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**I. G. FARBENINDUSTRIE,
HOECHST/MAIN**

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COMBINED INTELLIGENCE OBJECTIVES
SUB-COMMITTEE

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REPORT ON
I.G. FARBENINDUSTRIE AT HOECHST A/M.

Reported by:

K. GORDON,	Brit
H. V. ATWELL,	U.S.
OLIVER THOMPSON,	Brit.
I. H. JONES,	U.S.

On behalf of the
British Ministry of Fuel and Power
and
U.S. Technical Industrial Intelligence Committee.

20 July 1945

CIOS Target No. 30/188, 30/210 (Also
Nos. 8/59b; 24/4; 22/1g).

Fuels and Lubricants

COMBINED INTELLIGENCE OBJECTIVES SUB-COMMITTEE
G-2 Division SHAFT (Rear), APO 413

50 p. illus.

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PERSONNEL OF INVESTIGATING TEAM:

Col.K.Gordon)
Lt.Col.Oliver Thompson) British, Ministry of Fuel
Major E.Tilley) and Power.
I.H.Jones) British, G-2 SHAEF.
H.V.Atwell) U.S. Petroleum Administra-
tion for War.

I. G. FARBENINDUSTRIE
HOECHST A/M

INVESTIGATION PROCEDURE

In response to a signal from T Force Headquarters, 12th Army Group, the plant of I. G. Farbenindustrie at Hoechst was visited on 30 April and 2 May, 1945, by Col. K. Gordon, Lt. Col. Oliver Thompson, Major E. Tilley, Mr. I. H. Jones, and Mr. H. V. Atwell. The manager of the plant, Dr. Carl Ludwig Lautenschlager, was very cooperative and ordered all of his men to answer all questions fully and truthfully and to assist our investigation in every way possible. He stated that about twelve other missions had visited the plant previously but we had no knowledge of this prior to our arrival. Lt. Col. Thompson and Mr. Atwell called on Dr. Lautenschlager and others at Hoechst on 1 May for assistance in locating certain chemists who were presumed to have returned to Hoechst from Dyhernfurth and who were wanted for interrogation in Frankfurt. Major Tilley conferred with Dr. Lautenschlager later regarding possible participation of the Hoechst laboratories in poison gas activities. Mr. Atwell again visited Hoechst on 8 and 9 May to get additional data on patents, emulsifying agents, special fuels and insecticides, and to pick up samples.

Lt. Col. R. H. Ranger, U. S. Signal Corps, had made independent arrangements to be at Hoechst on 30th April as a CIOS investigator, and was present during most of our interrogations on that date. He obtained detailed information on infra-red filters, infra-red printing for camouflage, radio sensitive shells for range finding (AA) and a froth forming compound for airmen's clothing for emergency sea landings. On the assumption that these subjects would be covered completely by Col. Ranger's report, they are mentioned only briefly in this report.

DESCRIPTION OF TARGET

The I. G. Hoechst plant was formerly known as Meister, Lucius and Brünig. Under the same management is the nearby plant of Griesheim Elektron, which makes electrolytic oxygen. A subsidiary company known as Autogen distributes liquid and gaseous oxygen. Plants at Mainkur, Offenbach and Gersthofen are also closely associated for management purposes.

An aerial photograph of the I. G. Hoechst plant is shown on Page 5. The plant has suffered no serious damage from bombing and is probably now the largest potential producer of chemicals and drugs in Germany. Approximately 13,000 workers are normally employed. The following are the main items produced in 1944:

Chemicals

Inorganic chemicals
Organic chemicals
Organic chemicals from acetylene
Plastics

Dyes

Textile dyes
Azo colors
Photographic dyestuffs and colors
Textile auxiliaries
Leather auxiliaries
Emulsifiers for lubricants

Pharmaceuticals

Anaesthetics
Sedatives
Hormone preparations
Vitamins
Chemotherapeutics and antiseptics
Synthetic Pharmaceuticals
Narcotics
Serums and vaccines
Veterinary pharmaceuticals

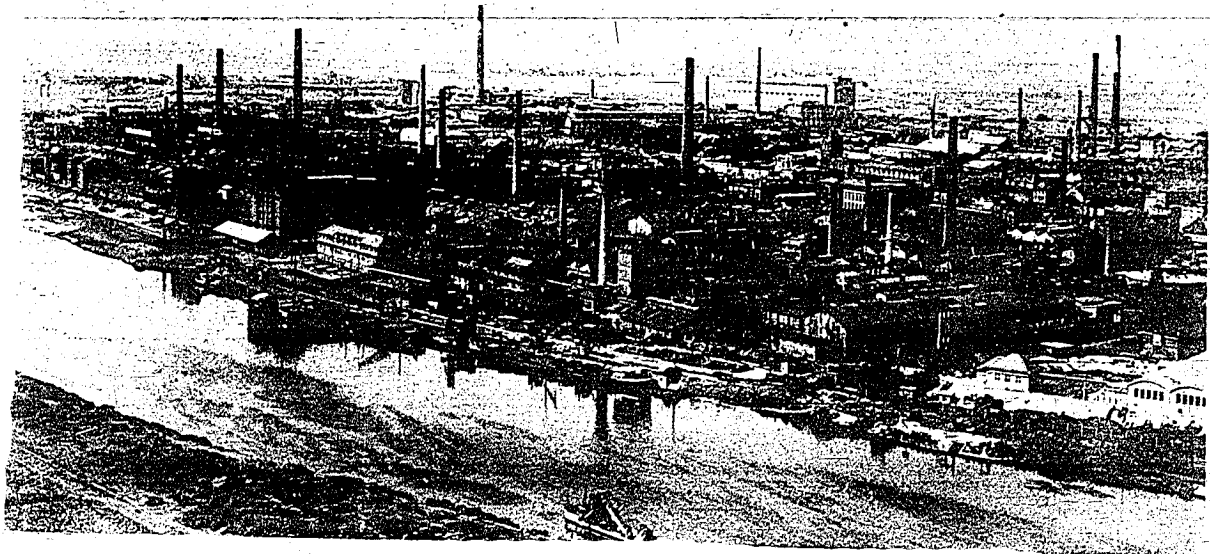
Insecticides and Fungicides

A more detailed list of the products formerly made at Hoechst is attached as Appendix A, Page 27. At the direction of the Allied Military Government at Frankfurt the production of drugs, and especially insulin, was being resumed at the time of this investigation.

The names of the more important technical men in the organic and inorganic chemical departments are given in connection with the list of Wehrmacht projects on Page 43, Appendix E. Several of these men were interviewed as will be brought out later in the report. A statement of the organization of other departments is given in Appendix B, Page 36.

DOCUMENTS

Special inquiry was made about hidden or destroyed documents and written statements were obtained on this



Aerial Photo of Hoechst Plant
I.G. Farbenindustrie.

subject which are attached as Appendix C, Page 37. Time did not permit a search for any hidden documents, or the investigation of any of the acknowledged storage places. Dr. Carl Winnacker, who was otherwise cooperative, stated that all his secret papers were burnt. Similarly Dr. Bernard Schultheis and Dr. Kurt Schimmelschmidt, his assistant, stated that they had burned all their research records in the presence of others.

(NOTE: It was our general impression, on examination of other targets, that German research workers do not burn or destroy all copies of important documents regarding the results of their work. We consequently consider that it is improbable that the research records of these persons, or of their associates, have been destroyed. We did not have the opportunity of pursuing this question further, but further interrogations on this subject would probably be fruitful.)

Professor Lautenschlager stated that his secretary, Dr. Carl Moldaenke, would make available such secret documents as he had in his files. Lautenschlager stated that he himself did not have any secret documents in the high security category, although various Department Heads might have papers of this nature which were their personal responsibility. It was explained that reports on research work for the Wehrmacht were sent direct to the Wehrmacht from Department Heads and there was, therefore, close security in these matters.

With the assistance of Dr. Moldaenke the indices to Hoechst research reports for the last three years were reviewed and a large number of reports were selected for examination. About fifty of these were confiscated for more thorough study, and the titles of these reports are shown in the list of seized documents constituting Appendix D, Page 39. A few more reports of probable interest which were missing from the readily available files are listed in Appendix D, Page 41.

Time did not permit a detailed study of any of the developments at this plant and, consequently, only a brief report can be made on most of the projects discussed. Furthermore, the present investigators were unable to assess the importance (or otherwise) of much of the work being done, since the subject matter was mostly outside their province which was liquid fuels and lubricants.

PROJECTS FOR THE WEHRMACHT

During the interrogation on 30 April, a list of projects carried out for the Wehrmacht was requested, together with a written statement by Dr. Winnacker supplementing his testimony regarding the nature of the work done on such assignments. Translations of these documents are attached as Appendix E, Page 44. The testimony of various witnesses regarding the Wehrmacht projects is summarized below, together with pertinent excerpts from the written statement by Winnacker inserted in quotation marks.

1. Replacement of Phosphorus in Incendiary Bombs and Grenades.

"Aluminum Chlor Methyl $Al_2(CH_3)_3Cl_3$ developed at Hoechst long before the war and made by the reaction of methyl chloride on metallic aluminum, was investigated in recent years as an igniter for incendiary grenades and bombs. Projectiles and bombs were developed containing a combustible and an igniter. The latter was essentially Aluminum Chlor Methyl which ignites upon contact with air or moisture. The combustible consists of a solution of Buna or Oppanol in benzol. The experimental shells were tested by the Wehrmacht and the Luftwaffe. They were never put to use."

Dr. Winnacker stated that the only two copies of his papers on this subject had been destroyed.

2. Radio Measuring Grenade ("Funkmessgranate").

"It was desired to develop an anti-aircraft shell which would provide a reference point upon exploding which could be used as a means of correcting aiming devices. Projectiles of 8.8, 10.5 and 15 cm. calibre were developed with filling of metal wires. After numerous experiments it was concluded best to use a filling of wires 190 mm. long and 0.25 mm. diameter which were detectable even at a height of 10,000 meters. The grenades were approved by the air defense and were soon to be made in large quantities."

A specimen shell of this type was obtained by Lt. Col. R. H. Ranger, U. S. Signal Corps, who happened to be present during this interrogation.

3. Adhesive Mines.

"It was desired to develop a mine which could be brought up to a tank by a single man and then could be

attached to the tank by some adhesive material. The mine consisted of a hollow charge and an adhesive layer. The latter was heated by a thermit charge so that it would adhere to an iron surface. The development was only in its infancy. In our opinion, not much importance should be attached to it."

This is evidently along similar lines to the British "sticky bomb." A document was found in the I.G. General Office files at Frankfurt describing experiments with a similar mine using a rubber vacuum cup as a means of attachment.

