FILM STUDY GROUP

REPORT

T.O.M. REEL NO. 43

Prepared by

THE PURE OIL COMPANY

THE PURE OIL COMPANY

RESEARCH AND DEVELOPMENT LABORATORIES

Report on

MICROFILM REEL #43
U. S. GOVERNMENT TECHNICAL OIL MISSION

Documents from:

Ruhrchemie A.G. at Sterkrade Holten
Koppers-Essen
Hoesch Benzin at Dortmund
Krupp Triebstoff Werke A.G. at Wanne-Eickel
Kamen-Dortmund

Prepared by Frank W. Pfohl

U. S. GOVERNMENT TECHNICAL OIL MISSION
MICROFILM REEL #43

The following report on Microfilm Reel #43 is presented in abstract form. Parts of the subject matter contained in this reel may be of sufficient interest to warrant complete translation for interested groups. However, the value of the film to the oil industry as a whole does not warrant complete translation.

Note: Microfilm Reel #43 has the advantage of consecutively numbered frames. The numbers of the frames from which the information was obtained precedes the abstracted information. In some instances subdivisions of general topics are noted by frame numbers in parenthesis.

Frank W. Pfohl
The Pure Oil Company
Research and Development Laboratories

BAG 3439 - TARGET #30/5.01

RUHRCHEMIE A.G. STERKRADE-HOLTEN

Frame #	
1 and 2	A comparative study of the effects of two motor fuels of different boiling ranges on the oils used in test motors.
3	Boiling range (distillation) curves of the above-mentioned motor fuels.
4 to 14	Data on the sources of energy employed in the synthesis of petroleum products. A discussion of the use of steam, coke, and electricity as sources of energy, both in the normal synthesis, and in synthesis under pressure.
15	Production chart showing comparative yield for normal synthesis, and synthesis under pressure.
16 to 20	Catalyst Regeneration. The filtration of the carbonate sludge formed in the new solutions.
21	Catalyst Regeneration. The separation of Thorium from Iron.
22 to 23	Filterability of carbonate sludge.
24 to 28	Smoke Screen Production and Smoke Producing Devices.
29 to 31	Proposal for the production of synthetic gas from water gas residue.
32	Hydrogen for Reduction. The procuremsnt of hydrogen from city (commercial) gas for use in the reduction of Cobalt and Nickel catalysts.
34 to 58	The Oxo-Process.
(34 to 35)	Letter concerning the oxo-process being run favorably in the presence of water.
(36)	Synthesis of fatty-alcohols.
(36 to 37)	Discussion of methods used in Holten, Leuna and Ludwigshafen.
(37 to 38)	Assignments for future work on the oxo-process at Holten, Leuna and Ludwigshafen.
(39 to 40)	Diagram for oxo-process at Leuna.

Frame #

(41)	Letter from I. G. Farben Co. to Ruhr Chemie, Holten, concerning cost estimates of oxo-process.
(42 and 43)	Discussion of Patent Lists and exchange of information on the oxo-process.
(44 to 46)	Cost and material estimates for the oxo-process.
(47)	Diagram of apparatus for the oxo-process.
(48 and 49)	Essential results of the oxo-process.
(50 and 51)	Report on production as of January 17, 1942.
(52)	Time-Temperature curves for oven #5-453A.
(53 to 56)	Standing costs of production.
(57 and 58)	Estimates of personnel and material for the "oxo-process" at Oberhausen-Holten.
59 to 202	Catalyst Regeneration.
(59)	Dry Regeneration Process.
(60 and 61)	Cobalt Regeneration.
(62 to 65)	Inactivation of Catalyst Regeneration.
(66 and 67)	Dry regeneration of catalysts. Experimentation to follow.
(68 to 76)	Partial report on experiments with dry regeneration.
(77 to 78)	Diagrams - The disposition of a Contact Plant.
(79 to 81)	Regeneration of Cobalt solutions by evaporization and crystallization. The results of two (2) experiments. 1. Experiment with the precipitated Cobalt solution from the catalytic reaction. 2. Experiment with the precipitated Cobalt solution following treatment with Magnesium nitrate solution, yielding 10% $MgNO_3$/Co.
(82 and 83)	A tabulation of the above experiments.
(84 and 85)	Corrosion in the presence of an acid-resisting stone used as an outer lining for the evaporating of Cobalt solution.
(86 to 88)	Thorium Regeneration. Recovery of Thorium from Fluoride precipitated sludge. Recovery of Thorium, directly from solution.

