Federal state educational institution of higher professional education
"Karelian State Pedagogical Academy"

Experimental methods of scientific research

Infrared spectroscopy

Research work

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Petrozavodsk
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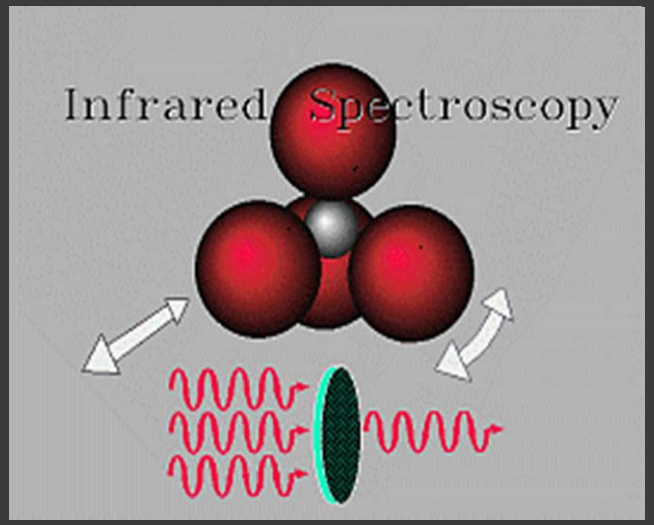
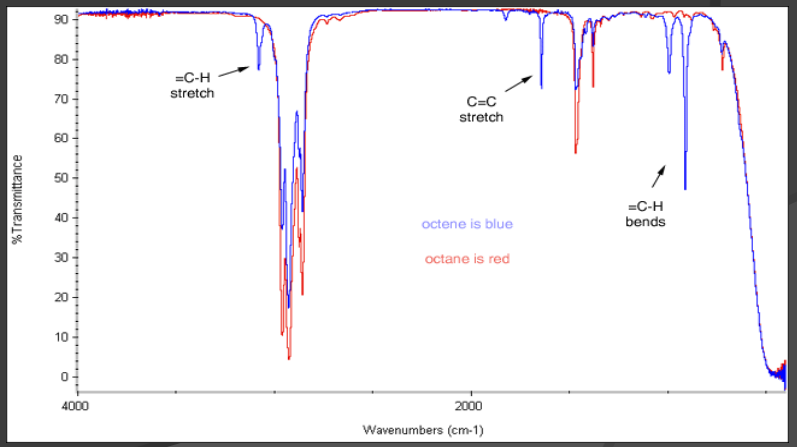
Aim of the project

1) To study the scientific method – infrared spectroscopy.

2) To understand the main principles of infrared spectroscopy.

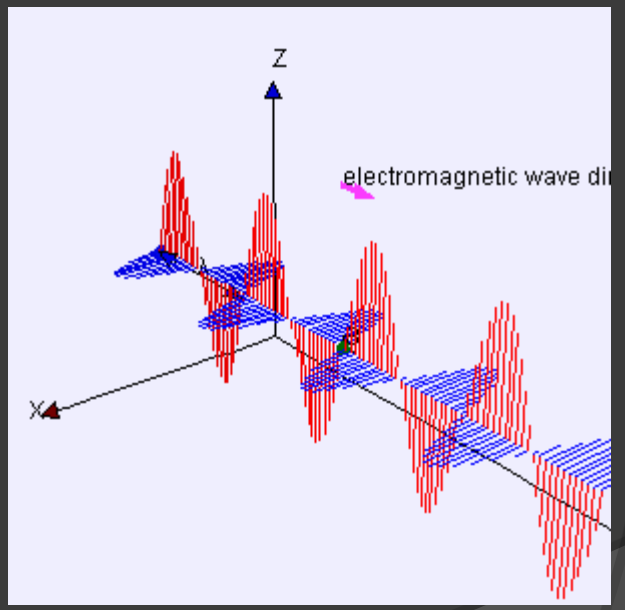




Elecrtomagnetic wave

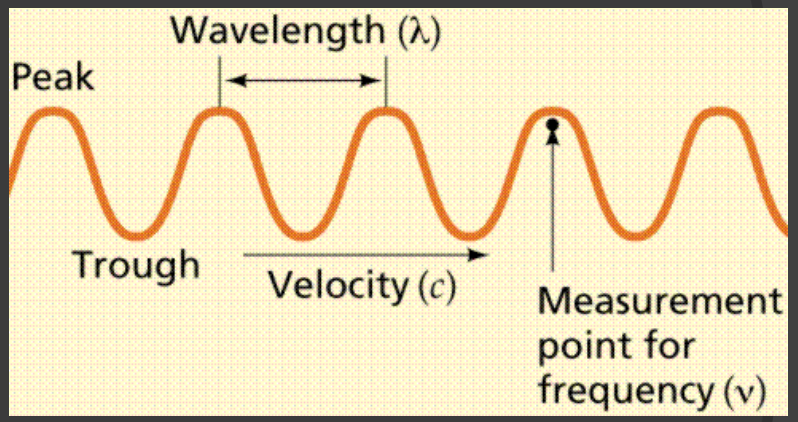
A everything on the Earth consists of electric charges, for example atoms and molecules.

