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Frequently Asked Questions to ASTM International Regarding D1319 Dye Issue

As of June 4, 2020

What is ASTM D1319?

- D1319 is one of about 13,000 voluntary consensus standards developed by members of ASTM International.
    - D1319's title is "test method for hydrocarbon types in liquid petroleum products by fluorescent indicator adsorption." It is a standardized test method used by refiners, labs, and others to measure the volume-percentage of aromatic hydrocarbons, olefins and saturates in petroleum products.
    - Members of the ASTM international committee on petroleum, liquid fuels, and lubricants (known as D02) include representatives from government agencies, industry, and labs. These members maintain, develop, and revise D1319, overseeing any changes to its technical content and status.

- D1319's Scope explains that this test method measures proportions of aromatics, olefins, and saturates.
    - An example of why this standard is used/important: According to the U.S. Federal Aviation Administration, high concentrations of aromatics in jet fuel can have adverse effects on turbine engine combustor durability while also producing more smoke and harmful particulates into the environment. D1655 and D7566 use testing of aromatics by D1319 as the referee method, but these specifications also cite D6379 as the accepted alternative. For more information, consult the current FAA Safety Airworthiness Information Bulletin (issued February 4, 2020).

What is the current issue related to the dye used to conduct the test?

- According to committee members, in 2018, a key component of the Fluorescent Indicator Dyed Gel required to perform Test Method D1319 became unavailable. An alternative dyed gel was substituted, but the reformulated dyed gel was later found to be unsuitable for the analysis of jet fuel, diesel fuel and gasoline samples. This resulted in a shortage of the original (legacy) dyed gel in the marketplace and led to a robust dialogue among oil companies, laboratories, and government agencies (e.g., FAA, U.S. Environmental Protection Agency). Many such stakeholders are involved in D02.

Are D02 volunteer-members doing something about determining the suitability of the dye? If so, what?

- At a December 2018 meeting of the D02 committee, members approved the ballots of the critical standards to add informational Notes alerting the user of the lot numbers of dye gel that should not be used in performing the analysis. The following standards have been published with this information.
    - ASTM D975 - 19b Standard Specification for Diesel Fuel
    - ASTM D7467 - 19 Standard Specification for Diesel Fuel Oil, Biodiesel Blend (B6 to B20)
    - ASTM D1655 - 19 Standard Specification for Aviation Turbine Fuels
    - ASTM D7566 - 19 Standard Specification for Aviation Turbine Fuel Containing Synthesized Hydrocarbons
    - ASTM D1319 – 19 Standard Test Method for Hydrocarbon Types in Liquid Petroleum Products by Fluorescent Indicator Adsorption

- Work based on these discussions continues, with some key revisions completed since the December 2018 meetings. These revisions provided the addition of a correlation equation applicable to diesel fuels between relevant standards and D1319 using D6708 protocols.
    - ASTM D5186 - 19 Standard Test Method for Determination of the Aromatic Content and Polynuclear Aromatic Content of Diesel Fuels By Supercritical Fluid Chromatography
    - ASTM D6591 - 19 Standard Test Method for Determination of Aromatic Hydrocarbon Types in Middle Distillates—High Performance Liquid Chromatography Method with Refractive Index Detection

- At the June 2019 meeting of the D02 committee, members continued this work. Discussions focused on the need to conduct an interlaboratory study program (ILS) to evaluate a new prototype of the dye gel. The ILS could be used to develop an updated precision statement for D1319. The Task Group is currently evaluating a protocol and conducting preliminary ruggedness testing.

- In August 2019 the new prototype of the dye gel was made available for limited ILS testing by the manufacturer and was shipped to 10 laboratories. Completed in October 2019, the results of the testing were evaluated. In December 2019 the ruggedness study data was presented at the D02 Committee Week meetings in New Orleans, LA. As a result of the discussions, subcommittee D02.04 decided to develop a D1319 ballot item. In addition, members of the subcommittee continued planning a full Interlaboratory Study program using the new prototype of the dye gel.