4. Laughing Gas - GM 1.

"Since laughing gas had been produced in small amounts as an anaesthetic since before the War, the Luftwaffe at the end of 1940 expressed an interest in the production of larger quantities. The material was to be injected into the engine as an oxygen carrier making it possible for the pilot to considerably increase the velocity of an aircraft suddenly and for a short period. A plant with a capacity of 1000 tons per month was constructed but during the War it was used only to part capacity. In recent months the capacity varied between 200 and 300 tons per month. Other plants with approximately the same capacity were located in Oppau, and two localities in France which were known to us only by the code names "Vaterstadt" and "Mutterstadt." The preparation was by known methods starting with ammonium nitrate. Shipment was made in the form of a cold liquid under atmospheric pressure in tank cars of a similar type to those used for shipping liquid oxygen. "

During interrogation, Dr. Winnacker stated that shipment was made in 12-ton tank cars at -80° C.

5. Fire Extinguishing Material CB.

"By the reaction of methylene chloride with bromine in the presence of aluminum, monobrom monochlor methane is obtained. This material was preferred over carbon tetrachloride and similar materials as a fire extinguisher by the air forces and tank forces since it was more effective. Mixtures of this extinguisher CB with CO₂ were used. Production was about 30 tons per month. A substantial expansion was under consideration."

6. Hexogen.

"Before the war a process had been developed at Hoechst for the preparation of Hexogen involving the reaction of the potassium salt of amido sulphonic acid with formaldehyde to give the corresponding methylene compound. Upon nitration the latter yielded Hexogen. In Hoechst up to the early part of 1944, approximately 200 tons per month of potassium methyleneimido-sulfonate were prepared by this method which was converted to about 100 tons per month of Hexogen at the DAG Krummel plant. The process was uneconomical in comparison with newer processes and was abandoned early in 1944."

During interrogation, Dr. Winnacker referred to the Hexogen process as the nitration of hexamethylenediamine.

7. Tetranitromethane and Nitroform (X-Stoff).

Tetranitromethane was manufactured experimentally as an addition to propellants, small quantities being made at the request of the OKM. The development of this product had been the responsibility of Dr. Bernard Schultheis, head of the Chemical Department, and his assistant, Dr. Kurt Schimmelschmidt. Tetranitromethane was an attempt to provide a suitable propellant for rockets, both for V-weapons and for flak. The problem was to find the most effective oxygen carrier. The research on this problem began by oxidizing acetic acid but the product was too costly. A new process based on acetylene and sulphuric acid was then studied. Schultheis went to Peenemunde in 1943 where he had discussions with the chief engineer, Dr. Riedel. Schultheis had made up 10 tons of Tetranitromethane, but Riedel decided that the cost of production was exorbitant; he needed a product which would cost less than 1 RM per kilo. Other defects of this product were that, firstly, the crystallization point was about 14° C. which was too high, although some improvements were made by the addition of NO₂. Secondly, the combustion temperature of 3,000° C. was too high, and, thirdly, the product caused excessive corrosion.

Schultheis stated that all this work was done for the OKH and that he had had no connections with the Navy.

In his written statement, Dr. Winnacker said that he had administered this work jointly with Dr. Schultheis "in various business dealings." These men might be a useful source of supplemental information on rocket fuels.

8. Panzer Glass.

"A panzer glass has been developed on the basis of Mowital as a bonding layer which was introduced into aircraft and tanks. The production was about 10 tons per month and was increasing."

9. Fog Acid (Nebelsäure)

"For our production of "Nebelsäure" at the request of the Wehrmacht, a new continuous process was developed for making chlorosulfuric acid and for Nebelsäure by the direct admixture of gaseous hydrogen chloride with contact oven gases. This process was in use at Hoechst until immediately before occupation by the American troops." Elsewhere "Nebelsäure" was identified as 50% chlorosulfonic acid and 50% liquid sulfur trioxide.

10. Hydrazine

It was stated that Hydrazine was manufactured at a plant belonging to the I.G. under the name of Transehe Gesellschaft, at Gerstofen, near Augsburg. The process used was the conventional one from hypochlorite and ammonia, and the output was 400 tons per month. (Note: Details of this target are given in CIOS Evaluation Report No. 21, 17 May 1945, "Elektrochemisches Werke München A. G.")

11. Special Fuels

Work on the development of special fuels was discussed on 2nd May with Dr. Moeller, director of this work. On this occasion Dr. Moeller stated that his laboratory had been requested by the Luftwaffe in 1943 to develop certain components of special fuel for the Walther Werke of Kiel. The fuel was to consist of hydrocarbons which would detonate upon admixture with concentrated nitric acid. Dr. Moeller stated that the exact use of these fuels had been concealed from his organization but he suspected they were intended for new turbo-type engines for the Luftwaffe and possibly also for submarines and V-bombs.

Dr. Moeller first described the production of divinylacetylene for use in such fuels. He stated that a Dupont process was used involving the reaction of acetylene with cuprous ammonium chloride in hydrochloric acid solution to produce a mixture containing 85% of monovinyl acetylene and 15% divinylacetylene. By cooling to minus 80° C the mixed vinylacetylenes are condensed and

they are subsequently fractionated by distillation from methyl alcohol. The monovinyl acetylene is recycled. The divinylacetylene was to be mixed with benzine, diethyl aniline and iron carbonyl to make the finished fuel. Laboratory experiments conducted by Dr. Moeller showed that such a mixture decomposed violently when 90% nitric acid was dropped into it. It was pointed out that divinylacetylene alone will decompose spontaneously if its surface is disturbed which necessitates its handling in a mixture with some solvent such as benzine.

On the occasion of a second visit to the Hoechst plant on 8th May 1945, Dr. Moeller had recalled that research had been carried out also on the use of diketene in place of divinylacetylene, and he volunteered some details of this work together with amplification of his previous report on the special fuel problem. For chemical uses Hoechst had previously made ketene by the thermal splitting of water from acetic acid. This was used in part for reaction with more acetic acid to make acetic anhydride and was in part dimerized and condensed with amines to make pyrazolones. Since Hoechst was thus in a position to manufacture diketene, they were ordered by Ludwigshafen to supply test quantities to Walther Werke. In this investigation Walther was represented by Messrs. Wehage, von Duren and Leutz. Although they did not reveal the intended purpose of the special fuel to Dr. Moeller, they indicated that the diketene might be used to the extent of 10 - 12% in mixture with benzine, diethylaniline and iron carbonyl to make a fuel which would detonate upon contact with nitric acid. Dr. Moeller stated that an ignition time of 1/100 to 1/200 of a second was required, and that the diketene (or divinylacetylene) was regarded as a catalyst of the chemical reaction with nitric acid to insure such short ignition times. Although the diketene was reported to be satisfactory from the ignition standpoint, its mixtures were found to undergo polymerisation upon storage and for this, and perhaps other reasons, the use of diketene was abandoned. If it had been used it was stated that quantities of 200 to 500 tons per month would have been required. Crotonaldehyde was also tested but apparently was not satisfactory. Divinylacetylene was quite effective, but the 10% concentration required to give the desired detonation properties was apparently dangerous to handle, and methods of reducing this amount were investigated. It was found that 5% divinylacetylene in combination with 10% divinylacetate was satisfactory, but manufacturing facilities for divinylacetate could not be provided because of the

shortage of steel. Dr. Moeller thought that the preferred composition for the divinyl acetylene fuel was about as follows:

75%	benzin
5/7%	divinylacetylene
10/12%	divinylacetate
6/8%	diethylaniline
Abt. 1% (?)	iron carbonyl.

Although divinylacetylene was the most promising catalyst known to Dr. Moeller, it was his understanding that some better material had been discovered outside of the I.G. organization and was adopted by the Luftwaffe. Some research on the same problem had been conducted by I.G. at Auschwitz, but their product likewise was finally rejected. Ludwigshafen also worked on the problem of testing vinyl and divinylethers as catalysts and trying to use alcohol in place of benzin, but so far as Dr. Moeller knew this work had not come to any successful conclusion. The Ludwigshafen research was under the direction of Dr. Reppe and Dr. Hausmann.

The fuel components prepared at Hoechst were sent to a Walther Werke branch factory or laboratory at Markliesse, and Dr. Moeller believed that tests were also conducted at Peenemunde, at the Technische Hochschule, Braunschweig, and the Goring Luftfahrt Forschungs Institute, near Braunschweig. Dr. Nicodemus of the Hoechst laboratory visited Kiel about March 1943, and Dr. Wolfram from the same laboratory visited Markliesse in the summer of 1944. However, Dr. Moeller believes that they obtained very little information about the use of these special fuels. Time did not permit the interrogation of either of these men on the present trip. On 8 May Dr. Nicodemus was still working at Hoechst and Dr. Wolfram was stated to be under arrest in Frankfurt because of his Nazi Party affiliations.

12. Sea Rescue Foam Powder (Seenot-Schaumpulver)

Dr. Nusslein and Dr. Gutman had invented a white soap powder intended for dusting into the fur clothing of air crews. In an emergency sea landing the powder froths upon the action of salt water, thereby providing both buoyancy and warmth. A sample of this powder brought back in MIRS bag No. 3413, was called to the attention of the appropriate investigators through the CIOS Secretariat.

13. The "U-Boat Program" related to means of applying a protective layer of Buna to submarines to prevent detection by radar. In the order named (Appendix E) the methods

were: Attachment to studs protruding from the submarine surface, locking in holes drilled into the surface, and attaching by some kind of cement made at Hoechst. "Tep-pich" also related to submarine defense. This work had been done by Dr. Kiesskalt and Dr. Patat.

DEVELOPMENTS IN LIGHT

There had been a number of interesting developments in researches upon light and infra-red technique. Much of this work was being under the direction of Dr. Joseph Nusslein, who was head of the Kilorische Abteilung. Nusslein stated that his research records had been destroyed by foreign workers. This was not an acceptable explanation, but time did not permit this matter being investigated further.

Interesting work had been done on filters to make light rays invisible to the naked eye. This work was in the charge of Dr. Kiesskalt.

Work had been done on the perfection of camouflage colours. Colour had been printed on cloth and rayon using colours not affected by infra-red. This development was considered of value in connection with the concealment of military activities. The dyestuffs for this purpose were made at Mainkur, this work being under the direction of Dr. Giesler. Full details were stated to be available at Mainkur and an investigation of this subject was made by Lt. Col. R. H. Ranger.

CHEMICAL WARFARE

Regarding the relationship of Hoechst to I. G. poison gas activities, Dr. Winnacker wrote the following:

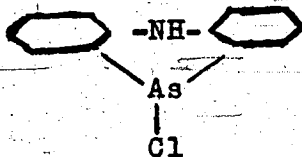
"The undersigned stated in answer to questions that he had not the slightest connection with the development and manufacture of poison gases at Dyhernfurth, Gendorf, Seewerk or any other places. The constitution of these products or the quantities produced have never been known to him. For the specified plants regular shipments have not been made from I.G. Hoechst. In special cases shipments were made which will be reported individually.

"Regarding special raw material requirements it is known to the undersigned in connection with the commission specified under I-1 only that phosphorus was required for Dyhernfurth; in what amounts is unknown.

"The undersigned was employed in the I.G. plant at Uerdingen and Niederhein from the summer of 1941 to the

summer of 1943. There phosgene was prepared. Also there was installed a plant for filling bombs with phosgene on orders of the Wehrmacht.

