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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

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**General rules for infrared analysis
(English Translation)**

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1 Scope

This Standard specifies the general rules for the quantitative or quantitative analysis of organic and inorganic substances using infrared spectrometer absorption spectrometry.

This Standard applies to infrared analysis with a wavenumber range of 4000 cm⁻¹~400 cm⁻¹ (wavelength 2.5 μm~25 μm).

2 Reference standards

The following standards contain provisions which, through reference in this

Standard, constitute provisions of this Standard. At the time of publication of this Standard, the editions shown are valid. All standards will be revised. The parties using this Standard shall investigate whether the latest editions of the following standards are applicable.

GB/T 7764-2001 Rubber - Identification - Infra-red spectrometric method

GB/T 14666-1993 Terms for Analytical Chemistry

3 Definitions

The definitions of the main terms covered by this Standard, in addition to those specified in GB/T 14666, include the following definitions.

3.1 Transmittance

The ratio OF the radiant energy transmitted through the sample TO the incident radiant energy.

3.2 Baseline

A straight line or curve drawn in a certain way on the absorption spectrum, which is used to represent the background absorption curve in the absence of absorption band.

3.3 Sample thickness

difference calculation, baseline correction, kubelka-munk transformation, kramers-kronig transformation, spectroscopic data retrieval, etc.

4.2.1.6 Display record. DISPLAY the analysis result and data processing result

on the screen. It consists of display and recorder.

4.2.2 Dispersive infrared spectrometer

4.2.2.1

Light source. Same as 4.2.1.1.

4.2.2.2

Sample chamber. The sample chamber consists of a sample cell, a sample holder, and a sample holder for assembling accessories. The dispersive infrared spectrometer is usually a double-beam spectrometer. The sample optical path and the reference optical path are respectively provided with a sample holder.

4.2.2.3

Spectrophotometric part. It consists of dimmer, optical splitter, detector, amplifier, calculator, etc. The optical system of the dispersive infrared spectrometer (optical zero method) is shown in Figure 5.

a) Dimmer. An optical element used for dimming in the optical zero method.

It is set in the reference optical path, to adjust the intensity of the beam passing through the reference optical path to be almost the same as the intensity of the beam passing through the sample optical path.

b) Fan-type mirror. A rotating mirror which switches the sample beam and the reference beam.

c) Optical splitter. An optical system consisting of a slit, a reflector, and a dispersing element. The dispersing element uses a prism, a diffraction grating, or an optical element

thereof. A diffraction grating is usually used.

d) Detector. CONVERT the intensity of incident light into an electric signal. A vacuum thermocouple, a thermoelectric detector, or a semiconductor detector, etc. is usually used.

e) Amplifier. To process the signal conveniently, amplify the signal obtained by the detector. In the optical zero method, it consists of a preamplifier, a main amplifier, a synchronous rectifier, a modulator, and a power amplifier.

f) Calculator. In the signal processing system using the electric ratio method, the electric signal of sample beam is separated from the electric signal of reference beam. The intensity ratio of the two signals is calculated.

4.3.6 Temperature change cell. A sample cell used to determine the infrared

absorption of a sample at various temperatures, which can change the sample temperature.

4.3.7 ATR measuring device. A device used to measure the high-absorption

sample or sample surface.

4.3.8 Diffuse reflection measuring device. A device for directly measuring a

powder sample.

4.3.9 Reflection measuring device. A device for measuring the reflection

spectrum, which has the following two types.

a) Reflection measuring device. A device for determining the specular reflection spectrum of a substance having an infrared reflecting surface by means of reflectance spectroscopy.

b) High-sensitivity reflection measuring device. A device used for high- sensitivity measurement of samples with high reflectivity and smooth surface.

4.3.10 Radiation measuring device. A device for determining the radiation

spectrum of a heated sample.

4.3.11 Photoacoustic spectrometric device. A measuring device using a

photoacoustic detector when measuring a high-scattering sample or a sample which is difficult to prepare.

4.3.12 Microscopic infrared measuring device. A device for measuring a very small amount of sample, which can perform transmittance, reflection, ATR, and high-sensitivity reflection measurement by changing the optical path and the optical mirror.

4.3.13 Gas chromatography infrared (GC-IR) combined device. A device which uses infrared analysis for components separated by a gas chromatographic column.

4.3.14 Liquid chromatography infrared (LC-IR) combined device. A device which uses infrared analysis for components separated by a liquid chromatographic column.

4.3.15 Thermogravimetric infrared (TG-IR) measuring device. A device which uses infrared analysis for the gas component generated by a thermogravimetric device.

4.4.14 Quantitative calculation. The function of using the absorption intensity to calculate the concentration of a component.

4.4.15 Data storage. The function of saving measurement results and data processing results.

5 Methods of sample preparation

This clause specifies the precautions for sample preparation methods for the determination of solid, powder, liquid, and gas samples.

When using an accessory device or performing the determination of reflection, radiation, photoacoustic spectroscopy, TG-IR, GC-IR, LC-IR, etc., sample preparation shall be performed according to the instrument's operating instruction.

5.1 General precautions. When performing infrared analysis, according to the analysis purpose, sample state, analytical method, and the performance of measuring device, the appropriate sample preparation method must be selected. For qualitative analysis, the concentration of sample shall be adjusted so that the transmittance of the strongest absorption band of the sample is

1%~10%. For quantitative analysis, the appropriate sample concentration, sample thickness, and optical path length of sample cell shall be selected, so that the relationship between the absorbance of the measured absorption band and the sample concentration is in a linear relationship.