

DIN 51451:2024-03 (E)

Testing of petroleum products and related products - Analysis by infrared spectrometry - General working principles

Contents		Page
Foreword		4
1	Scope	5
2	Normative references	5
3	Terms and definitions	5
4	General	5
4.1	Theoretical principles	5
4.2	Units	7
5	Apparatus	7
5.1	IR spectrometer	7
5.1.1	General	7
5.1.2	Minimum requirements	7
5.2	Cuvettes	8
5.3	ATR (Attenuated Total Reflection) accessories	9
5.4	Other apparatus and tools	10
6	Reagents and equipment	10
7	Sample preparation	11
8	Preparation for measurement	11
8.1	Instrument checking and adjustment	11
8.1.1	Spectrometer	11
8.1.2	Recording a test spectrum	12
8.1.3	Determination of the instrument factor F	12
8.2	Path length measurement	13
9	Procedure	14
9.1	General	14
9.2	Spectral recording	14
9.3	Direct measurement	14
9.4	Differential spectrometry	14
9.5	Suspension procedure	14
9.6	KBr pressing procedure	15
10	Evaluation	15
10.1	Qualitative analysis	15
10.2	Quantitative analysis	15
10.2.1	General	15
10.2.2	Baseline method	15
10.2.3	Reference graph method	16
10.2.4	Standard addition method	17
11	Expression of results	17
12	Precision	17

Annex A (informative) Infrared spectrometers	18
A.1 Fourier transform infrared spectrometers (FT-IR spectrometers)	18
A.2 Attenuated Total Reflection (ATR) accessories	18
Bibliography	20
Figures Figure 1 -- Representation of a mean infrared transmission spectrum for ca. 40 µm thick polystyrene film in the range of 4 000 cm⁻¹ to 400 cm⁻¹	11
Figure 2 -- Example of a transmittance spectrum for polypropylene film with interference pattern for path length determination	13
Figure 3 -- Baseline method (linear absorbance ordinate) with two signals as examples	16
Figure A.1 -- Essential parts of an FT-IR spectrometer	18
Figure A.2 -- Essential parts of an ATR accessory for IR spectrometry	19
Tables Table 1 -- Common window materials	9
Table 2 -- Window materials commonly used in ATR technology	9
Table 3 -- Absorption for determining the instrument factor F	12
Table 4 -- Measurement ranges for path length measurement	13