"In addition to the information given on 30 April, it should be added that in Uerdingen there was a manufacturing plant for dephenylaminearsinchloride (Adamsite)



"The volume of production, so far as I can recall, amounted to about 200 tons per month. Specifically, the undersigned had nothing to do with these matters since they were administered in strictest secrecy by other workers and were already in progress before (my) arrival at Uerdingen."

From interrogation, the impression was gained that Winnacker was engaged in some of the poison gas production at Uerdingen but this is not confirmed by his written statement. Professor Orthener and Dr. Graf had been working at Hoechst on Weichmacher No. 3 which was used as an intermediate in poison gas manufacture. A more detailed report upon the development of lethal gases is given in a CIOS Report dealing with the investigation of the I. G. Farbenindustrie main offices at Frankfurt A/M.

PLASTICS

Two reports were obtained written by Dr. Otto Bayer in 1941 on the subject of Polyurethane. This product, which is an improvement upon nylon, is regarded by the I.G. Farben as one of their most important discoveries in recent years. The basic development work had been done by Dr. Bayer, and he had been assisted by Professor Ordner and Dr. Balle. Commercial scale manufacture had been proved practical, and the I. G. Farben had made plans for large scale production.

These plastics result from the reaction of diisocyanates with polyhydroxy compounds. A wide range of physical properties is possible, including some rubber-like materials. Insolubility in water and other solvents, resistance to chemical attack, and excellent electrical properties are claimed for the various polyurethanes.

April, 1945, summarizing the status of penicillin work at Hoechst, of which a translation is given below. Reports dated February 1945 regarding spectrographic and titration measurements on different penicillin preparations were also obtained.

"In both the surface, and in the immersion process which is now in operation, Capex-Dox nutrient solutions are used as a base in conjunction with lactose instead of glucose, and an addition of yeast extract. Experiments with maize, wheat, soya peptone, peanut meal, and oats, gave no decisive advantages. After numerous experiments it was found that an initial pH of 6.4 was most advantageous. In the surface process the maximum growth of penicillin set in after a period of from 9 to 14 days. Emulsions obtained through shaking of the mycelia with glass beads are used for inoculation.

"A nutrient solution with potato water as a base has been found especially good, and even after longer periods of standing the penicillin values maintained a constant high level.

"The addition of silicic acid and other amphoteric acids also improves the penicillin yield, the alkali produced being thus neutralized. In order to obtain rapid inoculants in two to three days the addition of either glycerine or glycerogen is recommended. These additives not only cause a more rapid growth of the mycelia but also give rise to more rapid sporulation.

"The semi-solid nutrient media have also been investigated, the best results being obtained with oats. For rapid penicillin growth, however, the apparatus set up is more cumbersome. This research is being pursued.

"Ample aeration is important in the growth of penicillin, and this is especially the case when using the immersion process. This is being provided in all future operations.

"Additions of nutrients such as indolyl (?) - acetic acid, para-amino-benzoic acid, cystine, histidine, glutathione, etc. have given no better results as yeast extract appears to contain sufficient glos for the purpose. The use of other nutrients, such as biotin have not been tried out as in themselves they are constituents of yeast extract.

"Approximately 30 fungi cultures have been experimented with. These were obtained partly from our own

collection and partly from other research institutes, among which should be mentioned our works at Marburg. All these cultures are considered as satisfactory and consistent for penicillin growth and have been put at the disposal of the pilot plant. Up to the present mixtures of the best cultures have not improved the yield of penicillin. A depreciation of the strain has seldom been observed but if it became apparent it was remedied by the addition of suitable nutrients.

"Infection is the main difficulty in production, but during the growth period it can be overcome. Difficulties are caused by bacterial infections during the collection of the penicillin as at this stage in its formation strong penicillinase-producing bacteria have frequently been observed. Losses can be partly avoided by the addition of suitable anti-bodies (ether, toluene) and by rapid manipulation. Experiments for the isolation of the penicillinase-formers are in process as are also tests to find suitable substances for the destruction of the ferment. The extraction is carried out as laid down in the literature but butyl acetate is used instead of amyl acetate.

"Purification by adsorption on aluminum oxide.

"Conversion into calcium salt and sodium salt.

"Dry ampoules are filled under low temperature conditions.

"Physical characteristics of the salts (adsorption, electrometric titration, polarography) have been investigated.

"Experiments for the isolation of pure penicillin from the nutrient solution by adsorption and precipitation methods (aluminum oxide, Franconite, charcoal, wofatite, and lignin base exchangers) are being carried out. Low temperature concentration experiments "in vacuo" as well as freezing out tests have given contradictory results.

"Penicillin Preparations Manufactured in Hoechst:

- "(a) Parental penicillin (calcium and sodium salts)
- "(b) Penicillin powder (calcium salt)
- "(c) Penicillin bandages.

All three preparations are being used with good therapeutical results. Our penicillin preparations are regularly submitted to the Katalase tests for possible pollution by notatine.

"A strain of *Staphylococcus Aureus* is used as control."

For the production of insulin the Hoechst plant collected pancreas glands over an area bounded by a line connecting the following cities: Cologne, Trier, Saarbrücken, Mannheim, Wurtzburg, Coburg, Erfurt, Nordhausen, Kassel and Cologne. These collections amounted to 3600 kilograms per month, equivalent to 3.5 million units of insulin per month. When the plant was occupied by the Americans the stocks of insulin ready for test and tested amounted to about 43 million units, and the additional amount of process in the form of dry product was about 24 million units. The apparatus for manufacture was intact and production was to be resumed on order of the Military Government at Frankfurt as soon as fuel and facilities for collecting pancreas could be provided.

It was reported that interesting work was being done by this section studying fungicides and plant diseases. Of equal interest was the work being done in a department under Dr. Schulz in connection with preservatives for food-stuffs.

Several boxes of lantern slides belonging to Prof. Lautenschläger and showing apparently bacterial cultures and similar pharmaceutical studies were found in the I.G. wine cellars at Eltville, near Wiesbaden, and were reported to the CIOS Secretariat for the benefit of any investigators who might be interested.

INSECTICIDES

On 8 May 1945 Mr. Atwell interviewed Dr. Kaspar Pfaff, Director, and Dr. Michael Erlenbach, chemist, of the Plant Protection (Insecticides) Research Department. This department was organized in 1919 and at the time of occupation comprised about 6 chemists and 30 helpers. Leverkusen was stated to be the center of sales for the products developed. Inquiry was made particularly about insecticides developed during the war which are non toxic to human beings. A complete list of all insecticides made, including their compositions, was furnished by Dr. Pfaff and returned through CIOS channels.

Nirosan

Hoechst developed the first synthetic substitute for arsenicals for combatting the "wine moth" (grape pest) *Glysia ambiquella* and *Polychrosis botrana*. This product, known as Nirosan, was first tried in 1939, and was first marketed regularly in 1940. Subsequently it attained a production of 6000 tons per year. The use of arsenicals against the wine moth was forbidden by the German government in 1940. The composition of Nirosan was stated to be:

25% tetranitrocarbazol
10% "Zellpech" powder
0.25% 2406N "Igepal" spreader (dodecylene-
phenolethylenoxide)
20% chalk
44.75% clay

This is used as a 1% suspension in water. The recent production was 3000 tons per year.

Tritisan

Tritisan has been developed for the control of Bunt or Stinking Smut in wheat. Its composition is:

15% pentachloronitrobenzol
85% talc

Brassicol

Brassicol has been developed for use as a soil fungicide against botrytis (sclerotinia) in hot-houses, etc. Its composition is:

20% 1, 2, 4-trichlor 3, 5-dinitrobenzol
3% machine oil
77% talc

Bulbosan

Bulbosan for cure of the brown patch disease of tomatoes has the following composition:

7.5% 1, 3, 5-trichlor 2, 4, 6-trinitrobenzol
92.5% talc

Dizan

Dizan for use against cockroaches has the following composition:

2.5% Phenylidiazopyrrolidine
97.5% talc

Similar piperidine compounds were also stated to be effective for this purpose, perhaps with alkyl radicals in place of phenyl.

Gix

Gix, a fly spray, was developed about two years ago, and was recently produced at the rate of 120 tons per year,

almost exclusively for the Army. Its composition is:

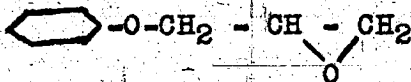
60% diparafluorphenyltrichlorethane
20% I. G. Z406-W Emulsifier
20% Mineral oil.

This is used as a dilute emulsion in water and is stated to be much more effective than pyrethrum base sprays.

During interrogation we were told that an insecticide effective against flies, mosquitoes and lice and having the same structure as the active principle of Gix was made by the condensation of chlorbenzene with chloral, followed by fluorination. Dr. Winnacker's written statement describes the production of "Fluorgesarol" by condensing fluor benzol with chloral. Although these reactions are different, they should yield the same product. Thus it appears that "Fluorgesarol" is the I.G. trade name for the active principle of Gix.

Synthetic Raupenleim Hoechst, developed for tree banding, has the following composition:

80.2% Kogasin Chloride (52% Cl)
0.8% Phenoxypropanoxide (Stabilizer)



15% Oxycresylcamphane
3.5% I. G. Wax S.

The composition of all Hoechst insecticides is given in Appendix F.

METAL WORKING LUBRICANTS

In conference with Dr. Lange and Dr. Pensel at Hoechst on 8th May 1945, the following information was obtained regarding the preparation and properties of synthetic emulsifying agents for metal-cutting and drawing lubricants.

Fischer-Tropsch middle oil is hydrogenated (non-destructively) at Leuna giving a product which is known as Mepasin. This is reacted with sulphur dioxide and chlorine at both Leuna and Wolfen to give R SO₂Cl according to what is known as the Reed process covered in part by U.S. Patent 2,193,824. In carrying out this reaction the temperature is not allowed to rise much above 30° C in order to obtain only one SO₂ Cl per molecule and a minimum substitution of chlorine elsewhere on the chain. As further

insurance of this type of reaction only about 50% of the oil is reacted, the rest remaining unchanged in the mixture. This product is known as Mersol, and is ordinarily reacted with caustic soda at Leuna and Wolfen to make detergents.

At Hoechst a variety of emulsifying agents have been developed by reacting Mersol with ammonia to make an amide $R\ SO_2NH_2$. This, in turn, is reacted with chloroacetic acid and is then saponified with caustic soda. The product emulsifies readily in water and is known as "Bohrmittel H" (Hoechst). For metal drilling and light cutting operations a 1% emulsion of Bohrmittel H is stated to be as effective as a 5% emulsion of fatty acid soaps previously used. Approximately 500 tons per month of Bohrmittel H were being made at the end of the war.

For heavy duty metal cutting 60% of Bohrmittel H is mixed with 40% mineral oil having a viscosity of 3 - 5% Engler at 20° C. This is used as a 5 - 20% emulsion in water. This heavy duty oil was not in production by I.G. but it was intended to make about 600 tons per month. However, such blended oils were being made by some outside purchasers of Bohrmittel H. Dr. Lange stated that no test methods had been developed for measuring the quality of different metal cutting lubricants and he could not make a quantitative comparison of Bohrmittel H with fatty acid lubricants. Undoubtedly, the acceptance of Bohrmittel H and its derivatives was influenced by the shortage of fatty acids in Germany. Samples of the synthetic emulsifying agents were obtained to permit direct comparison with other metal cutting lubricants available in England and the United States.

