

FILM STUDY GROUP
REPORT ON MICROFILM REEL NO. 25
Prepared by
THE ATLANTIC REFINING COMPANY

U. S. Government Technical Oil Mission

Reference, Index Page 14

Item 12 con. BUTADIENE FROM VINYLACETYLENEButadiene from Vinylacetylene

Frame 569+ apparently continues discussion on production of butadiene from vinylacetylene, carried over from reel 24. The reviewer has no knowledge of any appraisal made upon the material in reel 24, and accordingly has confined scanning on this particular subject to a statement of the principal paragraph headings:

- Production of pure hydrogen and ethylene from the arc gases.
- Synthesis of acetaldehyde.
- Aldehyde synthesis in the liquid phase with acidic, soluble mercury salt solution.
- Overall picture of aldehyde synthesis from arc acetylene (2 flow diagrams are given).
- Manufacture of Buna from acetaldehyde by the arc process.
- Recovery of acetaldehyde from unpurified gas, by means of mercuric sulfate.
- Synthesis of acetone.
- Production of acetonitrile (the reaction in this case is one mol each of acetylene and ammonia, which thereby produce one mol each of hydrogen and acetonitrile (CH_3CN). The nitrile can be converted to acetic acid in the presence of water and sulphuric acid.
- Production of ethylene.
- Production of ethylene diacetate.
- Recovery of the chlorinated products of acetylene.
- Production of sodium acetate.
- Production of vinylchloride.
- Production of vinylacetylene.
- Buna manufacture from vinylacetylene (2 step method).
- Production of acetylene black.

The foregoing material on acetylene and its products appears to have been a comprehensive report of approximately 75 pages.

Frame 624+. HYDROGENATION OF VINYLACETYLENE TO BUTADIENE BY MEANS OF ZINC DUST AND LYE, AND BY MEANS OF AMALGAM (approximately 12 frames).

IMPROVEMENT OF ANTIKNOCK STABILITY.

Frame 637+. January 14, 1943. It has been found a small amount of the fraction boiling between 160° and 250°C , derived from the hydrogenation of coal, tar, or oil in liquid phase, when added to gasoline lessens the separation of metallic antiknock agents.

Item 13. AMMONIA SYNTHESIS.

Frames 640 to 670 deal with ammonia synthesis. The reviewer does not believe the material should be translated, and has confined scanning to an enumeration of principal subject headings:

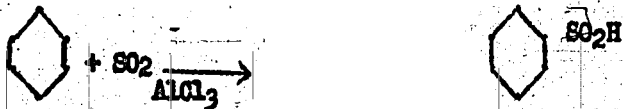
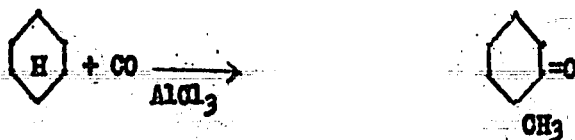
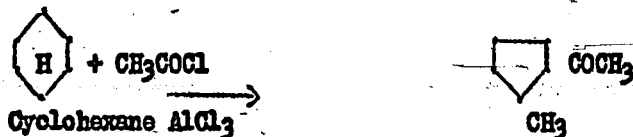
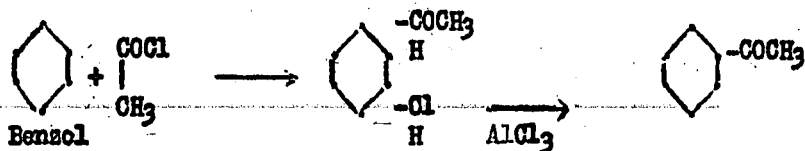
Research work with a potassium-rich ammonia catalyst.
Speed of reaction in ammonia synthesis.

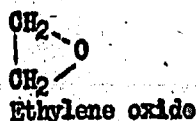
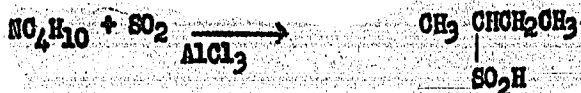
Item 14. MISCELLANEOUS

New Knowledge in the Field of AlCl₃ Synthesis

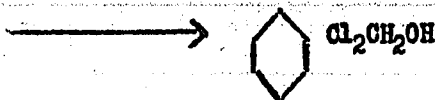
Frame 672+. Jan. 11, 1944.