Atoms and molecules move and radiate electromagnetic radiation as electromagnetic waves.



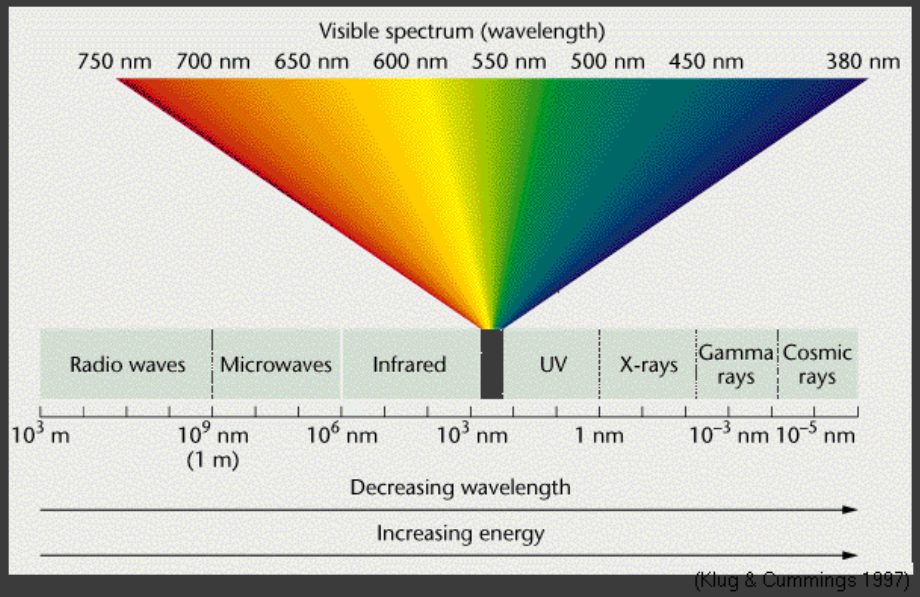
Wavelength

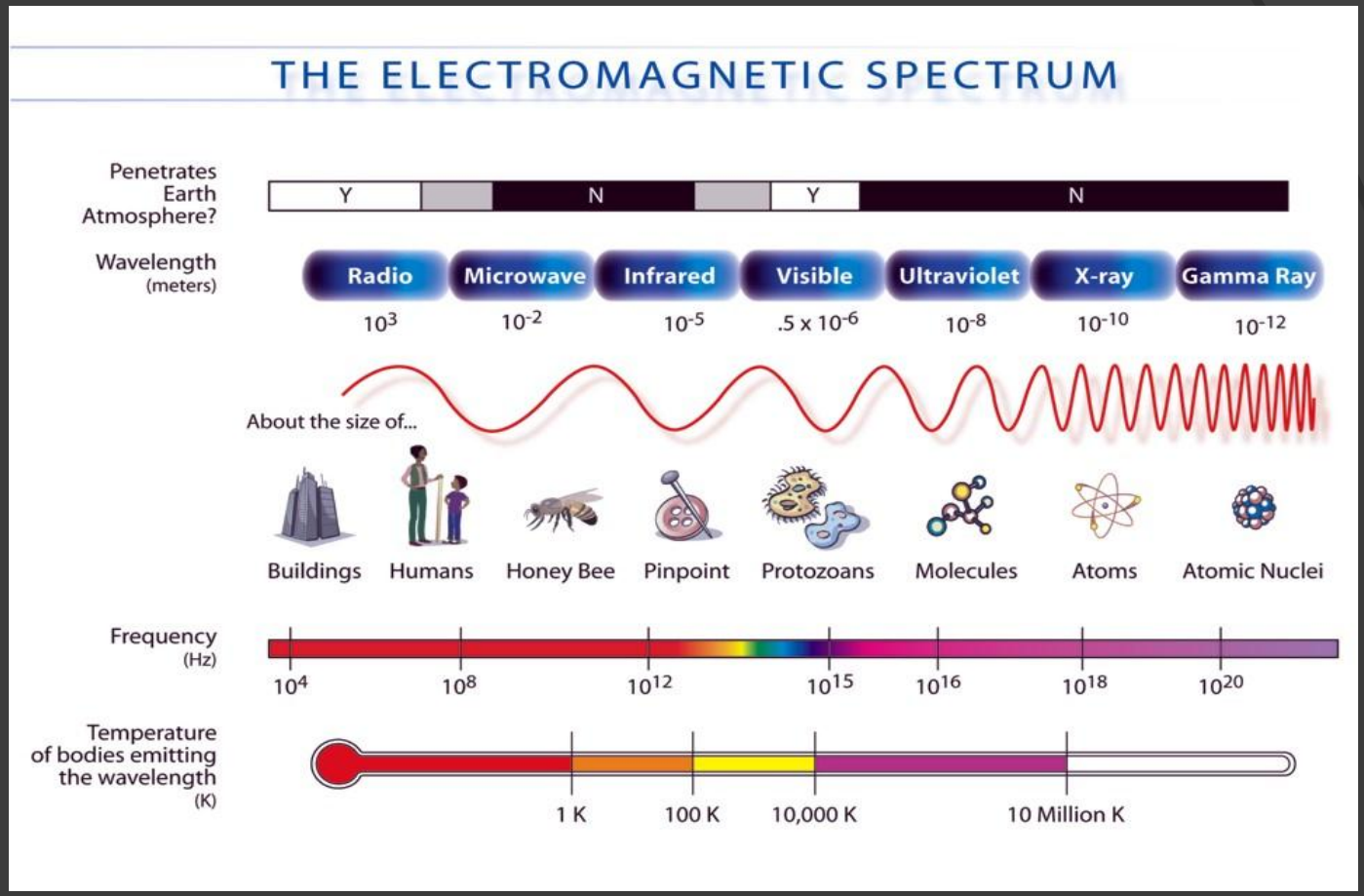
Wavelength - distance between two nearest points oscillated in the same phase.
Wavelength usually denotes by the Greek letter λ.