In describing these synthetic products, Dr. Lange emphasized the importance of three characteristics: (1) adhesion to metal surfaces, (2) lubricating and cooling ability, and (3) anti-corrosive properties. The adhesiveness or wetting ability of Bohrmittel H is attributed to the hydrogen attached to the nitrogen and to the sodium when in the specified relative positions. Similar adhesiveness is observed in the product of the condensation of octahydroanthracene with phthallic acid. The ortho position of CO and COOH groups in this product is believed to be responsible for its adhesiveness. This particular compound is not sufficiently soluble to be a good emulsifying agent. The substitution of CH_2 for CO in such a compound also gives a product having good adhesion characteristics. Lubricating ability depends on the use of an initial hydrocarbon of sufficiently high molecular weight, which requires at least a C_{12} hydrocarbon.

All of these products are stated to have excellent anti-corrosive properties. This is also true of the following compound,



in which R is cyclohexylamine. Dodecyclophenoxy acetic acid and its cyclohexylamine salt also have anti-corrosive properties. The Hoechst laboratory was interested in such materials for addition in small amounts to motor fuel to prevent tank corrosion during storage, but service test data are not available. It was expected that tests along this line would be conducted at: Versuchs Anstalt fur Kraftfahrzeuge, Berlin; the Technische Hochschule, Dresden; and the Versuchs Anstalt fur Luftwaffe at Rechlin, near Strelitz.

Several technical reports on Bohrmittel H and its derivatives were taken from the Hoechst laboratory and will be abstracted when received. Samples of Bohrmittel H and various derivatives and modifications thereof were obtained for whatever tests are desired.

From Document 2A (see Appendix D, Page 39) the following statements are taken regarding the preparation of "Bohroele H" and its properties:

"Mepasinsulfamid H, called "Amid H" as produced commercially has approximately the following composition:

38-33% Mepasinsulfamid
10-15% Dimepasinsulfimid-Ammonium
52% Mepasin

This "Amid H" is stirred with an equivalent amount of 40% caustic soda solution at 80° C until no further evolution of NH₃ is observed. For 860 gms of "Amid H" containing 116 gms of imide there would be required 123 gms of 40% NaOH. Solid sodium chloracetate is added as rapidly as possible to the ammonia free "Amid H" at 80° C. In the above example, this would require 116 gms of sodium chloracetate. The temperature rises to about 90° C and then drops rapidly. The mixture is stirred for about 2 hours at 80° C and finally 1 hour at 90-95° C until no more of the alkali layer is taken up. Then it is cooled to about 60° C and treated with 37% HCl and enough water so that the separated salts go into solution. For the above example, this would require 150 gms 37% HCl and 350 gms water. The resulting mepasinsulfamidacetic acid H called hereafter "Acid H" separates rapidly on the acid water layer. To separate the excess of HCl and some glycol acid the "Acid H" is stirred for ¼ hour at 70-80°

C with an equal volume of 10% sodium sulfate solution and then settled. The separated "Acid H" is heated to 120° C to drive off dissolved water and some hydrocarbons, the latter being returned after separation from the water. Upon cooling the distillation residue some sodium sulfate separates and is withdrawn. The "Acid H" is obtained as a clear bright yellow oil. "H Acids" on the average have an acid number of about 58 and a water content of about 1%, which corresponds to an acid equivalent of 967. The approximate composition of such an acid is as follows:

37%	Mepasinsulfamidoacetic Acid
10%	Mepasinsulfamide
4%	Dimepasinsulfamide
48%	Mepasin
1%	Water
100%	"Acid H"

For the preparation of "Emulgator M" the acid equivalent is neutralized with 1 mol of NaOH as 40% caustic and is distilled to a water content of 5%, with the hydrocarbons lost during distillation being returned again. From 967 gms of "Acid H" one obtains 1030 gms of "Emulgator M."

"Emulgator M" is a clear bright yellow oil which forms a clear slightly opalescent solution upon dilution with distilled water, and forms a somewhat less clear solution when diluted with hard water. A separation of the "hydrotropically" dissolved neutral oil does not occur in any case."

"In the emulsifying agent for "Bohrcole Ho 1/136" we have a product whose corrosion inhibiting property depends on its content of sodium salt of mepasinsulfonamidacetic acid, and whose mineral oil solubility, apart from its content of mepasin hydrocarbons, depends on a certain content of mepasinsulfamide. The emulsifying ability depends on the presence of an inter-related combination of sodium salts of mepasinsulfamidoacetic acid and of dimepasinsulfimide. Thus each component has a special function in Ho 1/136, and by their combination the exceptional properties of this new product are attained.

"It remains to be said that Ho 1/136 has been tried with good results as an emulsifier for vegetable oils and fats, as well as for mineral oils, in the preparation of

artificial silk and cotton. Also a series of other water soluble salts such as those of ammonium, cyclohexylamine, triethanol amine, etc. have been prepared and are being tested for special purposes, in particular where ash free products are required, as for corrosion-preventing oils, etc."

Dr. Lange stated that he was not familiar with work done at Leverkusen on oil - water emulsions for engine lubrication. He thought that Rhenania Ossag (Shell), Hamburg, had worked along this line under the direction of Dr. Bauerlein. Dr. Lange expressed the personal opinion that such emulsions should be of the water-in-oil type and would be too unstable for satisfactory service under engine conditions.

MISCELLANEOUS RESEARCH ACTIVITIES

Hoechst has developed a process for the non catalytic chlorination of methane to methyl chloride involving "partial combustion" at 600° C. Reports on this subject were seized for further study.

Research has been conducted on the corrosion of ferrous metals by nitric acid, and its prevention by regulation of the concentration of inorganic iron salts in the acid.

Waxes from Montan residues, camphor from terpeneol, flotation oils, and detergents were other problems on which work had been done at Hoechst.

Regarding fluorine compounds the written statement by Winnacker includes the following:

"No work has been done at Hoechst on the use of elemental fluorine. In the laboratory of the intermediates plant Dr. Scherer was intensively occupied with the chemistry of fluorine substituted organic compounds. Aliphatic fluorine compounds were prepared, from which are obtained starting materials for dyes (Azo dyes). In addition fluorbenzol was made and condensed with chloral to make Fluor gesarol. In the intermediate plant dichlorodifluor methane was prepared under the name "Frigen" on the basis of an American license."

PATENT ACTIVITIES

Information about Hoechst patent activities were obtained on 8 and 9 May 1945 by interrogation of Walter Bell, head of the Patent Department, and Karl Eishold, his first assistant.

Hoechst has been the clearing house for patent information for all I. G. plants and has extensive files of German patents to early 1945 and French patents to about July 1944, as well as for other foreign countries to as late a date as they were available. These patents are not filed by subject but an index is available by means of which the patents in any field of interest to E.G., including oils, could be located fairly easily. German patents which are classified as secret have not been published during the war and, therefore, would not be in these files.

The Hoechst patent department is supposed to have copies of all non-secret patent applications filed by all I.G. plants. Eishold stated that Beil burned the copies of all secret applications but this should not be accepted as fact without further confirmation. It was stated that about 180 patent applications originated at Hoechst in 1944 but this was much below the normal figure due to war conditions.

At the Hoechst Library can be seen files of a bi-weekly abstract bulletin, prepared there, and covering literature, including patents, on pure and applied chemistry. This library also has a file of irregular abstract bulletins prepared by Ludwigshaven and covering French, British, and American patents only in the field of oils. Samples of these bulletins and a copy of the Hoechst library classification manual were obtained.

On 9th May all Hoechst patent files were being sealed and set aside so that American Army forces could use the office space, and thus they may be secure for a considerable period. The clerk most familiar with the content and arrangement of these files is Ernst Haefer, residing at Gnadenthal, near Camberg.

Dr. Beil stated that the German Patent Office was moved to Strigeau in Silesia about a year ago and functioned there until shortly before that place was captured by the Russians.

RECOMMENDATIONS

All samples picked up at Hoechst should be tested promptly, and further details should be obtained from Hoechst regarding those which appear most useful.

The recent patents and patent applications in the patent files at Hoechst should be studied.

The documents sent away from Hoechst for safe storage should be located and examined, and search should be made for buried or otherwise hidden documents.

APPENDIX A
LISTS OF COMMERCIAL PRODUCTS
I. G. HOECHST

INORGANIC AND ORGANIC CHEMICALS
PHARMACEUTICALS
AGRICULTURAL PRODUCTS

Production of the I. G. Work Hoechst 1944

Group of Chemicals

Inorganic Chemicals:

Nitric acid, calcium nitrate, sodium nitrate, laughing gas, amidosulfonic acid and salts of the amidosulfonic acid, sulfonic acid, fuming sulfonic acid, chlorosulfonic acid, sodium sulfite, sodium sulfide, sodium pyrosulfite, sodium bisulfite liquor, sodium bisulfate, sodium hyposulfite.

Chlorine, sodium hydroxyde in solution, hydrogen, hydrochloric acid, sodium hypochloride, solid caustic soda, caustic soda in flakes, acid resisting cements, building insulation materials, solvents for fire protection, fluorescent pigments, magnesium oxyde.

Organic Chemicals:

Chloromethyl, methylen chloride, chloroform, chloroacetic acid, beta-naphtol, resorcinol, solvents for fire extinction, organic tanning agents, nitro aniline, nitrobenzene and dinitrobenzene, aniline, benzene sulfochloride, dimethylsulfate, phenylhydrazin, pyrazolon, anilide, refrigerants, betanaphtalinsulfochloride.

Organic Chemicals on acetylene basis:

Acetic acid and other lower aliphatic carboxylic acids, ethyl acetate, methyl acetate, butyl acetate and esters of acetic acids of different alcohols, croton aldehyde, butanol, methoxybutanol, butyric aldehyde, dimethyl ether, sodium acetate, ethyl ester of oxalic acid, isopropyl alcohol, acetoacetic-ester.

Artificial products (plastics):

Vinyl acetate and vinyl acetate polymerized to solid plastics and emulsions, mixed polymerized products, acetals (movital) chloropren, plastisizer for plastics and nitrocellulose lacquers, hydrogenation of sugar to polyalcohols (glycerol - substitute) methyltaurin, sodium oxyethansulfonate.