- In March 2020, subcommittee D02.04 initiated a ballot to update D1319 with the results of the limited ILS Work using ASTM International Work Item number WK67945. Negatives were received on this draft and the item has been removed from ballot for additional work by the Task Group. The next round of ballots is expected in June 2020. The results of this ballot will be discussed during next meeting of the D02 committee being held virtually due to the COVID-19 cancellation of the meetings in Washington DC. For the schedule of virtual subcommittee meetings, please check this Meeting LINK frequently.

What are other test methods for aromatics, olefins, and saturates published by the committee?
Users should consult the appropriate regulatory authorities having jurisdiction for specific compliance requirements.

- Subcommittee Section D02.04.0C's supercritical fluid chromatography test method D5186 for aromatic content of diesel fuels
- Subcommittee Section D02.04.0L's gas chromatography test method D5580 for total aromatics in finished motor gasoline
- Subcommittee Section D02.04.0M's mass spectrometry test method D5769 for total aromatics in spark-ignition engine fuels
- Subcommittee Section D02.04.0L's gas chromatography test method D5986 for total aromatics in finished gasoline
- Subcommittee Section D02.04.0L's gas chromatography test method D6296 for total olefins in spark-ignition engine fuels
- Subcommittee Section D02.04.0C's liquid chromatography test method D6379 for aromatic hydrocarbon types in aviation fuels and petroleum distillates by HPLC
- Subcommittee Section D02.04.0C's supercritical fluid chromatography test method D6550 for olefin content of gasolines
- Subcommittee Section D02.04.0C's supercritical fluid chromatography test method D8305 for aromatics of aviation turbine fuels and other kerosene range fuels

- Subcommittee Section D02.04.0L's gas chromatography test method D6839 for saturates, olefins, aromatics in spark-ignition engine fuels
- Subcommittee Section D02.04.0L's gas chromatography test method D8071 for total aromatics and olefins in automotive spark-ignition engine fuels
- Subcommittee Section D02.04.0L's gas chromatography test method D8144 for representative aromatics in middle distillates and biodiesel blends
- Subcommittee Section D02.04.0C's supercritical fluid chromatography test method D8305 for Determination of Total Aromatic Hydrocarbons and Total Polynuclear Aromatic Hydrocarbons in Aviation Turbine Fuels and other Kerosene Range Fuels
- Subcommittee Section D02.04.0L's gas chromatography with vacuum ultraviolet absorption spectroscopy test method D8267 for determination of total aromatic, monoaromatic and diaromatic content of aviation Turbine Fuels

Work Items in Subcommittee D02.04 that support testing for aromatics, olefins, and saturates:

- WK64297 * NEW STANDARD Detailed Hydrocarbon Analysis by High Resolution Gas Chromatography with Vacuum Ultraviolet Absorption Spectroscopy (GCVUV)
- WK72951 NEW STANDARD Determination of Totals of Saturate, Aromatic, Polyaromatic and Fatty Acid Methyl Esters (FAME) Content of Diesel Using Gas Chromatography with Vacuum Ultraviolet Absorption Spectroscopy Detection (GC-VUV)
- WK71904 - revision to D5186-19 Standard Test Method for Determination of the Aromatic Content and Polynuclear Aromatic Content of Diesel Fuels By Supercritical Fluid Chromatography
- WK71340 - revision to D6379-11(2019) Standard Test Method for Determination of Aromatic Hydrocarbon Types in Aviation Fuels and Petroleum Distillates—High Performance Liquid Chromatography Method with Refractive Index Detection

What is the timeframe?

- The next meetings of the D02 committee are being held virtually due to the COVID-19 cancellation of the meetings in Washington DC. For the schedule of virtual subcommittee meetings, please check this Meeting LINK frequently. This FAQ document will be updated as a result of those discussions, if not before. Note that ASTM International staff do not have technical expertise, so they support but do not drive the standards development process.

How can I support and/or stay up to date with this activity?

- Anyone can join the D02 committee and get involved in online and in-person standards development efforts. Go to www.astm.org/JOIN.

Is the standard being withdrawn?

- There is no current plan or open work item to withdraw the D1319 voluntary consensus standard.