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TECHNICAL REPORT No. 234-45

USE OF GRAPHITE OXIDE AS A FUEL

OR FUEL ADDITIVE

Bender

August 1945

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TECHNICAL REPORT No. 234-45

USE OF GRAPHITE OXIDE AS A FUEL
OR FUEL ADDITIVE

Bender, R. J.

SUMMARY

An investigation conducted in Germany in April-May 1945 concerning the use of graphite oxide, as well as finely divided carbon, as a fuel for boiler firing or for internal combustion engines. The result was negative in that it was found that no practical use was ever made of either product.

August 1945

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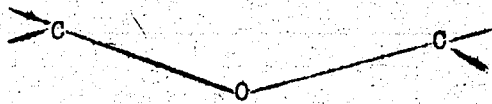
USE OF GRAPHITE OXIDE AS A FUEL OR FUEL ADDITIVE

1. Some rumors having been heard about the use of very finely pulverized graphite, or graphite oxide, prepared by Schering Kalbaum in Berlin, as a fuel or as an additive to fuel, the matter was investigated.

2. In Hamburg, Prof. Zerbe of Rhenania-Ossag (Shell) is familiar with the question and reports that this is a process similar to the "Colloidal Fuel" about which much is known in the United Kingdom and the United States of America. In other words, finely divided coal carried in suspension in fuel oil for burning in combustion chambers under boilers, etc. Economically it appears no sounder in Germany than in the U. S. A.

3. Not satisfied with this rather meager information, the writer kept on questioning other parties during his two latest missions in Germany about the use of solid pulverized coal, carbon, graphite, etc. either in suspension in fuel oil or for internal combustion engines.

4. It was found that Schering Kalbaum in Berlin had acquired from a Professor Hoffman a license to make "graphite oxide" of formula:



by treating graphite with $KClO_2$ in presence of concentrated sulfuric and nitric acid, also with K_2CrO_7 or $KMnO_4$ with concentrated H_2SO_4 . Such products have C:O value of 2.5 to 3.5 and heat breaks them up, liberating oxygen.

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Use of Graphite Oxide as a Fuel or Fuel Additive. (Cont'd)

5. The conclusion is that while certain specialists are still toying with the original idea of Dr. R. Diesel of making a pulverized coal internal combustion engine, the matter was dropped (in 1944 only) as unsound and uneconomical. Studies were made, among others, by Dr. Penzig, of I.G. Farben, at Ungstein near Bad-Durkheim; he expected his company to give him an engine to work on and apparently one was ordered from the Erste Brunner Maschinen Fabrik at Brunnen (Czechoslovakia) where a Prof. Jelizcka was working along the same line, but it was never delivered.

6. It can safely be stated that the matter was dropped well before the end of the war.

Prepared by:

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TECHNICAL REPORT No. 390-45

Hopkins

OIL AND GASOLINE-RESISTANT COATING
FOR CONCRETE FLOORS.

September 1945

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TECHNICAL REPORT No. 390-45

OIL AND GASOLINE RESISTANT COATING
FOR CONCRETE FLOORS.

Hopkins, e. a.

SUMMARY

A discussion of a concrete floor coating compound which is resistant to gasoline, oil and benzol; manufactured by Vereingte Lackfabriken of Hamburg, Germany. Included, is the processing formula; a treatment for new concrete prior to application and a method of applying.

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OIL AND GASOLINE RESISTANT COATING
FOR CONCRETE FLOORS.

1. General Description.

(a) Vereingte Lackfabriken manufactures paints, coating, lacquers and varnishes for specialized uses and is understood to be one of the foremost German concerns engaged in this line of business. The plant and office are located at 185 Hindenburg Street in Williamsburg, which is on the outskirts of Hamburg, Germany. Dr. Morgenroth, the Chief Chemist for the concern, furnished the information contained in this report.

(b) This compound was developed for coating concrete floors in garages, factories, oil refineries, or any place where the concrete floors are subjected to gasoline, oil and benzol. Concrete rapidly breaks down or deteriorates when saturated with oil and its derivatives, and this coating prevents the absorption by forming a resistant seal or coating.

(c) It is recommended that the coating material be tested by a qualified laboratory to determine its comparison with similar products manufactured in the United States.

Method of Preparation of the "Vehicle" and "Pigment" and the Blending of Them to Form the Coating Compound.

"VEHICLE"

40 kg. Chinawood Oil. - Heat quickly to 280 - 300°C until it forms light threads when a drop is pulled apart.

ADD: 40 kg. Cashew (Boiled Oil) Nut. - Quickly added to prevent gellatinizing and mixture permitted to cool to 100°C.

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1. General Description (cont'd.)

