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Standard Practice for Isolation of Representative Saturates Fraction from Low-Olefinic Petroleum Naphthas¹

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1. Scope

1.1 This practice covers the isolation of a representative saturates fraction from depentanized hydrocarbon mixtures that distill below 221°C (430°F) and that contain less than 1 volume percent of olefinic hydrocarbons.

1.2 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.3 *This standard does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.* Specific precautionary statements are given in Notes 1, 2, and 3.

2. Referenced Documents

2.1 ASTM Standards:

D 1319 Test Method for Hydrocarbon Types in Liquid Petroleum Products by Fluorescent Indicator Adsorption²

3. Significance and Use

3.1 The determination of paraffins and naphthenes by the refractivity intercept method requires a sample free from olefins and aromatics. This practice is applicable for the isolation of saturates fractions from samples containing less than 1 volume % of olefinic hydrocarbons.

4. Summary of Practice

4.1 A measured amount of sample is charged to the top of the glass column packed with fine activated silica gel. The adsorbed sample is then progressively desorbed with alcohol. In this process of adsorption and desorption the hydrocarbons are separated according to their adsorption affinities. The saturated hydrocarbon components are least adsorbed and issue from the bottom of the silica gel column first. The total percolate collected prior to the elution of the yellow fluorescing olefinic marker is representative of the saturates in the sample.

5. Apparatus

5.1 *Adsorption Column*, as shown in Fig. 1, consisting of

an eluent reservoir, a sample reservoir, and wide and narrow sections of a water-jacketed tubing. The column should be surrounded with a transparent protective shield when operating at pressures in excess of 69 kPa (10 psi). The column shown in Fig. 2 of this practice will give satisfactory performance if the charge does not exceed the capacity limits described in 7.3 of this test method.

5.2 *Receiver*, graduated, of capacity sufficient to collect the total saturates as one fraction.

5.3 *Vibrator*, for packing of silica gel.

5.4 *Pipet*, or hypodermic syringe for charging samples.

5.5 *Ultraviolet Light Source*, with radiation predominantly at 3650 Å.

6. Reagents and Materials

6.1 *Alcohol*, ethyl or isopropyl. (Warning—See Note 1.)

NOTE 1: Warning—Flammable liquid.

6.2 *Fluorescent Indicator*—Liquid dye mixture or standard dyed gel.³

6.3 *Pressuring Gas*, nitrogen or air delivered to the top of the column at a regulated pressure.

6.4 *Silica Gel*, 149 to 74 μm (100 to 200 mesh).⁴ (Warning—See Note 2.)

NOTE 2: Warning—Compressed gas.

7. Procedure

7.1 Prepare the apparatus and pack the adsorption column in accordance with 7.1.1 to 7.1.2 of this test method. Fluorescent indicator is required as a visual aid in making the cut between the separated saturates and olefin bands. Two forms of indicator are available for this purpose.³ If the liquid fluorescent dye mixture is preferred, it should be added to the sample in a volume ratio of approximately 1 to 1000. If the standard dyed gel is preferred, it should be added to the adsorption column while it is being packed with silica gel. Approximately 0.25 mL of dyed gel added so that it is positioned near the top of the 10-mm section has proven satisfactory.

7.1.1 Clean column and receiver with chromic-sulfuric acid, warm water, and acetone (Warning—See Note 3.) or alcohol, and dry them by evacuation. Lightly lubricate the stopcock at the bottom of the column and the receiver stopcock (but not the spherical joint of the sample reservoir

¹ This practice is under the jurisdiction of ASTM Committee D-2 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.04 on Hydrocarbon Analysis.

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² Annual Book of ASTM Standards, Vol 05.01.

³ The standard dyed gel is available from UOP Process Div., Organics Dept., 25 E. Algonquin Rd., Des Plaines, IL 60017-5017, by requesting "FIA Standard Dyed Gel", UOP Product No. 675.

⁴ Available from W. R. Grace and Co., Davison Chemical Div., Baltimore, MD 21203, by specifying Code 923.