Spectrum

Spectrum - the distribution of values of physical quantity (usually power, frequency, wavelength or mass).



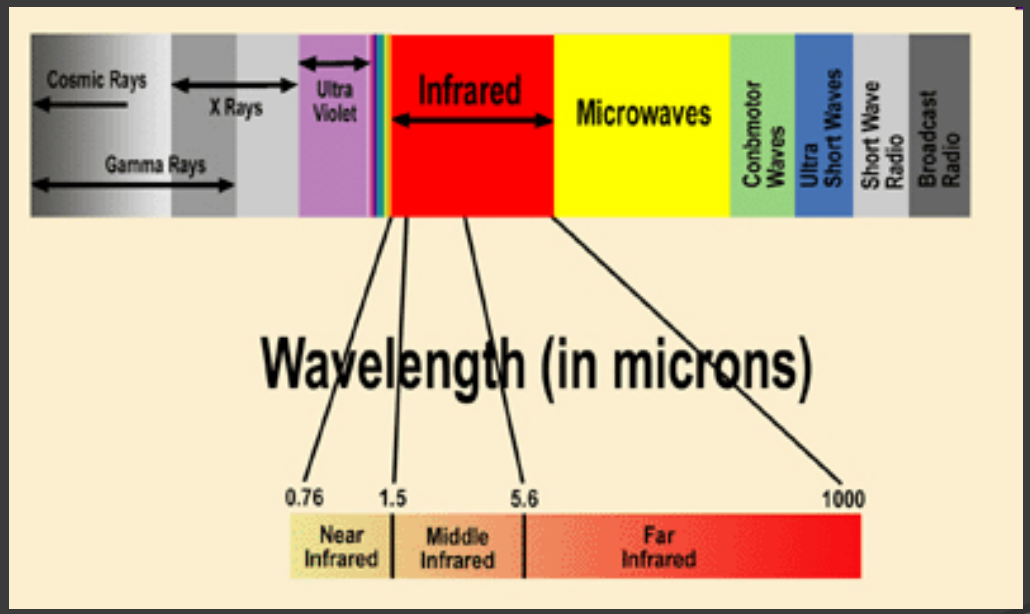


The **electromagnetic spectrum** is the range of all possible frequencies or wavelengths of electromagnetic radiation.
The "electromagnetic spectrum" of an object is the characteristic distribution of electromagnetic radiation emitted or absorbed by that particular object.

Infrared radiation

✓Our sun produces most of its energy output in the infrared spectrum.