Dyestuff - group:

- I. Indanthren colours.
Anthrimid dyestuffs
Dibenzpyrenchion dyestuffs
Tetra-carbonic-acid dyestuffs
Thioindigo dyestuffs.
- II. Helindone:
Wool vat colours.
- III. Anthrasole:
Sulfonic esters of vat leuco compounds.
- IV. Acid wool and chromium dyes.
- V. Sirius light dyestuffs:
(= direct cotton dyes).
- VI. Triphenylmethan dyestuffs:
Sulfonic Rosanillines e.g. Bronze Blues, Water Blues, Ink Blues.
Acid Wool dyes e.g. Patent Blues, Wool Fast Blues, Acid Fuchsin.
Basic Colours e.g. Methylene Blue, Fast New Blue 3R, Safranin T.
Nitro Colours e.g. Amido Yellow.
- VII. Azo Colours:
Pigment Colours for lacquers, pigment printing and spinning colours.
Vulkan colours.
Food dyestuffs.
Acid dyes for textile purposes.
Direct colours.
- VIII. Initial products for photographic dyestuffs and sensitizers.
- IX. Textile auxiliaries and raw products for washing purposes:
Products based upon fatty acids:
Igepons, Alipons, Medialans, Soromins.
Fat free products:
Igepals, Alipals, Emulphors, Servitals.
- X. Auxiliaries for treatment and care of leather:
Leather oil, leather fat, leather-licker.
- XI. Products for metal treatment:
Auxiliary for metal-drilling and emulsifier for cutting oils.

List of the Pharmaceutical Remedies of the I.G., Works
Hoechst

1. Remedies for Human Use

I. Anaesthetics

Anaesthesin

Novocain

Novocain-Corbasil

Nosuprin

(local-anaesthetic for dentistry)

Pantocain

Impletol

(complex combination of Novocain and Caffeine).

II. Sedatives

(a) Antipyretics, Antirheumatics and Antiarthritics

Antipyrin

Migränin

Melubrin, Novalgin (Novalgin/Pyramidon) Pyrazolon-
group

Gardan (Pyramidon/Butylchloralhydrate)

Novalgin-Quinine

Pyramidon

Trigemin

Hexophan (combination of quinoline and
carboxylic acid).

(b) Analgesics and Spasmolytics.

Dolantin

Aspasan (remedy for asthma)

III. Hormon-Preparations.

Lutren (Corpus-luteum-hormon)

Cortenil (synthetic cortical-hormon)

Corteniletten

Suprarenin (synthetic hormon of suprarenal
gland)

Elityran (a preparation of the thyroid gland)

Elityran K (a substance having the action of
the thyroid gland and made of non-
specific albumen by iodation.)

Emanal (a preparation of the thyroid gland,
enriched with iodine)

Erugon (testical-hormon-preparation)

Festal (pancreas-enzyme-preparation with
hemi-cellulase)

Hypophysin (labour-exciting drug and tonic of
the vessels)

Iliren (an Adrenalin-free preparation of
the suprarenal cortex).

Orasthin (a constituent of the posterior
lobe of the pituitary gland, with
a specific action on the uterus)

Preloban (active principle of the posterior
pituitary lobe)

Tonephin (a hormon of the pituitary gland
(pars posterior) acting as a tonic
on the intestine and checking
diuresis).

Torantil (obtained from the intestinal mucous
membrane and possessing anti-aller-
gic and detoxicating properties)

Insulin (Normal - Insulin
 (Depot - Insulin, turbid
 (" - " clear
 Native - Insulin.
 Lacarnol (a nucleoside preparation acting on
 the circulation)

IV. Vitamins

Cantan (Vitamin C)
 Citrin (permeability-Vitamin, factor P)
 Hemodal (Vitamin K - Preparation)
 Priovit (water-soluble vitamins of the B. and
 C group)
 Ereton (natural Vitamin E-preparation)

V. Chemotherapeutical and Antiseptical Remedies

(a) Metal-combinations

Casbis (a bismuth preparation for injections)
 Ebesal (organo-copper combination for combat-
 ing tuberculosis)
 Lopion (organo-gold combination for combating
 tuberculosis)
 Salyrgan Organo-mercury combination (compare
 also X)

(b) Non-metal-combinations

Trypaflavin (antiseptic for treating wounds, anti-
 gonorrhoeic and internal chemo-
 therapeutic)
 Trypaflavetten
 Pan-flavin-pastils
 Surfen (a colourless chemical substance for
 use in surface and deep antiseptis)
 Surfen-preparations: Revasa-Tablets
 Rivanol (a specific for use in deep acid sur-
 face antiseptis)
 Rivanol-pre- Rivanol granulate
 parations: Rivanoletten

(c) Arsenic Preparations

Salvarsan
 Salvarsan-Sodium
 Myosalvarsan
 Neosalvarsan
 Neo-Silbersalvarsan
 Solu-Salvarsan
 Spirocid (a compound of arsonic acid)

VI. Synthetics acting on the circulation

- Icoral (circulatory and respiratory restorative)
Racedrin (Raceme-Ephedrine)
Rephrin (Racedrin / Raceme-Suprarenin)
Suprarenin (compare Hormon-preparations)
Suprifen (a circulatory tonic and antileptic)

VII. Stomachics

- Hydronal (The antacid for conditions of gastric irritation and disorders of secretion)
Orexin (for improving the secretion of the gastric juice)

VIII. Narcotics

- Solaesthin (inhalation anesthesia)
Stickoxydul (narcotic gas)

IX. Eczema Remedies

- Pellidol in form of: Pellidol ointment
Pellidol bougies
Tumenol-Ammonium (an antiphlogistic dermatological preparation)

X. Remedies for indications not enumerated in I - IX

1. Synthetics

- Lubisan (anthelmintic)
Sajodin (a lipotropic iodine preparation)
Sajodinetten
Salyrgan (organo-mercury-combination, diuretic)
Varon (labour exciting drug)
Tonophosphan (for assisting metabolism).

2. Biochemical Remedies

- Devegan (for the treatment of leucorrhoea)

XI. Others

- Postonal (ground-mass for suppositories)
Ninhydrin (diagnostic)

21. April 1945/G

Sera and Vaccines

- Anti-cholera Vaccine
Anti-Dysentaria-Polyfagin
Febris-Undulans Vaccine of "Behringwerke"
Gonargin (Gonococcus Vaccine)
Mixed Gonorrhoeal Vaccine Behringwerke
Anti-whooping cough-Vaccine Behringwerke
Leukogen (antistaphylococcic Vaccine)
Omnadin (an non specific Vaccine)
Paragen (immune therapeutic)

Anti-whooping cough Vaccine Mixed Behringwerke
 Phytossan (monovalent antiwhooping cough Vaccine)
 Anti-Pneumococcic Vaccine Behringwerke
 Anti-Streptococcic and Anti-Staphylococcic Vaccine
 Mixed Behringwerke
 Tetra-Vaccine Behringwerke (a mixed Vaccine of Typhoid,
 paratyphoid and cholera A / B Bacilli)
 Trichophytin (a polyvalent extract prepared from
 trichophyton fungus)
 Tuberculin-Preparations
 Anti-Typhoid Vaccine Behringwerke
 Anti-Typhoid and Anti-paratyphoid Vaccine T.A.B.
 Behringwerke
 Typhoral (a polyvalent antityphoid Vaccine)
 Anti-typhoid - Anti-paratyphoid B Polyfagin
 Dermotobin (a skin-tuberculin)

2. Remedies for veterinary-medical use

I. Anaesthetics

Anaesthesin

Novocain

Novocain-Suprarenin (local anaesthetic)

Pantocain (surface anaesthetic)

II. Analgesics and Antispasmodics

Novalgin

III. Hormone-Preparations

Elityran

(preparation of the thyroid gland)

Erugon

(testical hormon preparation)

Festal

(pancreas-enzyme preparation with
hemicellulase)

Hypophysin

Insulin

Orasthin

(a constituent of the posterior
lobe of the pituitary gland,
with a specific action on the
uterus)

Suprarenin

(synthetic hormon of suprarenal
gland)

IV. Vitamins

Eviabit

(oil from wheat germ with stan-
dardized Vitamin-E-content)

Cantan

(Vitamin C)

V. Chemotherapeutical and antiseptical Remedies

Methylen-blue medicinal "Bayer"

Methyl-violet medicinal "Bayer"

- Trypanblue (Specific for various kinds of piroplasmosis)
- Bovoflavin ointment (incubation infection of the female and male cattle)
- Congasin (for combating diseases in cattle and horses caused by Tryp. congolense and Tryp. vivax)
- Entozon-Granulate (chemotherapeutical soothing antiseptic)
- " -rods
- " -studs
- " -ointment
- Rivanol (a chemotherapeutic for use in surface and deep antiseptis)
- Trypaflavin
- Neosalvarsan
- Spirocid-Sodium (for spirochaetosis of fowl and others)
- Natrolets (a disinfecting of virus)
- Osmaron (disinfecting and sliding agent to be used in milking/germicidal)
- VI. Synthetics acting on the circulation**
- Rephrin (Raceme Ephedrin and Raceme-Suprarenin)
- Suprarenin (compare Hormone-preparations)
- VII. Anthelmintics and other effective remedies for combating intestinal parasites**
- Allegan-plates (anthelmintic and reborant)
- Avomin (anthelmintic)
- Ciff-capsules (")
- Nemural (")
- igitol-powder and pills (for the treatment of liver-rot)
- VIII. Remedies for combating ectoparasites, horn-flies and others**
- Malix (Dusting powder obtained from debris)
- Derrophen (a preparation obtained from derris and to be used for combating larvae of horn-flies on cattle, scab, mange, vermin, Herpes tonsurans in cattle and horses)
- IX. Others**
- Pellidol-ointment (used to promote epitheliation)
- Salyrgan (a diuretic)
- Tonophosphan-solution (for assisting metabolism)

ARESIN	Against <i>Leptinotarsa decemlineata</i>
GRALIT	Dusting agent against eating insects.
NIGROPHREN NEW	A nicotine-saving product against sucking insects.
GIX	Against flies.
DIZAN	An insecticide against cockroaches.
GRODYL NEW	A spray against <i>Calandra granaria</i>
SYNTHETIC CATERPILLAR LIME HOECHST	Against all creeping insects.
AGROTIN	A product for improving the wetting power of fungicides.

APPENDIX B
ORGANIZATION AND ACTIVITIES OF PHARMACEUTICAL DEPARTMENT
I. G. HOECHST

Hoechst April 4, 1945

Pharmaceutical Department
Prof. Lautenschlaeger, General Director
Dr. M. Beckmuehl, Assistant Director

Pharmaceutical Synthesis

Dr. Ehrhart, Director
Dr. E. Bartholomaens
Dr. O. Eisleb
Dr. L. Stein
Dr. H. Jensch
Dr. N. Rusehig
Dr. P. Hartmann
Dr. A. Schmidt
Dr. W. Krohs
Dr. H. Leditschke
Dr. W. Aumueller
Dr. W. Schneider
Dr. H. Poetz
Dr. W. Persch

Biochemical Laboratory

Dr. W. Ludwig, Director
Dr. F. Lindner
Dr. H. Ceppinger
Dr. A. Mager
Dr. Th. Wegmann
Dr. H. Vetter

Pharmacological and
Physiological Laboratory

Dr. C. Schaumann, Director
Dr. E. Doerzbach
Dr. R. Rigler
Dr. H. Beuchelt

Chemotherapeutical Laboratory

Dr. R. Fussgaenger, Director

Parasitologic Laboratory

Dr. C. Wagner, Director
Dr. W. Hohorst

Serobacteriological
Laboratory

Dr. J. Stephan, Director

Laboratory for Protec-
tion of Plants

Dr. K. Pfaff, Director
Dr. M. Erlonbach
Dr. W. Staudermann
Dr. W. Finkenbrink
Dr. W. Gelmzoth

Salvarsau Laboratory

Dr. W. Hermann, Director
Dr. Fr. Hampe
Dr. Hilmer

Galonic(?) Laboratory

Dr. L. Middendorf, Director

Pharmaceuto-Analytical
Laboratory

Dr. J. Eisenbrand, Director
Dr. Sienz
Dr. Pichoz

Medico-Scientific Bureau

Dr. J. Weber, Director
Dr. Koepf
Dr. Fischman

Arbeitsgebiete der Pharmazeutisch-wissenschaftlichen

Laboratorian.

