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DETERMINATION OF FUNCTIONAL GROUPS IN THE QUANTITATIVE AND QUALITATIVE COMPOSITION OF SILKWORM WASTE BY IR SPECTROSCOPY

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Annatiation:
The presence of peaks characteristic of different functional groups present in the organic components of silkworm waste was detected by IR spectroscopy and allows trace analysis of the amount of impurities in the samples.

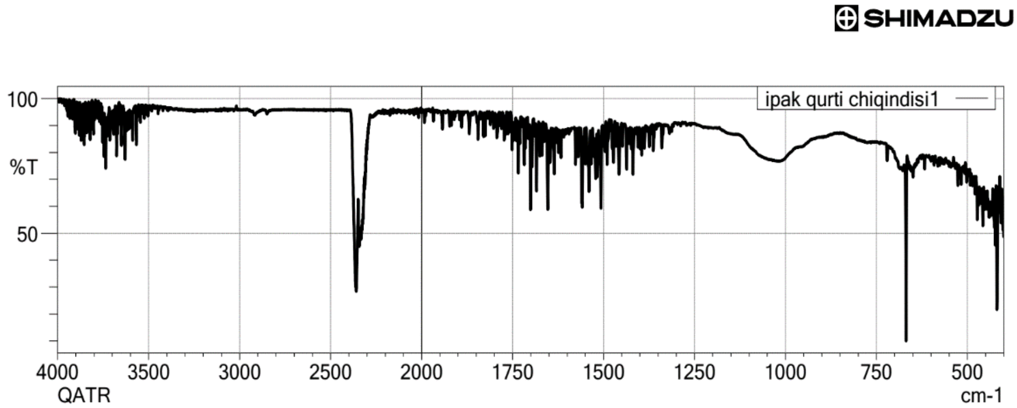
Keywords: IR spectroscopy, spectrophotometry, ultrasonic, UV spectrophotometer, interferometer.

Infrastructural spectroscopy (also known as vibrational spectroscopy, mid-infrared spectroscopy, IR spectroscopy, and ICS) is a branch of spectroscopy that studies the interaction of infrared radiation with substances. IR Spectroscopy Method This method of analysis is based on the recording of the infrared absorption spectra of a substance. Absorption by matter in the region of infrared radiation occurs due to the vibrations of atoms in molecules.

FT-IR spectroscopy is used to determine the content of various organic and inorganic substances and their compounds in solid, liquid and gaseous samples (food, soils, metals and their alloys, polymers, etc.). Sequentially scanned devices. In them, the spectrum is registered by a single-channel receiver. An instrument whose receiver immediately receives the entire spectral range. After the signals are decoded, information about each section is obtained, and the spectrum is recorded over the entire range. The study of vibrational-rotational and purely rotational spectra by the methods of infrared spectra makes it possible to determine the structure of molecules, their chemical composition, moments of inertia of molecules, the magnitude of forces acting between atoms in a molecule, etc. Usually, the spectrum refers to the electromagnetic (or acoustic) spectrum, which defines the distribution of frequencies/wavelengths of electromagnetic radiation (or elastic vibrations). The shape of the spectrum shows To what extent blue, green, and other colors (or ultrasonic, audible, and other waves) are represented in the signal.

The fundamental difference between UV and IR spectrometers is the different location of the cuvettes: between the dispersing device and the photodetector in UV spectrophotometers or between the radiation source and the dispersing device in IR spectrometers.

Spectrophotometry is widely used in the study of the structure and composition of various compounds (complexes, dyes, analytical reagents, etc.), for the qualitative and quantitative determination of substances (determination of traces of elements in metals, alloys, technical objects). The quantitative and qualitative composition of functional groups in silkworm wastes was determined by IR spectroscopy (Shimadzu IRTracer100, Japan). The high spectral sensitivity (signal-to-noise ratio of 60,000:1) makes it possible to analyze trace amounts of impurities in various samples, despite the low intensity of the lines of interest in the spectrum. IRTracer-100's 0.25 cm-1 spectral resolution provides high resolution for quantitative spectral identification, especially in in the case of gaseous compounds.



The interferometer operation optimization system in combination with internal self-diagnostics ensures stable operation of the instrument. IR spectra of silkworm waste. In this spectrum, there are peaks characteristic of various functional groups present in the organic components of silkworm waste.

Absorption bands of 650-670 cm-1 indicate the presence of a primary amino group (R-NH2 bond). Nitrous groups (N=O) are characterized by deformation oscillations in the range of 1500-1600 cm-1. Absorption lines in the region of 1600-1650 cm−1 appear as a result of amide bond oscillations (RCONH2) in the sample. Esters are characterized by intense dense peaks (C=O bonds) in the RCOOR' region of 1730-1740 cm−1. Absorption lines at 2360-2380 cm−1, which characterize valence fluctuations of phosphine (P-N) bonds, are comparatively more intense among other peaks.

At the same time, absorption lines in the region of 3550-3600 cm-1 indicate the presence of components of O-N RCH2OH bonds in the silkworm waste sample. The external environment refers to the amount of light coming from the Sun to the Earth's surface, the humidity of air in nature, food, the composition of air and food. The external environment affects all living organisms. The development of the silkworm is closely related to the external environment.

The silkworm receives its energy from the external environment: leaves, oxirod, and light. When feeding, the worm produces its own energy products from the external environment: heat, water, carbon dioxide and heat.

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