

- Light Jour., vol. 102, 1915, pp. 299-300; Jour. Gas Lighting, vol. 129, 1915, p. 450; Jour. Soc. Chem. Ind., vol. 34, Mar. 31, 1915, p. 266. Summarizes earlier work on benzol determination. Author modifies Müller's method of washing gas with cooled paraffin oil, and makes it available for coke-oven gas by using improved absorption apparatus. Benzol is absorbed almost quantitatively. Details of method are given.
133. LUNGE, GEORG. Coal tar and ammonia, 1909. Chapter entitled "Benzene—physical and chemical properties" (pp. 177-183) is valuable for its long list of references. Chapter entitled "Toluene—physical and chemical properties" (pp. 183-184) also contains references. In chapter entitled "Theory of the formation of benzene hydrocarbons in coal tar" (pp. 241-245) the author discusses formation of benzene from acetylene and other hydrocarbons and gives many references to the literature.
134. LUNGE, GEORG, AND BERL, ERNST. Chemisch-technische Untersuchungsmethoden. Berlin, 1911, Bd. 3. In the chapter on "Bestimmung des Benzoldampfes" (pp. 275-281) the Deville method of freezing out benzene from gaseous mixtures at -22° C., and the Harbeck and Lunge method, as modified by Lunge, of determining benzene as dinitrobenzene, are described in detail. Many references to literature. Chapter entitled "Untersuchung der Handelsbenzole" (pp. 407-423) gives distillation tables and methods of distilling. Literature on analytical methods for carbon bisulphide, for thiophene, for paraffin hydrocarbons, and for unsaturated and resinous compounds is reviewed. Shows methods of distinguishing between petroleum and coal-tar products. Chapter entitled "Untersuchung des Leichtöls" (pp. 391-397) contains many references and describes properties of light oil; analytical methods are given for determining specific gravity, boiling point, amount of phenols and pyridine bases present, and for running distillation tests. Tables of distillation tests of mixtures of benzol and toluol are included.
135. LUNGE, GEORG, AND VON KÉLER, H. Untersuchung Zweier Rohbenzole aus Koks-ofengasen. Ztschr. angew. Chem., Jahrg. 7, Nov. 1, 1894, pp. 637-640; Jour. Soc. Chem. Ind., vol. 14, Feb. 28, 1895, p. 143; Mineral Ind., vol. 5, 1896, p. 189. Distinguishes two varieties of crude benzol—absorption benzol and compression benzol—discusses chemical composition, physical properties and tests, and gives tables of distillations of these products. A 90 per cent benzol from Upper Silesia was examined by distillation. Composition by weight of benzols: Absorption benzol, 85.10 per cent benzene, 11.63 toluene, 1.54 xylene; compression benzol, 67.03 per cent benzene, 15.61 toluene, 2.18 xylene. All other constituents are given.
136. MARKS, ARTHUR. Benzol as a motor fuel; impurity troubles. Gas World, vol. 62, May 1, 1915, Coke section, p. 15. Tests for carbon bisulphide and sulphuric acid are important. Sulphuric acid may be neutralized by mixing benzol with $\frac{1}{3}$ to $\frac{1}{2}$ its amount of petrol, which is generally alkaline. When higher fractions boiling over 150° C. are allowed to pass over in distillation of light oil, the benzol may contain cumarone, which is extremely objectionable and not readily detected.
137. MASTBAUM, H. Benzin und Benzol. Ztschr. angew. Chem., Jahrg. 22, Jan. 29, 1909, p. 202. The French nomenclature is followed in Portugal for differentiating the petroleum from the coal-tar distillate, the first being "ether de petroleo" and the second "benzina," "benzenio," or "benzol."
138. NORTHAL-LAURIE, D. A new method for the determination of toluene in commercial toluols. Analyst, vol. 40, September, 1915, pp. 384-389. Mixtures of benzene and toluene, toluene and xylene, of known composition, by volume, were prepared and their boiling points determined. By plotting the boiling points against percentages a curve was drawn, from which the

- composition by volume for all boiling points could be read. Detailed directions for working and full description of apparatus are included. More than 50 per cent of toluene must be present or toluene must be added in known amount to the sample.