I. Arzneimittelsynthese

1. Kreislaufmittel
2. Uterusmittel
3. Anaesthetica
4. Sterin-Gebiet
 - a) Corpus luteum
 - b) Nebennierenrindenhormon
 - c) Männliches Sexualhormon
 - d) Abbau von Cholesterin und Gallensäuren
 - e) Glukoside
 - f) Versuche zur Vollsynthese des l. weiblichen Sexualhormons.

5. Versuche zur Gewinnung von Ersatzstoffen für die wirksamen Verbindungen der Sterinreihe (Lactone, Glukoside etc.).
6. Schlafmittel
7. Analeptica
8. Analgetica und Antipyretica
9. Vollersatzstoffe für Morphinum, Codein etc.
10. Antihelminthica
11. Vitamin E-Gebiet
12. Synthese in der Flavaronreihe
13. Arsenfreie Antiluetica
14. Chemotherapeutica der Chinolin- und Akridinreihe
15. Desinfektion (Alkylamine, Phenole, Chinoline).
16. Pyrone und andere zu dem Penicillin-Gebiet gehörige Substanzen.
17. Krebsmittel
18. Schädlingsbekämpfungsmittel.

II. Biochemie

A. Hormone

1. Hypophyse Vorder- und Hinterlappen-Inkrete
2. Pankreas: Insulin und Fermente (gleichzeitige Gewinnung der Wirkstoffe)
3. Nebennieren
4. Schilddrüsen und schilddrüsenwirksame Substanz aus unspezifischem Eiweiß sowie Basedow-Problem.
5. Ovar und Corpora lutea

B. Vitamine

1. Vitamin E: Neue Verfahren zur Gewinnung und Reinigung (Injektionspräparat)
2. Vitamin R: Reindarstellung des Citrin, Konstitutionsaufklärung Synthetische, wasserlösliche Derivate des Citrin.

C. Fermente

1. Pankreas-Fermente (Festal)
2. Blutgerinnung-fördernde und hemmende Fermente (Thrombokinese, Heparin und Heparin-Ersatzstoffe), Verarbeitung der Heparinabfallstoffe für Peptone (Nährboden).
3. Oxydasen pflanzlicher und tierischer Herkunft.

D. Bakterienpräparate, Antigene, Sera etc.

1. Penicillin und Stadium verschiedener Bakterien und Pilzstämmen, einschliesslich Nährbodenuntersuchungen.
2. Ruhrbakterienantigen.
3. Trichinenantigen. (z.T. mit Marburg)
4. Tuberkulin (Aufteilung der Wirkstoffe).
5. Pneumokokkenantige.
6. Fiebererzeugende Stoffe aus Bakterien.

E. Unspezifische Immuntherapie

1. Omnadin
2. Gripkalin (Milz, Lunge etc.).
3. Diagnostische Mittel für Meinicke-Reaktion.

Zusammenarbeit mit Marburg.

Antigenforschung (markierte Antigene, Erforschung des Prinzips der Komplementbindung, Trichinenantigen).

Zusammenarbeit mit Eystrup.

Schweinepestvirus, Hundestaupavirus, Geflügeldiphtherie (Ausarbeitung von Verfahren für die Stabilisierung der Viren).

III. Pharmakologie und Physiologie.

I. Kontrolle der pharmazeutischen Handelsprodukte

- A. Biologische Standardisierung der Hormonpräparate (Insulin, Hypophysin, Sexualhormone, Vordarlappenpräparate, N.N.-Rindenpräparate, Lacarnol, Torantil, Elityran)

- B. Biologische Prüfung von Vitamin-Präparaten.
- C. Biologische Standardisierung von Digitalis-Zubereitungen.
- D. Kontrolle synthetischer Arzneimittel auf Verträglichkeit usw. im Tierversuch.
- E. Nachprüfung von Haltbarkeitsmustern und etwaigen Reklamationen.

II. Gewerbehygiene und Toxikologie.

Prüfung technischer Produkte (Lösungsmittel, Pflanzenschutzmittel, Färberei und Textilhilfsprodukte usw.) auf etwaige gesundheitsschädliche Wirkung.

III. Kolloid-Chemie

Arbeiten auf dem Gebiet der kolloidalen Lösung und ihrer Anwendung auf dem pharmazeutischen Gebiet.

IV. Physiologisch-chemische Analyse.

Durchführung aller analytischen Arbeiten auf dem Gebiet der Pharmakologie und Physiologie.

V. Forschung.

a) Tierexperimentelle Untersuchungen neuer synthetischer Verbindungen auf ihre pharmakologischen und toxikologischen Eigenschaften besonders im Hinblick auf evtl. therapeutische Verwendbarkeit.

b) Tierexperimenteller Anteil an den Arbeiten des Biochemischen Laboratoriums auf dem Hormon- und Vitamin-Gebiet.

c) Erschliessung neuer Indikationsgebiete.

d) Freie wissenschaftliche Forschung:
Sammlung neuer Erkenntnisse auf dem Gebiet der Pharmakologie und Toxikologie.
Nachprüfung wichtiger Veröffentlichungen auf diesen Gebieten.
Veröffentlichung eigener wissenschaftlicher Arbeiten.

IV. Parasitologie

1. Herstellung von Trichinenantigenen.
2. Serologische Prüfungen auf Trichinose.
3. Kleiderlauszüchtung (zur Bekämpfung der Läuse durch chemische Mittel).

g) Gewinnung luetischer Lebern für die Behringwerke Marburg, zur Herstellung von Extrakten für die Wassermann-Reaktion.

2. Forschungsarbeiten.

- a) Chemotherapie der bakteriellen Infektionen.
Penicillin.
Arbeiten auf dem Akridin- und Chinolin-Gebiet.
- b) Auffindung neuer Desinfektionsmittel gegen Bakterien und Schimmelpilze.
- c) Chemotherapie der Protozoen.
Neue Mittel gegen Piroplasmose, Rückfallfieber, Trypanosomen und Spirochaeten.
Daneben Prüfung bei Leishmaniosen und Malaria.
- d) Chemotherapie des Fleckfiebers.
- e) Chemotherapie bei Virus-Infektionen unter Heranziehung der Elektronenmikroskopie.
- f) Chemotherapie des Krebses.

3. Laufende bakteriologische Untersuchungen für die Krankenstation und die Aerzteschaft.

(Rachenabstriche, Harn, Stuhl).

4. Bearbeitung von Fragen der Konservierung verschiedener ausserhalb der Pharmazeutischen Abteilung hergestellter Produkte.

VI. Serobakteriologie.

1. Herstellung von Impfstoffen.
2. Züchtung von Kulturen und Nährbodenbereitung.
3. Veterinär-medizinische Untersuchungen und Beratung der Tierärzte.
4. Prüfung von Tuberkulin-Präparaten.
5. Prüfung von Arzneimitteln an Grosstieren.

VII. Pflanzenschutz

I. Saatgutbeizmittel

1. Nass- und Trockenbeizmittel auf metallfreier Grundlage.
2. Ölbeizmittel bzw. ölfreie Flüssigkeitsbeizen.

II. Mittel zur Bekämpfung von Pilzkrankheiten.

1. Kupferhaltige Mittel zum Ersatz bzw. zur Verbesserung der Kupferkalkbrühe.

2. Metallfreie Fungizide zur Bekämpfung von Peronospora, Fusicladium, Phytophthora usw.
3. Getreiderostbekämpfung.
4. Mittel zur Bekämpfung von Pilzkrankheiten in Gartenbau,
Rostkrankheiten an Kohlhernie,
Bohnen, Löwenmaul usw. Salatfäule.
5. Botrytisbekämpfung.

III. Insektizide

1. Arsenfreie Frassgifte.
2. Nikotin, Derris- und Pyretrum-Ersatzmittel.
3. Fliegenbekämpfungsmittel.
4. Mittel zur Kleiderlausbekämpfung.
5. Mittel zur Bekämpfung von Vorratsschädlingen.
6. Mäuse- und Rattenbekämpfungsmittel.

IV. Mittel zur Bekämpfung von Waldkrankheiten und Schädlingen.

V. Bodendesinfektionsmittel.

VI. Pflanzen-Wachs- und -Hemmstoffe.

VII. Synthetische Raupenleime.

VIII. Salvarsan-Laboratorium.

1. Aromatische und aliphatische Arsinsäuren.
2. Arsenverbindungen.
3. Arsinoxyde.
4. Stibinverbindungen.
5. Metallorganische Verbindungen (Hg, Ag, Bi, Au, Cu, Se).
6. Synthesen geeigneter Vor- und Zwischenprodukte für obige Metall- und Metalloid-Verbindungen.

IX. Galenisches Laboratorium.

1. Zubereitung, Verformung, Abfüllung und Verpackung der für die klinische Prüfung bestimmten Arzneipräparate, wie Pillen, Tabletten, Dragees, Suppositorien, Salben, Emulsionen, Suspensionen, Lösungen, etc.

2. Pflanzliche Präparate, Anreicherung und Isolierung der Wirkstoffe.
3. Ersatzstoffe für Naturprodukte, wie Pfeffer, Zimt, Kakao-Cl, Vaseline, Lanolin etc.
4. Phytochemische Untersuchungen.
5. Problem der Salbengrundlagen.
6. Trockensalben.
7. Melkgleitmittel, wasserlöslich und desinfizierend.
8. Verarbeitung veterinär-medizinischer Produkte zu geeigneten Handelsformen, darunter auch Zitzenstifte u.a.
9. Verarbeitung von gewissen Arzneimitteln auf Depot-Präparate.
10. Geeignet Überzüge für peroral anzuwendende Arzneistoffe, welche sich im Dünndarm lösen sollen.

X. Pharmazeutisch-analytisches Untersuchungslaboratorium.

Untersuchungen der in den Laboratorien gewonnenen neuen Stoffe und Entwicklung neuer Untersuchungsmethoden:

1. rein analytisch
2. Polarographie
3. Absorptionsspektren
4. Elektrophorese
5. Elektronenmikroskop
6. Ultrazentrifuge.

Ferner: Untersuchung fremder Handelspräparate und Identifizierung ihrer Wirkstoffe.

