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PETROCHEMICAL INDUSTRY STANDARD
OF THE PEOPLE'S REPUBLIC OF CHINA

YBB 00262004-2015

Test for Infrared Spectrum of Packaging Materials

包装材料红外光谱测定法

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Test for Infrared Spectrum of Packaging Materials

Test for infrared spectrum is an effective means for identification and analysis of the chemical construction of substances. After infrared radiation of compounds, the molecular vibration and rotational motion jumps from a lower energy level to a higher energy level, which causes the selective absorption of infrared radiation of certain frequencies and forms an infrared absorption spectrum with strong characteristics. The intermediate infrared region ($4000 \sim 400 \text{ cm}^{-1}$) is a region in common use.

Test for Infrared Spectrum of Packaging Materials

Include test methods and specimen preparation techniques.

Test methods include transmission and attenuated total reflection (ATR) etc.

Transmission refers to infrared transmission spectrum obtained by the change of infrared intensity before and after penetrating specimen. Attenuated total reflection refers to reflection spectrum obtained by multiple reflections of infrared light on the surface of specimen adjoining crystal after penetrating ATR crystal at a certain incident angle, which can be divided into single-point attenuated total reflection and plane attenuated total reflection.

Specimen preparation techniques include hot application method, film method, thermal cracking method, attenuated total reflection method and microscopic infrared method and so on.

Instrument calibration

Use polystyrene film (of thickness about 0.05 mm) to calibrate instruments; plot the spectrum; use the absorption peaks at 3027 cm^{-1} , 2851 cm^{-1} , 1601 cm^{-1} , 1028 cm^{-1} , 907 cm^{-1} to calibrate the wave number of instruments. The error of the wave number of Fourier transform infrared spectrometer near 3000 cm^{-1} shall not be greater than $\pm 5 \text{ cm}^{-1}$; the error of the wave number near 1000 cm^{-1} shall not be greater than $\pm 1 \text{ cm}^{-1}$.

When polystyrene film is used for calibration, the resolution of instruments within $3110 \sim 2850 \text{ cm}^{-1}$ shall ensure that they are capable of distinguishing 7 peaks clearly, that the resolution depth between peak 2851 cm^{-1} and valley 2870 cm^{-1} is not less than 18% light transmission and that the resolution depth between peak 1583 cm^{-1} and 1589 cm^{-1} is not less than 12% light transmission. Unless specified otherwise, the nominal resolution of instruments shall not be lower than 2 cm^{-1} .

Environmental condition

Temperature shall be $15 \sim 30^{\circ}\text{C}$; relative humidity shall be less than 65%. Appropriate ventilation means shall be provided to prevent the accumulation of excessive carbon dioxide and organic solvent vapour.

Methods for determination

Method I – Hot application method

This method applies to the determination for the infrared spectrum of granular materials, plastic bottles, single-layer film.

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Contact: Wayne Zheng, Sales@ChineseStandard.net

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