Memorandum citing conventional and novel uses of AlCl₃ in I.G. syntheses. Examples:





explodes with AlCl_3 , but in benzol



No data were given upon favorable temperature, concentration, etc. of reactants, nor yields of products.

Flame Velocities - Engine Knock

Frame 676. Determination of the flame velocities of several hydrocarbons and hydrocarbon mixtures showed that the tendency to knock is not related to flame velocity. Flame velocity is primarily a function of flame temperature. The maximum flame temperature is obtained with a fuel-air ratio smaller than the stoichiometric ratio due to partial dissociation of the end products of combustion.

Heat Engines. A Heat Pump with High Efficiency.

Frame 677. The efficiency of a heat pump with a gas as the medium is greatly influenced by the energy losses in the compressors and pumps. This is due to the fact that the total positive and negative work done by compressors and pumps is very much larger than the useful work which is the algebraic sum of large positive and negative quantities. However, if liquids (such as diphenyl) are used in a cyclic process involving condensation and evaporation, the total positive and negative work done is much smaller than the useful work:- In a particular case (diphenyl) this practice is 34% as compared to 200% for a heat pump using gas. Heat pumps with liquid media have the further advantage that the heat transfer in the liquid state is better and that due to the higher molecular weight of the medium, fewer stages are necessary in the turbo compressors.

The Development of a Granular Soap-like Laundering Material

Frames 683 through 687. March 4, 1944.

By the oxidation of different hydrocarbons, resulting fatty-acid containing products were obtained which were examined and appraised for washing purposes.

Molecular Distillation

Frame 688. Jan. 15, 1943.

Oils suitable for use in vacuum pumps employed in manufacture of radio tubes, electric lamps, etc. were produced from machine oil by molecular distillation. No technical details on equipment and operation are given.

Mirror Surfacing

Frame 689+. Jan. 12, 1943.

A general discussion, without any technical details, of the advantages of rhodium and aluminum or their alloys over silver as a mirror producing surface. Such films may be produced by vaporization and condensation of the metals upon glass surfaces. Numerous applications were found in the production of scientific instruments and anti-aircraft material.

Research on Biosynthesis in Germany

Frame 693. July 16, 1940.

Five frames are devoted to a general discussion on the subject of biosynthesis, with particular reference to the production of specific chemicals or groups of chemical compounds. The article does not appear to have any interest to present day researchers in this field.

Dispersion of Air in Liquids

Frame 698. June 15, 1944.

Eight frames of texts and pictures describe experiments on the dispersion of gases in liquids through tubes, porous plates and filter media. No numerical data are given and because such techniques are known to American Industry, translation is not considered necessary.

ANALYTICAL METHODS

This section of the reel, beginning at Frame 706, appears to be quarterly summary reports describing analytical work in the several laboratories of I.G. Analytical techniques are not described in detail; in fact many of the references infer that well established and commonly known procedures were used. A partial listing of the subjects which covered 400 frames will be given to show the breadth of interest and activity engaged upon by the I.G. Laboratories.

Ethylbenzaine - The heat of reaction of ethylbenzine when sulphonated by contacting with sulphuric acid and oleum was found to be 9.3 kilogram calories per mol ethylbenzine.

Determination of formic acids in the presence of crotonaldehyde and other acids.

Determination of carbonyl groups by volumetric gas measurements with phenylhydrogen and Fehling solution.

3-Chlorobutadiene - The heat of polymerization of chloroprene was found to be 18 kilogram calories per mol.

Explosive limits of chloroprene in air.

X-ray examination of activated clay catalyst.

Correlation between ash content, melting point and other properties of brown coal.

Determination of butene-1 in the presence of butene-2.

Determination of acetylene in the presence of CO₂, H₂S and organic sulphur compounds.

Pyridine in activated charcoal.

SO₂ and sulphite in the presence of bisulfite.

Detection of Buna S and Buna SS.

Chloral.

Crotonaldehyde.

Polystyrol.

Pyrrolidine.

Nitrogenetroxide in the presence of HNO₃ and N₂O₃.

Vulcanite.

Hydrogen peroxide.

Xylol isomers.

Acetyl groups.

Acrylic acids.

Tributylphenol.

Higher acetylenes.

Benzoic acids.

Tricresylphosphates.

Double bonds in natural rubber and synthetic Buna.

Examination of Buna S and Buna SS.