XI. Medizinisch-wissenschaftliches Büro.

1. Medizinische Literatur des In- und Auslandes, Anfertigung von Auszügen.
2. Wissenschaftliche Korrespondenz.
3. Besuch der hiesigen und auswärtigen Kliniken und "Bayer"-Büro.
4. Betreuung der in den Laboratorien aufgefundenen neuen Arzneimittel für die klinische Ausprüfung.
5. Beratung von Ärzten.
6. Ausarbeitung von Prospekten und Realorien.

Ffm.-Höchst, den 4. April 1945/G.

APPENDIX C
STATEMENTS REGARDING DESTRUCTION AND STORAGE OF DOCUMENTS
I. G. HOECHST

INSPECTION OF ADMINISTRATIVE DEPARTMENT T ON
30 APRIL, 1945 BY AN ALLIED COMMISSION

In response to the question regarding the development work of the plant, I handed over a statement of our organization as of 4 April 1945, and then showed the files of the department.

The "Geheime Kommandosachen" under orders of the Rustungskommando of Frankfurt were burned before the American troops entered Hoechst, but a number of documents stamped "Geheim" are still in the current files and were shown and inspected. Thoroughly examined among other things were chemical journals, annual reports and special reports still in the plant (from about 1941) of which a complete index was made available.

Four selected annual reports and 46 special reports were handed over as requested. Concerning the remainder of the chemical journals and reports, information was given as to where they, together with other departmental records including operating instructions, have been stored for protection against air attack.

Not inspected were two cabinets containing statistical records and a cellar (Record storage) with old, partly historical, documents of the department.

No documents of the department have been put away or buried in any other place.

(signed) Moldaenke

2 May, 1945.

STORED DOCUMENTS OF THE TECHNICAL ADMINISTRATIVE
DEPARTMENT OF I.G. FARBENINDUSTRIE A.G. PLANT AT HOECHST

1. With the Buderus concern, Breuer plant in Hirzenhain / Oberhessen: old chemical journals, special reports and annual reports.
2. In the Castle ruins in Koenigstein in Taunus: newer chemical journals, special reports and annual reports, accounts of the I.G. plant to 1941, some older accountings, memoirs, and profit calculations.
3. At the I.G. plant in Gersthofen near Augsburg: operating instructions.

30 April, 1945.

APPENDIX D
LIST OF DOCUMENTS SEIZED AT I. G. HOECHST PLANT
STORED IN MIRS BAG GBI/DOCS/R03413

1. Five folders listing products made at Hoechst works.
2. ABC Three laboratory reports on emulsifying agents.
 - 2A Recent investigations of the manufacture of Emulgator M - 11 Feb. 1943.
 - 2B New emulsifying agents for lard oil and "Bohroel" Feb. 1943.
 - 2C Practical considerations in the field of lubricants and surface protection agents in the metal industry - Feb. 1945.
3. A-F incl. Six laboratory reports relating to coal washing, coking and ammonia recovery.
 - 3A Preparation of low ash coke - June 1942. (Strictly Confidential)
 - 3B The nitrogen department of Hoechst Works - 9 June 1942. (Strictly confidential)
 - 3C "Alkylbrengeols" and their "oxethylation" products - 22 Feb. 1943.
 - 3D Report on the status of research on deashing and carbonization of brown coal - 20 May 1940.
 - 3E War requirements in nitrogen utilization - 13 Dec. 1944. (Secret)
 - 3F The conversion of coke over nitrogen to nitric acid at Hoechst - 28 Jan. 1945.
4. AB Two departmental reports on plant insecticides.
 - 4A Annual report of the plant protection department (insecticides, etc.) - 20 July 1944.
 - 4B Annual report of the plant protection department (insecticides, etc.) - 22 July 1943.
5. A-I incl. Nine research reports relating to the halogenation of light hydrocarbons.
 - 5A Progress report on the conversion of "oven gases" from methane chlorination with oxygen over catalysts (Deacon-Methane chlorination) - 20 Dec. 1942.
 - 5B Fluorine in Organic Chemistry - 30 June 1942.
 - 5C Further experiments on the catalytic preparation of methyl chloride by the reaction of tetrachlorethane with dimethylether or methanol - 22 Sept. 1942.

- #5D The photochlorination of methane methyl chloride, methylene chloride, and chlorination. 9 Jan. 1943.
- #5E Influence of oxygen on methane chlorination (in empty space) - 5 Sept. 1942.
- #5F Fluorine derivatives of propane and butane. 15 Apr. 1943.
- #5G The photochlorination of methane and methyl chloride in the gas phase - 1 July 1943.
- #5H Annual report of the methyl (chloride) department - 22 Dec. 1943.
- #5I Organization of the methyl chloride and related departments - June 1941. (Confidential)

6 A-P incl. Sixteen research reports relating to synthetic rubber and plastics.

- 6A Synthetic Faktis - 18 Feb. 1943.
- 6B Preparation of Akrylamines - 22 Apr. 1943.
- #6C The acceleration of polymerization. Secret. 11 Feb. 1943.
- 6D The present status of vinyl esters - 15 Feb. 1943.
- 6E The preparation and use of acrylamides - 20 Jan. 1943.
- #6F The copolymerization of butadiene with acrylamides - 5 Feb. 1943.
- 6G Preparation and copolymerization of vinylsulfones - 14 Jan. 1943.
- 6H The present status of safety glass bonded with Mowitals - Feb. 1943.
- #6I New information on the reaction mechanism of chloroprene polymerization - 17 Feb. 1943.
- 6J Synthetic Faktis - 18 Feb. 1943.
- #6K The distillation of easily polymerizable or sensitive materials by the thin-layer process. 19 Jan. 1943.
- #6L Report of the synthetic (resin) department for 1940, 1941, and 1942. 20 Feb. 1943.
- #6M Investigation of the production of chloroprene and chloropreneperoxide - 18 May 1944.
- #6N Chloroprene peroxide and its influence on emulsion polymerization of chloroprene - 17 Dec. 1943.
- #6O Polyamide conference on 30 Oct. 1942.
- #6P The preparation of polyurethanes by the reaction of diamines with bis-chlorcarbonic acid esters of bivalent alcohols - 5 Dec. 1941.

7. One photostat copy of Parts I and II of Hoechst report on Polyurethane.

8. A-Q incl. Seventeen research reports on miscellaneous subjects.

- 8A Methylacetophenon - 22 Apr. 1943.
- 8B Ignition of chloraniline-Alkali hydroxide mixtures by Water-Geheim. 5 Oct. 1944.
- 8C Preparation of "Hostapon" by the light process. 8 Feb. 1943.
- 8D A new process for making Mepasin sulfamido-methyl carbonic and sulfonic acids - 12 Feb. 1943.
- 8E Exchange reactions of chlorinated Kogasin - 23 Feb. 1943.
- 8F Products for the leather industry from ethylene chloride and xylol, and by sulfurizing of xylol. 10 Feb. 1943.
- 8G Concerning the present status of sulfuric acid concentration in the I.G. - 18 Nov. 1942.
- 8H A new process for "Endlange" utilization and the preparation of dichloroacetic acid and its esters - 11 Sept. 1942.
- 8I Nickel zinc oxide catalysts for glycerol production - 24 Sept. 1942.
- 8J Propionyl chloride from propionic acid and phosgene - 11 Nov. 1940.
- 8K Preparation of propionyl chloride from propionic acid and thionyl chloride - 26 Aug. 1940.
- 8L Investigation of the preparation of Pyranton A (diacetonol) - 6 June 1940.
- 8M Explosion investigations with acetylene and mono and divinyl acetylene - 1 Feb. 1939.
- 8N The addition reaction of compounds with olefinic double bonds - 15 Jan. 1942.
- 8O Preparation of high molecular weight fatty acid chlorides from technical fatty acids and phosgene - 5 Oct. 1940.
- 8P Preparation of Lubisan (Resorcinol-Mono-n-butyl ether-carbonic-diethylamide) - 28 Nov. 1943.
- 8Q Report of the Analytical Laboratory Ch 10 for the War years 1940-1942 inclusive.

9. Not used.

10. One bottle of frothing powder for sea emergency.

* Indicates documents which have been microfilmed.

DOCUMENTS STORED IN ENVELOPE 3515 IN MIRS BAG 3516

1. Bulletin on I. G. Classification system for foreign patents.
2. Collection of recent abstract bulletins for patents and other literature prepared by I.G. Hoechst and Ludwigshaven.
3. Data on composition of I.G. insecticides together with descriptive literature.

RECENT HOECHST RESEARCH REPORTS OF PROBABLE INTEREST BUT MISSING FROM AVAILABLE FILES

<u>Hoechst No.</u>	<u>Title</u>
11106	Dispersion of fogs. 5 April, 1940.
11123	Results of experiments on the production of Hexogen, etc. 5 July, 1940.
11201	Report on the work of the carbon monoxide laboratory.
11202	Concerning cobalt catalysts for hydrocarbon synthesis.

Also several "Geheim" reports on Hexogen, which it was said might be obtainable from personal files of Dr. Winnacher.

APPENDIX E
STATEMENTS REGARDING WORK DONE FOR THE WEHRMACHT
I. G. HOECHST

Ffm.-Hochst, den 1.5.1945

Im Auftrage der Wehrmacht wurden folgende Themen
bearbeitet:

Methylstoff (Aluminium/Chlormethyl)	Dir. Dr. Winnacker
Funkmessgranaten	" " "
Weissalz (Hexogen)	" " "
GM 1	" " "
Leuchtfarben	" " "
Nebelsäure	" " "
X-Stoff (Tetranitromethan)	Dir. Dr. Lange/Dr. Schultheis
Seenot-Schaumpulver	Dir. Dr. Nusslein/ Dr. Gutmann
Infrarot-Tarung	Dir. Dr. Nusslein
Treib-Sätze	Dr. Greune
Selloxine	" "
Erkennen von Lost im Dunkeln	" "
U-Boot-Programm: Schornsteinfeger Alberich	Dr. Kiesskalt/Dr. Patat
Chloropren-Klebel- ösung	
Teppich	Dr. Kiesskalt
Sondertreibstoff	Dr. Möller
Mowital-Panzerglas	" "
Verleimung/Verklebung	Dr. Schulz
Lebensmittel-Konservierung	" "
Weichmacher 3 (Kampfstoff-Vorpro- dukt)	Prof. Dr. Orthner/ Dr. Graf
Haftmine	Dr. Nicodemus/ Dr. Wolfram
Brandkissen	Dr. Nicodemus/ Dr. Wolfram
Feuerlöschmittel CB	Dr. Thiel/Dr. Scherer
Steueröl	Dr. Schultheis/ Dr. Funke

Statement by Dr. Winnacker

Frankfurt a.M. Hochst.

1st May 1945.

Statement in Connection with Interrogation
by an Allied Commission on 30th April 1945

In response to the various questions of the following statements are made by the undersigned, Director Dr. Karl Winnacker, residing at Brüningstrasse 84, Frankfurt.

Within the I.G. Hoechst Works the following departments are under the direction of the undersigned:

1. Inorganic manufacture, including nitrogen.
2. Solvents including plastics.
3. Organic intermediates.

The following subjects are reported in response to the question regarding development projects carried out in conjunction with the Wehrmacht. The steady production of common chemicals, such as nitric acid, which was carried on by contract with the Wehrmacht to meet war needs is not taken into consideration.