Frame #

(89 to 92) Regeneration of Cobalt from a contact solution by purification through evaporation and crystallization.
Experiments on Magnesium containing Cobalt solution.
Two methods of purification.
1. Fluoride purification.
2. Precipitation of Cobalt Carbonate and the direct application of the Cobalt Carbonate precipitate in contact production.

(93 to 95) Regeneration of the used Cobalt solution elimination of the precipitated catalyst, in two stages.

(96 to 98) Necessity of increasing Thorium regeneration.
Regeneration of kieselgur.
Results to be awaited on drying and incandescence, two steps.
Discussion on various problems of regeneration being handled by staff members.
Ammonium carbonate regeneration. Problems and questions to be considered at a later date.

(99 to 101) Regeneration employing ammonium carbonate.
Expected yields 80% Cobalt and 60 to 70% Thorium.
Use of Nitric acid solution to precipitate Aluminum, Iron and Calcium leaving Cobalt in solution.
(A discussion of method and equipment.)
Regeneration by crystallization of Cobalt Nitrate.
A comparison of this method with the above method as concerns yield of catalyst.

(102 to 107) Purification of Cobalt solutions by evaporation.
1. Evaporation and fractional crystallization gives cobalt nitrate.
2. Crystallization of Cobalt only.
Contents of the raw solution.
Contents of the evaporated solution.
~~Contents of the mother liquor.~~
The distribution of calcium.
Method for the elimination of organic substances.
3. Crystallization of Cobalt with Magnesium.
Essentially a double salt $Co(NO_3)_2 \cdot 2\ Mg(NO_3)_2 \cdot 18\ H_2O$
4. Direct evaporation of an acid solution.
Not yet determined whether Cobalt-nitrate can be sufficiently purified by crystallization.
5. A technical "follow up".
Technical problems presented by the above processes.

(108) Solubility Chart: Cobalt and Magnesium nitrate in combination in mother liquor.

Frame #

(109 to 111) Thorium-Cobalt complex solution.
Problem of elimination of Fe_2O_3, Al_2O_3 and CaO from the raw nitrate solution by treatment with ammonium carbonate and NH_4OH.
Steam treatment of the complex Cobalt-Thorium.
Treatment of the complex salt solution with Ammonium hydroxide and carbonic acid.
Treatment with Ammonium carbonate.

(112 to 114) Results of research on catalyst regeneration.
Tables showing results.

(115 to 120) Removal of detrimental acids from Cobalt solutions using Al_2O_3 as an agent.
Research problems on the above.

(121 and 122) Use of Fluoride precipitate for the decalcification of Cobalt-Magnesium catalyst.
Cold and heated solutions.

(123 and 124) Tables showing results of the above.

(125 to 136) Solution of the used Cobalt catalyst.
A. Solution
Nitric acid and dil. Nitric acid.
Partial recovery of Cobalt (by use of HNO_3) normally lost by evaporation.
B. Solution of Thorium.
Precipitates out in very fine form.
C. Recovery of kieselgur by filtration
D. Solution without previous paraffinization.
Distillation impractical with large amounts of Diesel oil.
Use of dilute acids facilitates separation and filtration.
Difficulties of Cobalt separation with Nitric acid ~~without deparaffinization.~~
1. Foaming
2. Organic reactions producing fatty acids.

(137) E. Work methods.
Methods previous to above research.

(138 to 146) Tables on above work.

(147) Purification of regenerated solutions with superheated steam.

(148) Curves showing results of above.

Frame #

(149) Phosphate purification.

(150 to 156) Regeneration of used catalysts over phosphates.
List of uses of many agents.

(157 and 158) Removal of copper from Cobalt nitrate solution.
A list of experiments.

(158 and 159) Removal of Calcium
A list of experiments.

(160 to 162) Discussion of deparaffinization of Cobalt solution.

