Ursache der Rußbildung ist in dem CH_4 + CO-Gehalt des angewandten H_2 zu suchen.

Die Öfen, in denen die Synthese durchgeführt wurde, waren Röhrenöfen mit $d = 15$ mm des einzelnen Kontaktrohres, als Heizmedium diente ein mit einem Gemisch von Diphenyl und Diphenyloxid gefüllter Mantel. Der Temperatenausgleich in diesen Öfen ist bei Ölfüllung nicht so gut wie bei Wasserfüllung. Temperaturunterschiede bis zu 5° über die Länge der Rohre sind unvermeidlich, während bei Wasserfüllung praktisch völliger Temperatenausgleich zu erreichen ist.

Als Gas wurde zunächst ein Synthesegas angewandt mit der Zusammensetzung $\text{CO} : \text{H}_2 = 1 : 2,6$; die von uns mit Fe-Kontakten bei 20 atü durchgeführte Synthese verlangt ein Gas der Zusammensetzung $\text{CO} : \text{H}_2 = 1,2 : 1$. Wir sind daher, um der geforderten Gaszusammensetzung näher zu kommen, dazu übergegangen, Wassergas von genügender Reinheit für unsere Versuche zu verwenden, mit ca. 43 % CO, 53 % H_2 und 4 % CO_2 . Legt man bei der Berechnung der Ausbeuten ein Idealgas der Zusammensetzung $\text{CO} + \text{H}_2 = 1 : 1$ zu Grunde, so ergeben Synthesegas und Wassergas annähernd gleiche Ausbeuten, d. h. aber die Effektivausbeuten je m^3 Synthesegas und m^3 Wassergas