

Physical Methods of Investigation of Substances: The Technique of Infrared-Spectroscopy

Yulia Korobka, Maria Molozhon

National University of Food Technologies

Introduction. Spectroscopy is a branch of physics and analytical chemistry, for examining the spectra of the interaction of radiation of the substance. Infrared spectroscopy method makes it possible to obtain information about the relative positions of the molecules within very short periods of time as well as to assess the relationship between them, which is essential in the study of structural and informational properties of various substances. The basis of this method is a physical phenomenon as infrared radiation.

Materials and methods. This work was conducting by researching the method of infrared spectroscopy, classic spectrophotometers and FT-IR spectrometers. The research of IR spectrometer Varian Scimitar 1000 FT-IR was also included.

Results and Discussion. Infrared spectroscopy is a section of molecular spectroscopy that studies the absorption and reflection of electromagnetic radiation in the infrared region. The coordinates of the intensity of the absorbed radiation - the wavelength infrared spectrum is a complex curve with a large number of highs and lows. The method of infrared spectroscopy is a versatile physical-chemical method, which is used to study the structural features of various organic and inorganic compounds. The method is based on the phenomenon of groups of atoms absorption of the test object electromagnetic radiation in the infrared. Absorption is due to violation of the molecular vibrations of photons of infrared light. When irradiated with infrared light absorbed by the molecule only those photons whose frequencies correspond to frequencies stretching, deformation and libration vibrations of molecules. Infrared spectroscopy is widely used for the analysis and identification of mixtures of pure substances. Identification of pure substances is usually carried out by means of information retrieval systems by automatically comparing the analysed spectrum with spectra stored in computer memory. The study of molecular structure and more objects infrared spectroscopy methods mean information about parameters and molecular models mathematically reduced to the solution of inverse spectral problems. Infrared spectroscopy has several advantages over spectroscopy in the visible and ultraviolet regions because we can trace change of all major types of bonds in the molecules of these substances. When using infrared spectroscopy, there is no destruction of substances that allows them to apply for these studies. The infrared spectrum of the biological sample is a total spectrum, in which the imposition of absorption bands of different functional groups of organic compounds and water. This phenomenon is compounded in mind the interaction of certain types of vibrations of these groups, thus there is a distortion of the absorption bands and shift. Therefore, the infrared spectra observed a large number of broad absorption bands with unclear maxima. Usually decoding infrared spectra of biological samples is very difficult. Therefore, to facilitate the decoding of the total spectrum must share a biological sample into simpler components. This will allow to get a greater number of absorption bands of the substance and to more accurately determine the composition of components in the sample.

Conclusions. Infrared spectroscopy is used to study the structure of the semiconductor materials, polymers, biological objects and living cells directly as a method of studying the structure of molecules were most common in organic chemistry and organoelement. It plays a major role in the creation and study of molecular optical quantum generators, which radiation is in the infrared spectrum. Infrared spectroscopy methods most widely studied region near and medium infrared spectrum, which made a large variety of spectrometers.