(163 to 165) Purification of the raw solution with Sodium Fluoride:
3 methods:
1. Solution previously precipitated with Soda.
2. Acid solution with an overcharge of Sodium Fluoride.
3. Very large amount of Sodium Fluoride used, followed by precipitation with Soda.
A discussion of the above methods.

(166 and 167) The restricted precipitation of Calcium during precipitation with Sodium Fluoride.
Process for the determination of Fluoride remaining in solution.

(168 to 171) Solubility of precipitated sludge: two methods:
1. Oxalate method.
2. Fluoride method.
Discussion of the oxalate method.
Recommended process for the oxalate method.
1. Solution of sludge.
2. Precipitation of the unfiltered solution with sodium oxalate.
3. Filtration of the oxalate .
4. "Cooking" out other oxalates.
Discussion of the Fluoride method.
Discussion of Sodium Phosphate treatment of solution.

(172 and 173) Individual problems relating to catalyst regeneration, i.e. transportation and costs, amount of production.

(174) Specifications for Thorium Catalyst used in the production of fuels.

(175) Amount of Thorium recovered by regeneration and amounts expected to be recovered.

(176 and 177) Probability of recovery of Thorium from sludge.

Frame #

(178) Work on Iron, Thorium sludge of precipitated solutions.

(179 to 180) Recovery of Thorium.

(181 and 182) Sulfur content in contact solutions.

(183 and 184) Life of catalyst.
A table.
A. Life of catalyst.
B. Form.
C. Catalyst Chemistry.

(185 to 187) An oven to be put into use, using mixed Cobalt-Magnesium contact catalyst.
A discussion of the probabilities of the above.

(188 to 191) A general discussion of methods.

(192 to 195) Catalyst production.
1. Assembly.
2. Solution.
3. Paraffinization.
4. Kieselgur, filtration.
5. Kieselgur, regeneration.
6. Purification of solution.
7. Organic purification
8. Precipitation and washing
9. Formation.
10. Continuous reduction.
A diagram of the above.

(196 to 198) Catalyst costs.

(199 to 202) Patent lists.

203 and 204 Proof of the yield of a synthetic process installation.
140 gm. of synthetics to be produced from 1 Cu. Meter of water gas.
1. Basis of yield.
Methanes, ethanes and ethylenes produced later becoming C_3-C_4 chains.
2. Sampling.
3. Analysis.
To be determined CO_2, O_2, CO.
N_2C-hydrocarbons, C_2-hydrocarbons, N_2 C_3-C_4 hydrocarbons.

205 French patent lists.

206 and 207 French lube oil contract specifications.

BAG 2917 - TARGET #30/612

KOPPERS-ESSEN

Frame #	
208	English Title Page
209 to 358	Gasification of Coal Dust
(210 to 214)	Discussion of gasification of coal dust to produce heating gas and synthetic gas. 1. Production of heating gas. Pilot plant production to be increased. Search for heatinggas with capacity of 2000 WE (heat units) 2. Synthetic gas production. Fischer-Tropsch method to be attempted. Medium pressure synthesis with Fe contact. Some cost estimates.
(215 to 218)	Types of coke to be used; probable gas production per ton of coke; costs of production.
(219 to 224)	The Winkler process attempted at Brabag-Zeitz proved to be of experimental value only. Comparison of Kopper and Winkler processes; the Kopper process superior from standpoint of expense and production. The Winkler process, and apparatus described and discussed.
(225 to 226)	Comparative fuel costs for the gasification of coal dust by the Kopper and Winkler methods.
(227 to 237)	Discussion on the installation of gasification plants. New materials needed. Present apparatus which is still of use.
(238 to 240)	Analysis of "coal" dust from granular lignite coke. Gas analysis. Same apparatus used for producing Tail gas, in water gas. Analysis of Tail gas. Production per hour.
(241 to 244)	Advantages of gasification at Zeitz over the Winkler system. Tail gas and gasification of coal dust compared.
(245 to 251)	Gas production plant for hydrogenation work at Zeitz. Hydrogenation of brown coal. Costs.
(252)	English Title Page.
(253 to 258)	Tables Comparison of coal gas, water gas, cracked gas, converter gas, and synthetic gas. Mixtures of gases.