ADD: 6 kg. Super-Eleckacite, "1001". - Bleckacite Kunstharz Fabrik, Wandsbeck, Hamburg, Paul Strasse, (Vienna, London, Detroit, Hamburg). It is a Para (substituted) Phenol Resin. When heated, a reaction takes place which gives off formaldehyde.

ADD: 76 kg. White Spirits. - Added after mixture has cooled to 200°C.

ADD: 4 kg. Dryer.

Total = 166 kg. "Vehicle".

"Pigment".

40 to 50 kg. Titanium oxide (Sb_2O_5) - White or Grey.

40 to 50 kg. Iron oxide (Fe_2O_3) - Red.

40 to 50 kg. Chromium oxide (Cr_2O_3) - Green.

Compounded as follows:

50 to 60 kg. of "Vehicle" or lacquer added to 40 to 50 kg. of Pigment.

Primer Coat.

Add zinc dust to the Pigment in the quantity of 6 to 10 percent of total paint required.
Compound as above.

Method of Application of Coating.

Apply a primer coat to the thoroughly cleaned concrete surface and allow to dry over night.

Apply one 'top' coat and dry over night. The floor is then ready for use.

New concrete must first be treated with salt of

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Method of Application of Coating. (cont'd.)

hydrofluoric acid in a water solution, in order to neutralize the surface. After treating with acid, allow two or three days to elapse before applying the priming coat.

Prepared by:

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TECHNICAL REPORT No. 389-45

OIL AND GASOLINE RESISTANT COATING FOR LINING CONCRETE TANKS

Hopkins

September 1945

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TECHNICAL REPORT No. 389-45

OIL AND GASOLINE RESISTANT COATING FOR LINING CONCRETE TANKS

Hopkins, E. A.

SUMMARY

Vereingte Lackfabriken of Hamburg, Germany, manufacture coatings for specialized uses. This report discusses a preparation made by this concern for coating the interior surface of concrete storage tanks, which was stated to be resistant to oil, gasoline, benzol, etc. The processing formula is included.

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OIL AND GASOLINE RESISTANT COATING FOR LINING CONCRETE TANKS

1. General Description.

(a) Vereingte Lackfabriken manufacture paints, coating, lacquers and varnishes for specialized uses and is understood to be one of the foremost German concerns engaged in this line of business. The plant and office are located at 185 Hindenburg Street in Williamsburg, which is on the outskirts of Hamburg, Germany. Dr. Morgenroth, the Chief Chemist for the concern, furnished the information contained in this report.

(b) The lining compound was developed for coating the interiors of concrete tanks in which oil, gasoline, benzol and other similar products are stored. A coating compound is necessary for tanks of this type and usage, because concrete rapidly breaks down and deteriorates when subjected to oil, or the products derived from oil. This coating is intended to become a resistant seal, and thereby prevent the absorption of the contained liquid into the concrete tank.

(c) It was mentioned that this "vehicle" or lacquer, without pigment, could conceivably be employed as a sealing agent to protect and impregnate the packings in gasoline pumps, in which the packings must be of special or treated material. In the opinion of the writer, this application for the compound is worthy of some investigation.

(d) Dr. Morgenroth went on to state that prior to the present war, a similar compound was made by his firm. It was produced under license granted by the HARVEL CORPORATION of Newark, New Jersey. The war caused a scarcity of certain raw materials contained in the HARVEL product and the new compound was formulated as a substitute. The Chief Chemist stated that this later developed compound was more costly to produce, and in his opinion an inferior product in comparison with the HARVEL product.

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Method of Preparation of Concrete Tank Lining Compound

"VEHICLE"

25 kg. "Mowilote G".

Obtained from I. G. Farben Company.

ADD: 25 kg. of following mixture.

85 parts Ethyl Acetate ($\text{CH}_3 \text{COO C}_2 \text{H}_5$).
15 parts Butyl Acetate.

ADD: 15 kg. Butyl Acetate.

ADD: 5 kg. N/C (Nitro Celulose) solvent with a high boiling point -
used "GB Ester" made by Dr. Wacker, Munich.

ADD: 30 kg. Toluol.

100 kg. = "Vehicle".

PAINT

73.6 kg. of the "Vehicle".

ADD: 9.2 kg. Anon (I.G. Farben).
A high boiling point solvent.

ADD: 3.2 kg. Tetraline.

ADD: 14.0 kg. of following Pigment:
13.8 kg. Titanium Oxide ($\text{Sb}_2 \text{O}_5$).
0.2 kg. Lamp Black.

100 kg. of "a gray paint".

NOTE: Iron Oxide ($\text{Fe}_2 \text{O}_3$) may be substituted in place of the
Titanium Oxide, which would produce a reddish brown color.

Prepared by:

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