

each of the vapors forming with steam a mixture that boils at a fixed temperature. An excess of steam is mixed with these bodies and the mixture subjected to fractional cooling. Thus naphthalene, xylene, toluene, and benzene may be separated from one another.

101. STILL, C. Process for distilling the benzene hydrocarbons from saturated (gas) washing oils. English patent 16493, July 15, 1912; German patent 251,562, Klasse 12r., Aug. 9, 1911; Gas World, vol. 59, Oct. 1, 1913, Coke section, p. 21. Above the distilling column is a reflux condenser where the vapors are cooled sufficiently to condense naphthalene and the constituents of the washing oils only. The condensate is then run into another condenser, where it is cooled until no more naphthalene separates.

BENZENE, TOLUENE, AND RELATED PRODUCTS—TESTS, IMPURITIES, PROPERTIES, USES.

102. BARKER, J. T. Experimentelle Bestimmung und thermodynamische Berechnung der Dampfdrucke von Toluol, Naphthalin, und Benzol. Ztschr. phys. Chem., Bd. 71, 1910, pp. 235-253. The vapor pressure determined is as follows: Toluene at 25.8° C., 28.75 mm.; at 14.8°, 16.80; 0°, 6.86; -21°, 1.61; -78°, 0.0058. Naphthalene 20°, 0.064; 30°, 0.164; 40°, 0.378. Benzene (solid), -77.5°, 0.018. These values are compared with those calculated from Nernst's theory.
103. BAY, I. Dosage du sulfure de carbone dans les benzols. Compt. rend., t. 146, Jan. 20, 1908, p. 132. The carbon bisulphide in benzene may be determined by precipitation with phenylhydrazine, phenylhydrazine-phenylthiocarbamate being formed, and the precipitation being complete after two or three hours. The substance is collected on a tared double filter paper, washed with pure benzene, and dried. The method is extremely accurate, the greatest error being less than 0.5 per cent of the amount determined. The values are generally too high.
104. BIEHRINGER, JOACHIM. Beiträge zur Kenntniss der leichtest flüchtigen Antheile des Steinkohlentheers. Dingl. poly. Jour., Bd. 276, 1890, pp. 78-90. The author discusses carbon bisulphide and various methods for its determination and removal.
105. BRUNI, G. Über das Gefrieren von gemischten stellungsisomerer Benzolderivate. Ztschr. Elektrochem., Jahrg. 16, May 1, 1910, p. 285. Bruni states that the conclusions reached in Fischer's experiments exactly agree with his own earlier results. In general, isomerides in the benzene series do not form solid solutions, but substances having analogous substituting groups in the same positions do.
106. BURRELL, G. A., and ROBERTSON, I. W. The determination of benzol in gas mixtures. Jour. Ind. Eng. Chem., vol. 7, August, 1915, pp. 669-670. The same method is used as in separating illuminants. The percentage of benzol was checked by combustion analysis and it was found that all of the benzol was separated at -78° C.
107. ——— The separation of the illuminants in mixed coal and water gas. Jour. Ind. Eng. Chem., vol. 7, January, 1915, pp. 17-21. A method for determination of benzene is described as follows: The gas, freed from water vapor, is introduced into a liquefaction bulb and cooled to -78° C. After removal of as much gas as possible with a pump, the condensed liquid is vaporized, and its pressure read on a manometer. This pressure compared with the original pressure of the gas gives the percentage of benzene.
108. CHURCH, S. R. Methods for testing coal tar and refined tars, oils, and pitches derived therefrom. Jour. Ind. Eng. Chem., vol. 3, April, 1911, pp. 227-233.

- Describes tests, standardized by a manufacturing company; for examining raw materials and products of tar distillation. Methods for distilling and for determining specific gravity of light oils and benzols are given.
109. CHURCH, S. R., AND WEISS, J. M. Paraffin bodies in coal-tar creosote and their bearing on specifications. Jour. Ind. Eng. Chem., vol. 6, May, 1914, pp. 396-398. Furnishes a key to literature on the dimethyl-sulphate method for separating aromatic from open-chain compounds. The authors believe the method is of little value.
110. COLMAN, H. G. Determination of the percentage of toluene in commercial solvent naphtha. Jour. Gas Lighting, vol. 129, 1915, pp. 314-315. One hundred c. c. of the sample is distilled at rate of one drop per second, and distillate up to 138° C. is collected. If this does not amount to 35 c. c., a second 100 c. c. is fractionated, and the distillates combined. If combined distillates do not amount to 35 c. c., sample is considered to be free from toluene. Otherwise 35 c. c. of distillate is mixed with 50 c. c. of pure toluene and 15 c. c. of pure benzene, toluene in this mixture determined as previously described, and the toluene content of solvent naphtha calculated.
111. ——— Determination of the percentage of toluene in commercial toluol. Jour. Gas Lighting, vol. 129, 1915, pp. 196-198; Jour. Soc. Chem. Ind., vol. 34, Feb. 27, 1915, pp. 168-170. From a large number of distillations of mixtures of known amounts of benzene, toluene, xylene, an analytical process has been devised. One hundred c. c. of sample is distilled under standard conditions, and from amounts passing over below 105° C., and above 117° C., amount of pure toluene present can be calculated by aid of a table. Specific details are given.
112. DAVIS, G. E. On the valuation of the crude naphthas of commerce. Jour. Soc. Chem. Ind., vol. 4, Nov. 30, 1885, pp. 645-649. A lengthy discussion of the distillation of commercial benzol, and the estimation of benzene, toluene, and xylene.
113. DENIGES, GEORGES. Dosage volumétrique rapide du thiophène dans la benzine. Bull. Soc. chim. France, ser. 3, t. 13, 1895, pp. 537-546; t. 15, 1896, pp. 1064-1065; Jour. Soc. Chem. Ind. vol. 15, Oct. 31, 1896, p. 746, vol. 14, Oct. 31, 1895, p. 893; Jour. Chem. Soc., vol. 68, 1895, A. 1, p. 411; A. 2, p. 372. Thiophen is estimated, by precipitating, as a basic thiophen mercuric sulphate, with an excess of mercuric sulphate solution and titrating back with decinormal silver nitrate solution until permanent opalescence caused by the separation of benzene appears.
114. DIETERICH, KARL. Analysis and valuation of motor fuels; fourteen methods for examining them. Automobile, vol. 33, July 29, August 5, 1915, pp. 202-205, 247-249, 267. Properties of benzol and gasoline are compared, with use of these fuels discussed. Describes methods of testing as follows: Specific gravity, color and other external characteristics, test of odor, timing of evaporation in a clock crystal, behavior toward litmus, color reaction with sulphuric acid, benzol test with isatine-sulphuric acid, benzol test by nitration, test with "Dracorubin" paper, nitrate of silver test, calcium carbide test for water, fractional distillation, refractometer test, mentions comparative prices.
115. ELLERTON, J. G. The estimation and elimination of sulphur compounds in commercial benzol. Jour. Soc. Chem. Ind., vol. 31, Jan. 15, 1912, pp. 10-12. Discusses various methods of estimating carbon bisulphide and thiophen in benzol. The Nickels method was adopted for carbon bisulphide, and the Deniges method for thiophen. Carbon bisulphide may be separated by fractional distillation, but removal of thiophen requires treatment with the strongest sulphuric acid, which involves a loss of 8 to 12 per cent of the