Cyclohexane.

Determination of small quantities of fluorine in Oppanol.

Beginning on Frame 1124, there are detailed descriptions of analytical methods pertaining to the following subjects:

Colorimetric determination of iron with valence of 2 and 3.

Determination of oxygen.

Determination of lamp-black (gravimetrically).

Colorimetric determination of oxygen occurring in gases.

Determination of acetylene.

Determination of acetic acid.

Determination of H₂S with cadmium acetate.

Iodimetric determination of acetone.
 Determination of acetaldehyde.
 Colorimetric determination of COS with lead paper.
~~Colorimetric determination of H₂S with lead paper.~~
 Determination of organic sulphur (COS) by the cadmium acetate method.
 Determination of ammonia in gases.
 Qualitative identification of acetone with furfural.
 Determination of acetone by the hydroxylamine method.
 Qualitative identification of acetaldehyde.
Toxicity of carbon-monoxide; identification of carbon-
monoxide in blood.
 Determination of copper in raw platinum.
 Determination of nicotinic acid in the presence of saltpeter.
 Determination of valeric and adipic acids in the presence of
 free mineral salt.
 Determination of isovaleric acid in the presence of adipic acid.
 Determination of total phosphoric acid.
 Determination of total hardness in condenser water.
 Determination of copper and selenium in copper selenite and
 copper selenide.
 Determination of aniline and diphenylamine in nigrosines.
 Determination of nickel-carbonyl in air.

Frames 1295 up to Frame 1345 are devoted to a report by Dr. Robert Stadler, dated July 14, 1937, upon analytical and explosive investigations of acetylene silver. This material is the result of a chemical reaction of 3 mols of silver nitrate and one mol of acetylene, yielding 2 mols of nitric acid and the double compound Ag₂C₂·AgNO₃. The reviewer believes that Dr. Stadler was in residence at Heidelberg and conducted his researches for I.G.

Beginning with Frame 1345, about 20 pages are devoted to a research on the rapid determination of higher alcohols in catalytic syntheses of the Fischer-Tropsch type. The investigation, dated March 14, 1938 appears to have been conducted by or for the Oppau group of I.G. Report consists of text, tabulated data and graphs.

Advances in Visual Conductimetry.

By Dr. O. Pfundt, November 19, 1937.

This report deals with titration in the presence of many foreign electrodes, and was recommended for use in the determination of small amounts of substances.

The Solubility of Volatile Hydrocarbons in Organic Fluids - July 1, 1937.

About 30 pages of text and tabulated data are devoted to a summary of a research project upon the solubility of gaseous hydrocarbons in organic liquids, wherein the author showed or deduced relationships between the solubility and constitution of the hydrocarbon, as well as the chemical constitution of the solvent. He also believed that the research showed practical

applications in the recovery and separation of hydrocarbons from gaseous mixtures. The hydrocarbons studied included methene, propene, normal butene, isobutene, ethylene, propylene, normal butylene, isobutylene, butadiene, acetylene, dephenylene and vinyl acetylene. Over 200 solvents were studied.

Frame 1433 and several successive pages described the quantitative determination of higher molecular weight aldehydes, and is dated July 22, 1940.

Hydrocarbon Analysis.

Beginning on Frame 1440, and continuing for about 25 pages, is a report on the examination of gas-oil and its refined products, to whose analysis the methods of Waterman and the methods of Gross & Grodde were applied. Both methods were found very useful, but apparently small amounts of inhibitor hinder oxidation. The writer cites the work of Gross & Grodde as appearing in *Öl und Kohle* 1942, page 419.

Identification and Constitution of Branched Acids from Fischer-Tropsch Soap Fat Acids.

This 12 page report, beginning on Frame 1458, is dated February 14, 1942 and describes work done on the above subject in the Oppau Laboratories of I.G.

A Simple Method for the Determination of the Reactivity of Fuel.

A report dated May 17, 1938, and consisting of about a dozen pages, describes means for securing the reactivity of fuels, particularly those used in gasification. The essence of the experiment consists in passing definite quantities of air at predetermined temperatures over the specimens of solid fuel to be assayed. The time required to bring the fuel from ignition until it is strongly glowing is considered the measure of activity.

The final 20 frames of this reel is a report dated March 12, 1936 upon the simultaneous determination of mixed alcohols (methyl, ethyl, isobutyl and isopropyl alcohols).