I. Development projects for the Wehrmacht.

1. Replacement of Phosphorus in Incendiary Bombs and Grenades.

Aluminum Chlor Methyl $Al_2(CH_3)_3Cl_3$ developed at Hoechst long before the war and made by the reaction of methyl chloride on metallic aluminum, was investigated in recent years as an igniter for incendiary grenades and bombs. Projectiles and bombs were developed containing a combustible and an igniter. The latter was essentially Aluminium Chlor Methyl which ignites upon contact with air or moisture. The combustible consists of a solution of Buna or Oppanol in benzol. The experimental shells were tested by the Wehrmacht and the Luftwaffe. They were never put to use.

2. Radio measuring grande ("Funkmessgranate")

It was desired to develop an anti-aircraft shell which would provide a reference point upon exploding which could be used as a means of correcting aiming devices. Projectiles of 8.8, 10.5, and 15 cm. calibre were developed with filling of metal wires. After numerous experiments it was concluded best to use a filling of wires 190 mm. long and 0.25 mm. diameter which were perceptible even at a height of 10,000 meters. The grenades were approved by the air defense and were soon to be made in large quantities.

3. Adhesive Mines.

It was desired to develop a mine which could be brought up to a tank by a single man and then could be attached to the tank by some adhesive material. The mine consisted of a hollow charge and an adhesive layer. The latter was heated by a thermit charge so that it

would adhere to an iron surface. The development was only in its infancy. In our opinion not much importance should be attached to it.

4. Laughing Gas - GM 1.

Since laughing gas had been produced in small amounts as an anaesthetic since before the War, the Luftwaffe at the end of 1940 expressed an interest in the production of larger quantities. The material was to be injected into the engine as an oxygen carrier making it possible for the pilot to considerably increase the velocity of an aircraft suddenly and for a short period. A plant with a capacity of 1000 tons per month was constructed but during the War it was used only to part capacity. In recent months the capacity varied between 200 and 300 tons per month. Other plants with approximately the same capacity were located in Oppau, and two localities in France which were known to us only by the code names "Vaterstadt" and "Mutterstadt." The preparation was by known methods starting with Ammonium Nitrate. Shipment was made in the form of a cold liquid under atmospheric pressure in tank cars of a similar type to those used for shipping liquid oxygen.

5. Fire extinguishing material CB.

By the reaction of methylene chloride with bromine in the presence of aluminium, monobrom monochlor methane is obtained. This material was preferred over carbon tetrachloride and similar materials as a fire extinguisher by the air forces and tank forces since it was more effective. Mixtures of this extinguisher CB with CO₂ were used. Production was about 30 tons per month. A substantial expansion was under construction.

6. Hexogen.

Before the war a process had been developed at Hoechst for the preparation of Hexogen involving the reaction of the potassium salt of amido sulphonic acid with formaldehyde to give the corresponding methylene compound. Upon nitration the latter yielded Hexogen. In Hoechst up to the early part of 1944 approximately 200 tons per month of potassium methyleneimido-sulfonate were prepared by this method which was converted to about 100 tons per month of Hexogen at the DAG Krummel. The process was uneconomical in comparison with newer processes and was abandoned early in 1944.

7. Tetranitromethane and Nitroform.

The work on the preparation of these products conducted by Dr. Schultheis in the AZO department has been jointly administered by the undersigned in various business dealings.

In addition to the projects enumerated during the interrogation on April 30 the following items are to be considered which did not occur to the undersigned at the moment.

8. Panzer Glass.

A panzer glass has been developed on the basis of Mowital as a bonding layer which was introduced into aircraft and tanks. The production was about 10 tons per month and was increasing.

9. Fog Acid (Nebelsäure)

For our production of "Nebelsäure" at the request of the Wehrmacht, a new continuous process was developed for making chlorosulfuric acid and/or Nebelsäure by the direct admixture of gaseous hydrogen chloride with contact oven gases. This process was in use at Hoechst until immediately before occupation by the American troops.

A number of smaller projects in which the Wehrmacht had some interest are set forth in the list furnished from the plant management (Appendix A) but are not mentioned here because of their lack of importance.

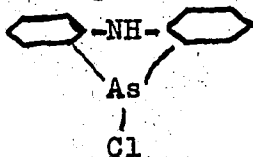
II. The undersigned stated in answer to questions that he had not the slightest connection with the development and manufacture of poison gases at Dyhernfurth, Gendorf, Seewerk or any other places. The constitution of these products or the quantities produced have never been known to him. For the specified plants regular shipments have not been made from I. G. Hoechst. In special cases shipments were made which will be reported individually.

Regarding special raw material requirements it is known to the undersigned in connection with the commission specified under I-1 (above) only that phosphorus was required for Dyhernfurth; in what amounts is unknown.

The undersigned was employed in the I.G. plant at Uerdingen am Niederrhein from the summer of 1941 to the summer of 1943. There phosgene was prepared. Also there

was installed a plant for filling bombs with phosgene on orders of the Wehrmacht.

In addition to the information given on 30 April, it should be added that in Uerdingen there was a manufacturing plant for dephenylamine-arsinchloride (Adamsite).



The volume of production, so far as I can recall, amounted to about 200 tons per month. Specifically, the undersigned had nothing to do with these matters since they were administered in strictest secrecy by other workers and were already in progress before (my) arrival at Uerdingen.

III. No work has been done at Hoechst on the use of elemental fluorine. In the laboratory of the intermediates plant Dr. Scherer was intensively occupied with the chemistry of fluorine substituted organic compounds. Aliphatic fluorine compounds were prepared, from which are obtained starting materials for dyes (Azo dyes). In addition fluorbenzol was made and condensed with chloral to make Fluor gesarol. In the intermediate plant dichlorodifluor methane was prepared under the name "Frigen" on the basis of an American license.

The foregoing statements have been recorded from memory after the conversation.

Signed

Winnacker

APPENDIX F
PLANT PROTECTION PRODUCTS OF THE I.G. PLANT HOECHST
(Manufacture 1944)

- (1) Calcium-Arsenate spray for the control of Colorado-beetle:
93.9 % Calcium-Arsenate (raw material $As_2O_5 = 42\%$)
6.0 % Powdered sulphite lye
0.01% Alkaliechtgrün B.BF (green dyestuff)
application = 0.4% in water
- (2) Calcium-Arsenate green coloured 100%
for export $As_2O_5 = 40 - 42.5\%$
- (3) Gralit - Calcium-Arsenate dust for control of Blitophaga opaca:
29.3 % Calcium-Arsenate ($As_2O_5 - 42\%$) fatted
0.1 % Alkaliechtgrün
70.6 % Tallow
- (4) Nosprasit = spray for control of pests in the fruit-culture:
27.5 % Calcium-Arsenate ($As_2O_5 = 42\%$)
13.0 % Basic Copper-chloride = 7.5% Cu.
20.0 % Naphtol-pitch-sulfo-acid-Calcium
0.25% 2406 N (Spreader of basic polyoxaethylated-Isocetylphenol)
0.10% Alkaliechtgrün BBF
3.30% Powdered sulphite lye
35.85% precipitated chalk
application 1% in water
- (5) Vitigran = spray for control of fungi
15 % Cu (downy mildew of the vine, downy mildew of the hop, potato blight)
26.0 % Basic copper chloride
6.6 % Powdered sulphite lye
3.0 % Sticker of basic oxethylated Methyl-cellulose
64.4 % Precipitated chalk
application 1% in water.
- (6) Nirosan = spray (non poisonous) for control of the first and second generation of vine-moth
25 % Tetranitrocarbazol
10 % Powdered sulphite lye
0.25 % Spreader of basic polyoxaethylated Iso octylphenol
20.00% Precipitated chalk
44.75% China clay
application 1% in water.

- 7) Niroso-dust = dust (non poisonous) for control of the first and second generation of vine-moth:
 10% Tetranitrocarbazol
 90% Tallow (fatted)
- (8) Copper-Niroso = spray for the contemporary control of insects and fungi in the vine-culture:
 15% Cu
 25% Tetranitrocarbazol
 26% Basic copper-chloride
 8% Powdered sulphite lye
 0.25% Spreader of basic polyoxaethylated iso octyl-phenol
 40.75% Precipitated chalk
- (9) Copper-Niroso-dust:
 8% Cu
 10% Tetranitrocarbazol
 14.0% Basic copper chloride
 3.5% Powdered sulphite lye
 14.5% Diatomite (fatted)
 58.0% Tallow (fatted)
- (10) Spray 2317 W for the control of the downy mildew of vine and hop, and potato blight:
 2.5% Cu
 15.0% 1 Rhodan-2-4-dinitrobenzene
 4.5% Basic copper chloride
 11.0% Powdered sulphite lye
 1.5% Sticker of basic oxethylated methyl-cellulose
 15.0% China clay
 53.0% Precipitated chalk
- (11) Nikopren = spray for the control of insects in the vine-culture:
 28.0% Nicotin 95-98%
 32.0% Spreader of basic polyoxaethylated iso-octylphenol
 40.0% water
 application 0.125% - 0.15% in water.
- (12) Venetan = spray for the control of lice in the horticulture:
 3.0% Nicotin 95-98%
 4.0% Spreader of basic polyoxaethylated iso-octylphenol
 93.0% Water
 application 1% in water.

- (13) Brassikol = soil-disinfectant for the control of damping off:
 20% Pentachloronitrobenzene
 80% tallow
- (14) Brassisan = soil-disinfectant for the control of club-root:
 20% 1-2-4-Trichlor-3-5-dinitrobenzene
 3% Engine oil
 77% Tallow (fatted)
- (15) Bulbosan = dust for the control of tomato leaf mould in the glasshouses:
 7.5% 1-3-5-Trichlor-2-4-6-trinitrobenzene
 92.5% Tallow (fatted)
- (16) Tritisan = seed disinfectant for dry treatment of wheat:
 20% Pentachloronitrobenzene
 80% Tallow
- (17) Dizan = dust for the control of cockroaches
 2.5% Phenyl-diazopynolidin (-piperidin)
 97.5% Tallow
- (18) Grodyl = oil spray for the control of weevils:
 98.0% Mineral oil boiling point (225°-360° C)
 2.0% Emulsifer of basis polyoxaethylated Diisohexylphenol
 application 10% in water
- (19) Synthetical "Raupenleim" an adhesive material in order to catch the winter moth and the mottled umber moth on the fruit trees:
 80.7% Kogasin chlorinated Cl = 52%
 0.8% Phenoxypropenoxyd
 15.0% Oxykresylcamphan (a condensation product of Cresol and Camphan)
 3.5% I.G. Wax S
- (20) Gix = spray for the control of flies, mosquitoes, etc. in the rooms:
 60% Di-p-fluorphenyl-trichloraethan
 20% Gas-oil from Lobau
 20% Emulsifer of basis polyoxaethylated -isooctylphenol
 application 3% in water.