Frame #	
(259)	Research plant and gasification of coal dust.
(260 to 266)	Costs - synthetic gas production, fuel.
(267 to 269)	Construction of gasification plant discussed.
(270)	Favorable gasification results thru use of screen as suggested by H. H. Koppers.
(271 to 272)	Construction of gasification plant discussed.
(273)	Research with brown coal dust.
(274)	Sulfur determination in gasification 180 g inorganic S/100 m^3 of gas. 3-5 g organic S/100 m^3 of gas.
(275-278)	Construction cost estimates.
(279-281)	Distribution of construction design.
(282-285)	Placement of reserve generators.
(286)	Diagram of a gasification plant.
(287)	Synthetic gas plant at Rheinpreussen.
(288-289)	Discussion of patent rights.
(290-291)	By-products H_2SO_4 at Rheinpreussen
(292-295)	Coke plant Fatbergschichte. General production and costs.
(296-298)	Installation of a generator.
(299-302)	Some specifications for a reserve water gas generator.
(303-305)	Costs of above.
(306-312)	Construction work at Rheinpreussen Generator. Automatic cleaning device. Specifications. Materials and personnel available. Probable construction of an A.B.C. Roaster.
(313-315)	Patent rights involved in construction of above generator. Water gas-high in CO is desirable if gasoline by the Fischer-Tropsch method is to be obtained. Treatment of slag to retain carbon.
(316-317)	The water gas generator at Rheinpreussen as a financial risk.

Frame #	
(318-319)	Questions about the construction of a synthetic gas plant. Cost of gasification with steam and acid in a dry roaster. Cost of gasification of coke in a water gas-generator.
(320-322)	Processing of "gas flame" coal from Neumühl at medium temperatures to give a tar-free coke. Distillate gas cracked and mixed with gas previously produced to give synthetic gas. Low temperature cokes are not tar-free and yield gum formers. The treatment of the "gas-flame" coal.
(323)	Difference in cost of purchasing, or constructing the generator at Rheinpreussen.
(324)	A discussion concerning the above generator.
(325)	*Note: This synthetic gas producer contains a separate washer.
(326)	Safety devices for the gasser. Coking minerals found in strata (Laboratory research forthcoming).
(327-328)	CO & H rich gas in "Blue water gas". Production of steel and ceramics (From a conference in 1936 with Mr. Forbes, vice president of U.S.Steel.
(329-331)	Construction of generator at Rheinpreussen.
(332-337)	Gasoline synthesis plant. Total disposition. Prices. Construction plans.
(338-340)	Fire resistant stone for coke ovens.
(341)	Use of contact ovens or synthetic ovens. Loss in contact oven due to paraffinization. Regeneration of catalyst.
(342)	Rheinpreussen construction to await results of Fischer synthesis now in progress at Vilitor.
(343-348)	Summary of discussion concerning construction of a Fischer synthesis plant.
(349)	Chart showing stages of water gas to gasoline.
(350)	#
(351-358)	Tables: Yearly expenses, sales, and profits.
359	English Title page.
360 to 412	Gasification of brown coal briquettes.
(360-362)	"Producer gas" from brown coal briquettes.

* Translated in full.
\# Too faint for translation.

Frame #	
(363)	Diagram of the above.
(364)	Installation of a generator for the gasification of brown coal briquettes.
(365)	Bids on construction.
(366)	*"Construction to begin following October 1, 1941."
(367-369)	Need for sketches showing processes of gasification of coal dust, and acid gasification.
(370)	Concerning the plant at Brabag-Böhlen
(371)	Sulfur in gasoline produces H_2SO_4 which attacks generator tubes. A method of correction to be studied.
(372-373)	Brown coal gasoline. Corrosion of generator tubing. A method of correction.
(374-376)	Brown coal gasoline. Wish to decrease price of synthetic gas. Decomposition of briquettes. Granular structure of briquettes at least 4 mm preferable. Necessity for hourly control in briquette factory. Soda for removal of H_2SO_4, H_2SO_3 and H_2S tied up in syndicate.
(377)	Discontinuous Synthetic gas production. Washing of apparatus with live steam.
(378-379)	References to - (1) Fire resistant stone. (2) Salt containing coals. a. English Treatment. b. Russian Treatment (not recommended).
(380-381)	Briquettes from brown coal. 100 parts coke 10 parts Palatinate clay 5 cm^3 Milk of lime with silicate Pressed at 150 kg/cm^2. Awaiting results to see if this briquette is satisfactory.
(382)	Curves: Burnability at 800°C of cokes, coal, and briquettes.
(383)	Curves: Ditto at 950°C.
(384)	Curve: Ash melting point/size of grain of lignite and coke.
(385)	Curve: Ditto, briquettes.

