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Standard Test Method for BENZENE AND TOLUENE IN 250°F AND LIGHTER PETROLEUM PRODUCTS BY ULTRAVIOLET SPECTROPHOTOMETRY¹

This Standard is issued under the fixed designation D 1017; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reappraisal.

^c NOTE 1—The title was revised editorially in July 1976.

NOTE 2—Editorial changes were made throughout and Annex A1 was editorially added in August 1978.

1. Scope

1.1 This method covers the determination of benzene and toluene in petroleum products having a boiling range from 100 to 250°F (38 to 121°C) and a maximum content of 25 % total benzene plus toluene. (**Caution**—See Annex A1.1.)

1.2 Paraffins, naphthenes, or monoolefins do not interfere with the analysis. Any interference that might arise from ultraviolet absorption due to diolefins or sulfur compounds is substantially eliminated by the base-line technique or by chemical treatment of the sample before analysis. The boiling range specification eliminates the xylenes, ethyl benzene, and styrene.

2. Definitions and Symbols

2.1 *transmittance*, τ —the ratio of the radiant power transmitted by a sample, P , to the radiant power incident on the sample, P_0 , both being measured at the same spectral position and with the same slit width. In symbols:

$$\tau = P/P_0$$

Under the conditions of this method:

$$\text{Transmittance} = 10^{-a/b}$$

where a , b , and c are defined in 2.3 to 2.5.

2.2 *absorbance*, A —the logarithm to the base 10 of the reciprocal of the transmittance. Under the conditions of this method:

$$A = \log (1/\tau) = abc$$

2.3 *length of optical path*, b —the distance in centimetres traversed by the beam of radiation in passing through the sample.

2.4 *concentration*, c —the quantity of absorbing substance per unit volume. In this method it is expressed in grams per litre.

2.5 *absorptivity*, a —the ratio of the absorbance to the product of the concentration and the length of optical path. In symbols:

$$a = A/cb$$

Base-line absorptivity is the absorptivity for the sample measured from the base line vertically to the absorption peak.

3. Summary of Method

3.1 Benzene and toluene in petroleum products are determined by absorbance measurements on the sample at known dilution with a spectrophotometer that previously has been calibrated with solutions of pure benzene and toluene. Interference by conjugated diolefins and traces of sulfur compounds is minimized by use of the base-line method, or interference may be substantially eliminated by washing the sample with alkaline KMnO_4 solution before analysis.

4. Apparatus

4.1 Spectrophotometer, equipped for liquid

¹ This method is under the jurisdiction of ASTM Committee D-2 on Petroleum Products and Lubricants.

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