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**Committee D16 on Aromatic Hydrocarbons and Related Chemicals
Subcommittee D16.07 on Styrene, Ethylbenzene and C9 and C10
Aromatic Hydrocarbons**

Research Report RR # D16-1033

**Inter-Laboratory Study to Establish Precision Statements for ASTM
D7057, Standard Test Method for Analysis of Isopropylbenzene
(Cumene) by Gas Chromatography (External Standard)**

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COMMITTEE D16 ON AROMATIC HYDROCARBONS AND RELATED CHEMICALS

RR:D16-1033

INTERLABORATORY TEST STUDY FOR THE ANALYSIS OF ISOPROPYL BENZENE (CUMENE) BY CAPILLARY GAS CHROMATOGRAPHY (EXTERNAL STANDARD)

Introduction

This round robin was conducted in support of a revision of an existing test method, D3760-00, Analysis of Isopropyl benzene (Cumene) by Capillary Gas Chromatography, to update the components identified and switch to calibration of the gas chromatography system by the external standard technique.

The method was found to be applicable to the measurement of impurities such as non-aromatic hydrocarbons, benzene, toluene, ethylbenzene, phenol, cymenes, *t*-butylbenzene, *n*-butylbenzene, *n*-propylbenzene, alpha-methylstyrene, sec-butylbenzene, and diisopropylbenzenes.

Cumene is analyzed by a gas chromatograph (GC) equipped with a flame ionization detector (FID). A repeatable volume of the specimen to be analyzed is precisely injected into a gas chromatograph. The peak areas of the impurities are measured. Purity by GC (the Cumene content) is calculated by subtracting the sum of the impurities from 100.00, excluding CHP, Acetophenone, and 2-Phenyl-2-Propanol (Dimethylbenzylalcohol). Results are reported in weight percent. If extremely high boiling or unusual impurities are present in the Cumene, this test method would not necessarily detect them.

All of the participants used the method as outlined in Table 1 under Test Methodology with only minor variations in equipment and equipment parameters used. Solutions were prepared and issued by Sunoco Chemicals Chemical Development Laboratory, and they retain all of the raw data from the test. See Appendix A for individual raw results and instrument conditions.

Test Methodology

The following letter and attached Table 1 were sent to each participant:

Cumene Round Robin Participant

Address 1

Address 2

City, State Zip Code

Dear Participant:

Thanks for participating in our Cumene analysis round robin. Enclosed you will find 5 samples of Cumene (C1-C5).

Basically, as far as the test protocol, any instrument having an FID that can be operated at conditions roughly equivalent to the example conditions listed in Table 1 can be used. The system should have sufficient sensitivity to be able to distinguish 2ppm of Phenol with a height greater than twice the height of the background noise level.

Any GC column may be chosen that is capable of resolving all of the significant impurities from Cumene. The column in Table 1 has been found to work, but others may be suitable as well.

The samples should be analyzed in triplicate using an external standard method (preferably without normalization). What this means is that ideally the instrument should be equipped with an autoinjector and three separate vials should be generated from each sample for analysis. The analysis should be performed by the same analyst on the same instrument within the shortest timeframe possible and within a single calibration timeframe.

Please send all of the raw results to me via mail and I will take care of all of the tabulation required. Also include your standard run, and the exact instrument parameters and conditions used (see Table 1 for the type of information needed).

Thanks again for your help, and we will share (anonymously) the results once they have been tabulated and analyzed statistically.

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