* Translated in full.

Frame #	
(386-389)	Cracking of stone linings of kettles.
(390-391)	Linings for kettles.
(392-394)	Concerning the "generator plant."
(395)	Cracking of ovens.
(396-401)	Concerning the "generator."
(402)	Work to be done at Essen.
(403)	Briquette manufacture at Essen.
(404-405)	Larger grain fuel more favorable for gasification. Search for binding agent (clay) for briquettes.
(406-412)	Letter from Brabag: Orders.
413	English Title Page.
414 to 467c	Coking.
(414-422)	Coking research with Rheinland coal.
(423)	Burnability.
(424-427)	Reactability of post heated medium temperature coke.
(428 to 440)	Photographs and descriptions of various cokes.
(441-442)	Curves: Burnability of cokes.
(443-445)	Coking. Construction of new apparatus. Gasoline production.
(446-448)	Coal preparation plant. By-products.
(449-452)	Treatment of Rheinland coal by carbolux method. Oven dimensions.
(453)	Carbolux process
(454-455)	Materials, yield.
(456)	"Magazine clipping" Syndicates, etc.
(457)	Diagram of plant for synthetic gas production from brown coal briquettes.
(458)	Diagram of a converter plant
(459-467c)	Koppers Undertakings "1940-1941".

BAG 2719 - TARGET 30/5.04

HOESCH BENZIN, DORTMUND

Frame #	
468	English Title Page.
469-474	Catalyst losses, costs and compositions.
(469)	Yearly Cobalt losses.
(470-471)	Costs. Regenerated catalysts.
(472)	2-3 mm crystals give smaller loss than smaller crystals.
(473-474)	Research: Tables.
475	English Title Page.
476-640	Operations and Tests in the Contact Oven House.
(476-476B)	Method of drying extracted catalyst.
(477-479)	Tables: Adsorption of raw materials.
(480)	Contact oven loads.
(481)	Paraffin extraction of catalyst in nonpressure oven at Ruhrland
(482-484)	Exchange of information on emptying and inspection of ovens - Fuel works Brabag - Schwarzheide. I. Jet or blast extraction. II. Distillation " III. Hydrogenation.
(485-492)	Same as above from Viktor, Krupp, Rheinpreussen, & Ruhrbenzin.
(490-491)	Production chart: Fluid products by pressure synthesis.
(492)	Production chart: A cracking plant.
(493)	Table: Products from Contact ovens.
(494)	Table: Liquid products by pressure synthesis.
(495-496)	Resins in dry purification of catalysts.
(497)	Curve: Dependence of $CO:H_2$ exchange for the Hydrocarbon content in synthetic gas.
(498-499)	Yields, analytical from 5/12/42-7/12/42.

Frame #	
(500-503)	Distribution of gases in contact ovens.
(504)	Flow of gas thru contact oven after long disuse.
(505-507)	Decreased production of synthetic gas.
(508-509)	Emptying by simultaneous extraction from 2 ovens.
(510)	Table: Measurement of adsorption CO:H
(511-512)	Personnel for contact oven house, shifts.
(513-515)	CH_4 formation at various oven loads.
(516-519)	Production for #1 oven for operating period.
(520-521)	Compilation of synthesis yields using material of varied CO:H content.
(522)	Condensate collected - Stage II.
(523-525)	Gas exchange with increased oven charges.
(526)	Table: Primary and vapor products from a contact oven.
(527-528)	Synthetic gas production by condensation - Compressor I on 9/5/41.
(529-531)	Use of a vent for separation of gases.
(532-533)	Results for the month using 3 different agents for gas production.
(534-535)	Curves: showing the above.
(536-537)	Operation of a gas vent of 7000 m^3/hour capacity.
(538)	Operating periods - methods used.
(539)	Compilation of various generating periods.
(540)	Contact dust removal.
(541-542)	Fresh contact for dust removal.
(543)	Drawing: Staub-fort dust remover.
(544-546)	Determination of yield by analysis: Method & Results.
(547)	Note: Result of 3 experiments, extraction outlets.
(548)	Curves: showing above.
(549-550)	Specifications for analytical determination of converter gas mixture.

