A Program of ASTM International

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Sequence IIIH Information Letter 19-4
Sequence Number 13
September 18, 2019

ASTM consensus has not been obtained on this information letter. An appropriate ASTM ballot will be issued in order to achieve such consensus.

TO: Sequence III Surveillance Panel

SUBJECT: Correction to Section 12.8 and Addition of Annex

Recently, it was noted that Section 12.8 referenced the T12 Method for oxidation and nitration measurements. However, the laboratories running Sequence IIIH tests have been using a method described as the "IIIG" method. Section 12.8 has been modified and Annex A13 has been added to document this method properly. These changes are effective with the issuance of this letter.

Test Method D8111-19 has been revised to incorporate these changes. The text of the revisions are shown in the attachment.

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Attachment

c: http://www.astmtmc.cmu.edu/ftp/docs/gas/sequenceiii /procedure_and_ils/IIIH/il19-4_IIIH.pdf

Distribution: Email

(Revises D8111-19 as amended by Information Letters 19-1, 19-2 and 19-3)

12.8 *Oxidation and Nitration*—Use Fourier Transform Infrared (FTIR) to measure oxidation using integrated IR techniques based on Practice E168, using the IIIG method as described in Annex A13. Carry out quantitative infrared analysis on each of the 20 h analysis samples and the EOT sample. Report the results on Form 7.

A13. Integrated and Peak Method Techniques.

A13.1 Utilize a nominally 0.1 mm path length cell. BaF_2, KBr and ZnSe cells have been found suitable. Measured units are absorbance per centimeter (Abs/cm). The FTIR device is not specified, any commercially available device maybe used.

A13.2 Obtain the spectra of the fresh oil and corresponding used oils. Subtract the new oil spectra from the used oil and perform the analysis on the differential spectra. If oxidation or nitration absorbance, or both exceeds the linear range of the detector, oxidation or nitration measurements, or both, are not required.

A13.3 Peak area integration, oxidation—Determine area under the curve between baseline endpoints. Draw baseline endpoints in a subjective manner, at the discretion of the operator. Typical endpoints will be the left at around 1800 cm^{-1} (1780 - 1820 cm^{-1}) and the right around 1650 cm^{-1} (1640-1660 cm^{-1}) (See Fig A13.1). Typical peak will fall around 1710 cm^{-1}. If the instrument does not correct to a specific path length in the subtraction process, conversion from the actual path length to a 1 cm path length is required to report the final result. Convert to a 1 cm path length using the following:

$$A_F = 10\ (A_R / PL_A) \qquad \text{(A13.1)}$$

where:

A_F = final area, Abs/cm,
A_R = raw area = the area determined by the device at the end points and peak, Absorbance units
PL_A = actual path length = the cell path length, mm.

If the instrument does correct to 0.1mm path length during the subtraction process use the following to calculate the final result:

$$A_F = 100\ A_R \qquad \text{(A13.2)}$$

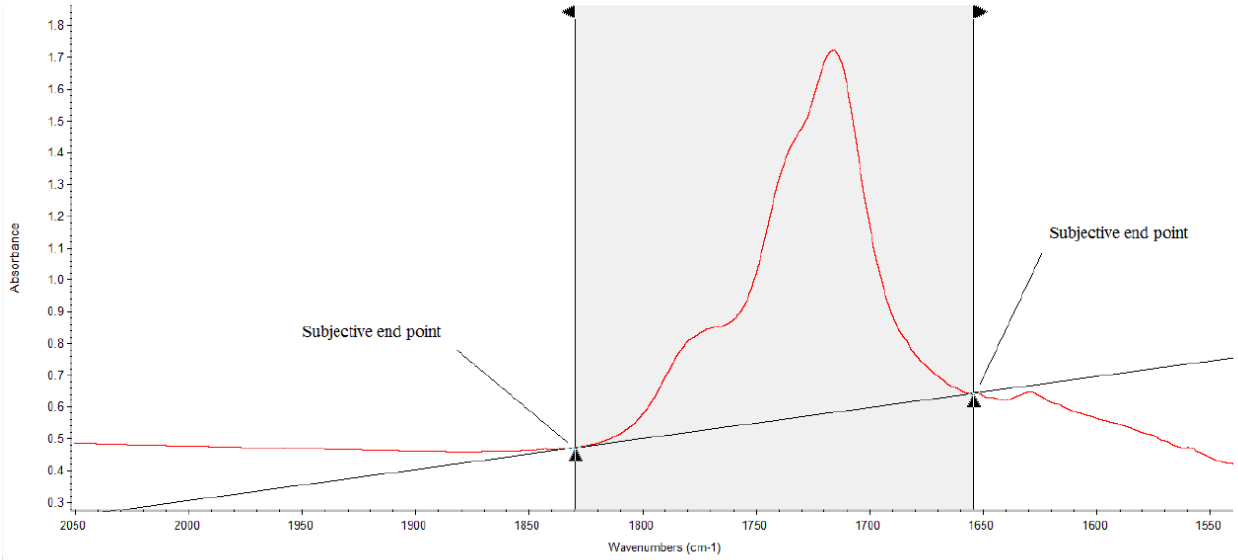

Fig. A13.1

A13.4 Peak area integration, nitration— Determine area under the curve between baseline endpoints. Draw baseline endpoints in a subjective manner, at the discretion of the operator. Typical endpoints will be the left at around 1640 cm^{-1} (1635 - 1645 cm^{-1}) and the right around 1620 cm^{-1} (1615 - 1625 cm^{-1}) (See Fig A13.2). Typical peak will fall around 1633 cm^{-1}. If the instrument does not correct to a specific path length in the subtraction process, conversion from the actual path length to a 1 cm path length is required to report the final result. Convert to a 1 cm path length using equation 13.1.

If the instrument does correct to 0.1mm path length during the subtraction process, convert to 0.1 mm process using equation 13.2.

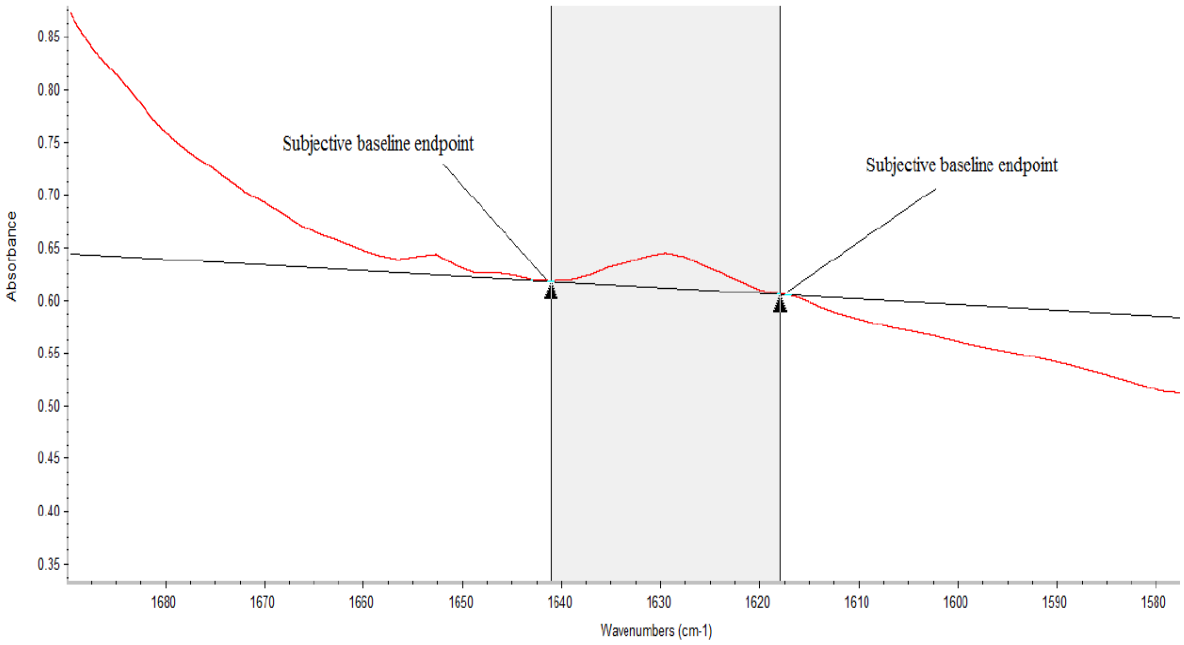
Subjective baseline endpoint
Subjective baseline endpoint
Absorbance
Wavenumbers (cm-1)
0.85
0.80
0.75
0.70
0.65
0.60
0.55
0.50
0.45
0.40
0.35
1680
1670
1660
1650
1640
1630
1620
1610
1600
1590
1580

Fig. A13.2