139. REEVE, C. S., AND LEWIS, R. H. Application of the dimethyl sulphate test for determining small amounts of petroleum or asphalt products in tars. Jour. Ind. Eng. Chem., vol. 5, April, 1913, pp. 293-295. Reviews literature on this test for separating aromatic from open-chain hydrocarbons.
140. RITTMAN, W. F., AND EGLOFF, GUSTAV. Physical constants of gas oils and derived tars. Jour. Ind. Eng. Chem., vol. 7, June, 1915, pp. 481-484. Gives fractional distillation, specific gravity, surface tension, and refractive index of 4 gas oils and the derived tars. Difference between constituents of an aliphatic oil and of its derived tar are made evident by differences between volatility-gravity, volatility-refractive index, and volatility-surface tension relations. Aromatic hydrocarbons can be formed from the aliphatic hydrocarbons in petroleum. Various physical constants of typical gas oils and of derived tars have been tabulated.
141. SCHELENZ, HERMANN. Benzin und Benzol. Ztschr. angew. Chem., Jahrg. 21, Dec. 18, 1908, pp. 2577-2579. Discusses various names, past and present, used to denote coal-tar fraction and petroleum fraction.
142. SCHENK, KONRAD. Über die Bestimmung des Gesamt-Schwefels im Handelsbenzol. Chem. Ztg., Jahrg. 38, Jan. 17, 1914, pp. 83-84; Gas World, vol. 60, 1914, p. 490. The benzol is burned in a specially constructed apparatus, sulphur dioxide absorbed in a 1 per cent hydrogen peroxide solution, and sulphuric acid estimated by titration with decinormal alkali, and methyl-orange as an indicator.
143. SCHWALBE, CARL. Sulphur content of pure benzols. Jour. Soc. Chem. Ind., vol. 24, Mar. 31, 1905, p. 271; from Ztschr. Farben-u Textil-Ind., Jahrg. 4, 1905, pp. 113-119. Presents a table showing sulphur content of several commercial benzols and discusses various methods of testing.
144. ——— Verfahren zur Ausscheidung der Schwefelverbindungen, insbesondere des Schwefelkohlenstoffs und Thiophens aus Theeröledestillaten. German patent 133,761 Klasse 12o., Dec. 10, 1901. Oil to be purified is shaken with ammonia in gas or liquid form. The benzol when removed from the oily residue formed is free from carbon bisulphide.
145. SMITH, J. K. Imperishable color-standard solutions, and their application to the classification of benzol washing tests. Jour. Soc. Chem. Ind., vol. 18, Mar. 31, 1899, p. 212. Many practical observations on commercial testing of benzol. Three tests are discussed in detail; specific gravity test, behavior of benzol on distillation, and behavior with acid.
146. SOCIÉTÉ ANONYME DE ST. DENIS. Verfahren zum Ausscheiden des Thiophens aus dem Rohbenzol. German patent 79,505, Klasse 12, July 27, 1894. Crude benzol is heated several hours with 0.5 per cent of aluminium chloride, then decanted, distilled, and washed with a concentrated solution of sodium carbonate. The process depends on aluminium chloride forming condensation products with thiophen more easily than with benzene hydrocarbons.
147. STAVORINUS, D. Zur Bestimmung des Schwefelkohlenstoffs im Benzol. Jour. Gasbel., Jahrg., 49, Jan. 6, 1906, p. 8; Jour. Soc. Chem. Ind., vol. 25, Feb. 15, 1906, p. 139. Twenty-five c. c. of sample are mixed with 70 c. c. of 96 per cent alcohol and 10 c. c. of twice-normal sodium hydroxide. After half an hour 5 c. c. of concentrated hydrogen peroxide is added, the alcohol removed by evaporation, and the sulphate estimated.