Frame #	
(551-553)	Compilation of results of synthesis with and without mixing of converted gas.
(554-558)	Synthetic process yield with low content $CO:H_2$.
(559-561)	Influence of temperature increase on synthesis.
(562)	Intermediate extraction: Oven 10A
(563)	Increased gasification by increased temperatures.
(564-566)	Production increase.
(567-569)	Emptying of ovens; Block I
(570-572)	Chart: oven production.
(573-574)	Table: Medium pressure synthesis Ruhrbenzin.
(575-578)	Table: Research on used catalyst: Block II.
(579)	Catalysts and production.
(580-581)	Tables: on above.
(582-586)	Increased gas production by contact ovens.
(587-591)	Pressure plant at Holten into production.
(592)	Table: Increased production after 1st month.
(593-599)	Explanation of the "Balance idea" as CO conversion, CO liquification, etc.
(600)	Table: Production program.
(601-602)	Intermediate extraction, oven 10A.
(603-605)	Data on experimental oven 10A.
(606)	Schematic diagram circulatory research installation.
(607-613)	Contact oven production, January to May 1939.
(614-615)	Table: Gas separation with normal contact oven loads.
(616-640)	Condition of the plant.
641	English Title Page.
642-644	Cost of Alcohol production.
645-647	Gasol. formation in the individual months of 1943.

Frame #	
648	Table: on above.
649	Curve: on above.
650-652	Work on tar oils, synthetic oils, mixtures with gasoline.
653	English Title Page.
654-658	True Vapor Phase (TVP) and carburol process for cracking plants.
659-660	Additional costs.
661	Chart: Cracking yields, plant #7.
662	Chart: T.V.P. (ref. Texas City 1935) with liquid Fischer primary products.
663	Chart: Overall gasoline production by various cracking processes on the same Fischer primary products with and without polymerization of the cracked gas oil, and synthetic gas oil.
664-666	Table: Materials and apparatus needed for cracking by various methods.
667	Table: Results of cracking.
668	Fuel Costs.
669	Similarities between T.V.P. and carburol cracking.
670	Cooperative research on T.V.P. and carburol cracking.
671-676	Carburol cracking plant Viktor.
677-686	Choice of cracking process for Hoesch gasoline.
687-688	Table: Carburol - vs. T.V.P.
689-693	Carburol plant Ruhland.
694	Schematic Drawings - Cracking plant, Stabilizer & vapor recovery plant, treating plant Rerun unit.
695	Diagram: Cracking plant.
696	Stabilization of the cracking period.
697	Curve: Octane No.
698-700	Choice of cracking process for Hoesch gasoline.
701	Cracking of "coke gasoline" for Ruhrchemie.

Frame #	
702	Table: Total stabilization of cracking.
703	Table: Gas, cooling water, and oil temperatures.
704	Total Stabilization of cracking.
705	"Driving" gas: stability in cracking plant.
706-707	Stability in the cracking plant.
708-711	Cracking period.

BAG 2719 - TARGET 30/5.02

KRUPP-TRIEBSTOFFWERKE A. G., WANNE EICKEL

712	Flow scheme for Wanne-Eickel plant; prepared by Dr. H. Fischer.
713	English Title Page.
714	? Rough sketch of fins for generator tubes.
715-718	Leading productions of the low temperature carbonization plant.
719-720	Schematic diagram of a Krupp-Lurgi low temperature coal oven.
721	Drawing: Fischer-Tropsch synthesis.
722	Diagram: Water-gas generator plant.
723	Diagram: Activated carbon unit, medium condensation.
724	Diagram: Stabilization of gasoline and fuel gas.
725	English Title page.
726-731	Monthly production graphs, October 1938-Nov. 1941.
732-735	Output and possibility of increasing production Krupp Triebstoffwerke.
736	English Title Page.
737	Site Plan Krupp Triebstoffwerke.
738	English Title Page.
739-740	Photo; mounting contact ovens.

BAG 3027 - TARGET #30/5.06

KAMEN - DORTMUND

Frame #	
741	English Title Page.
742	Graph of Labor Requirement for Plant Construction.
743	English Title Page.
744	General layout of Kamen-Dortmund Plant.
745	English Title Page.
746	- Blank -
747-749	Flow diagrams.
750	English Title Page.
751-759	Yearly and monthly production requirements. Records of Plant.
760	English Title Page.
761-762	A gas analysis
763	English Title Page.
764	Research on cracking tail gas.
765	Diagram: Research apparatus.
766	English Title page
767	Flow diagram: H_2 and CO_2 plant.
768	English Title Page.
769	Schematic Drawing: Gas conversion plant.
770	English Title Page.
771	Catalyst Composition and Requirements for December, 1940.
772	Decreasing Cobalt content of the contact catalyst.
773	Table: Amount and source of catalyst purchase.
774-776	Catalyst on hand, catalyst losses

Frame #	
777	"Script - not readable".
778	English Title Page.
779	Drawing: Layout of 4 contact chambers with a common steam drum.
780	English Title Page.
781	Drawing: Organic sulfur removal plant.
782	English Title Page.
783-790	Lurgi active carbon gas treating plant connected with organic sulfur removal plant: Project records. I Super purification plant for synthetic gas after passing through carbo-union. II Condensation Group. III Circulatory installations. IV Complete separation, gas, steam and water. V Steel construction and transportation. VI Complete insulation of all heated parts.
791	Activated carbon costs.
792-800	Super purification plant for synthesis.
801	English Title Page.
802-803	Schematic Drawing: Activated carbon gas treating plant connected with organic sulfur removal.
804	English Title Page.
805-808	Flow diagrams: Activated carbon absorption plant for recovery of C_3-C_4 Hydrocarbons.
809	English Title Page.
810	Flow Diagram: Distillation Plant.
811	English Title Page.
812	Graph: Distillation temperatures of products from distillation plant.
813	English Title Page.
814	Laboratory distillation of condensate oil.
815	Drawing apparatus for above.

Frame #

816 Curve: above

817 English Title Page.

818-821 Typical tests on gasoline shipments.

822 English Title Page.

823-827 Typical tests on diesel oil shipments.

BAC 3441 - TARGET #30/5.01

RUHRCHEMIE A.G. STERKRADE-HOLTEN

829 English Title Page

830-870 Paraffin wax.

(831-832) Refining.

(833-834) Analysis.

(835-837) Refinability of hard paraffin.

(838-843) Analysis of vacuum distillation.

(844-848) Synthetic hard paraffin.

(849) Anti-splitting, anti-aging agents.

(850-851) Inflamability of paraffin-soaked mineral wools.

(852) Letter concerning synthetic paraffin.

(853-854) Curve: Paraffin yield at distillation temperatures.

(855) Research on the separation of stable hydrocarbons.

(856) Mixing of hard and soft paraffins.

(857-858) Air sensitivity of raw product from Hoesch.

(859) Plastic wax.

(860-861) Soft and hard waxes in 70:30 mixture.

(862) Isomerization of paraffin oils.

Frame #

(863-865) Hard wax refining from soft wax.
Hard wax refining for treatment of shoes.

(866-869) Paraffin Distillation.

(870) Contact paraffin.

871-887 German air transport investigation - The working of peroxide in motors. Its determination.
I Chemical composition of the peroxide.
II Working of the peroxide in motors.
a. Influence as a knock inhibiter.
b. Influence on resin formation and corrosion.
III Research on the relationship between the chemical structure of peroxide and anti-knock characteristics.
a. Chain forming peroxides.
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