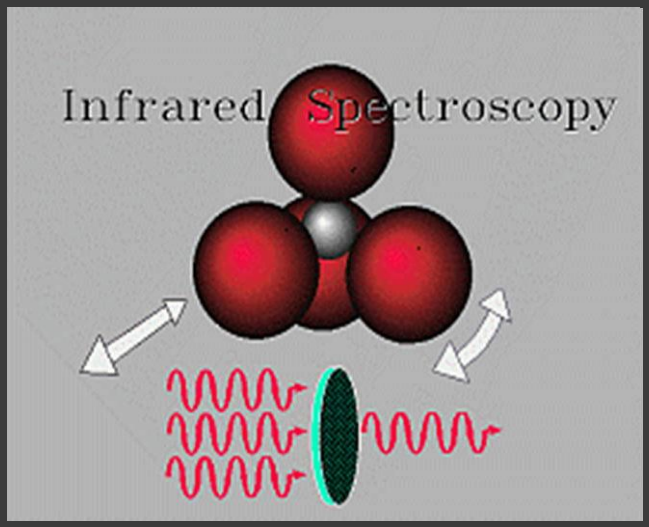
Infrared is the band of light we perceive as heat. We cannot see this band of light with the naked eye, but we can feel this type of light in the form of heat.
The infrared spectrum is divided into 3 segments by wavelengths and is measured in microns.

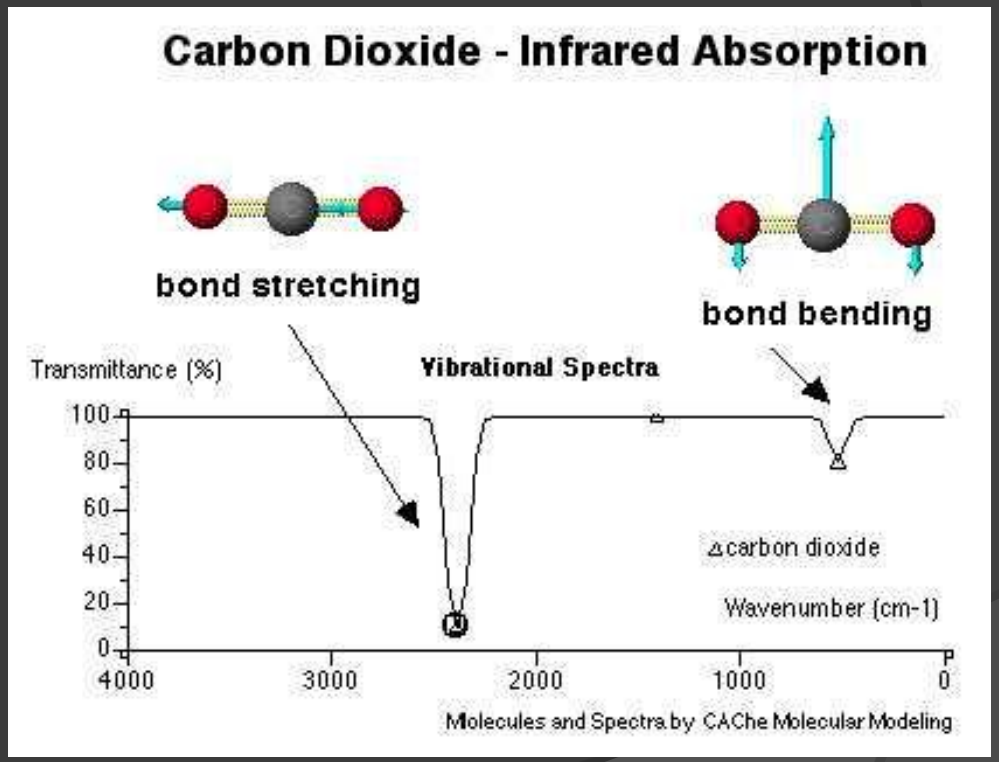


Infrared radiation - electromagnetic radiation, occupying the spectral region between the red end of visible light (with a wavelength λ ≈ 0,74 m) and short-wave radio emission (λ ~ 1-2 mm).

Infrared spectroscopy

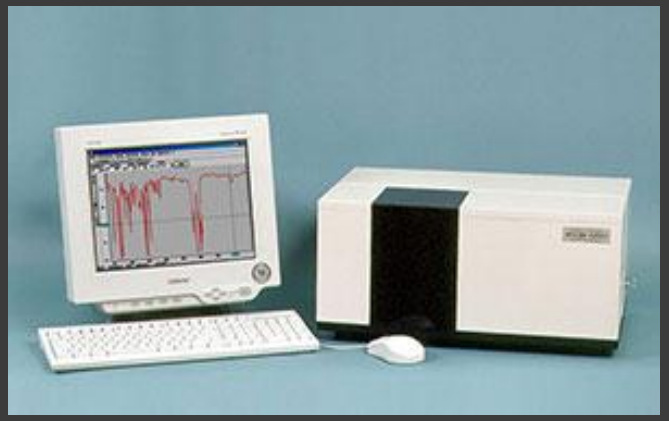
Infrared spectroscopy (IR) - a section of optical spectroscopy, which studies the molecular spectra of substances, because the vibrational and rotational spectra of molecules are in the infrared region.



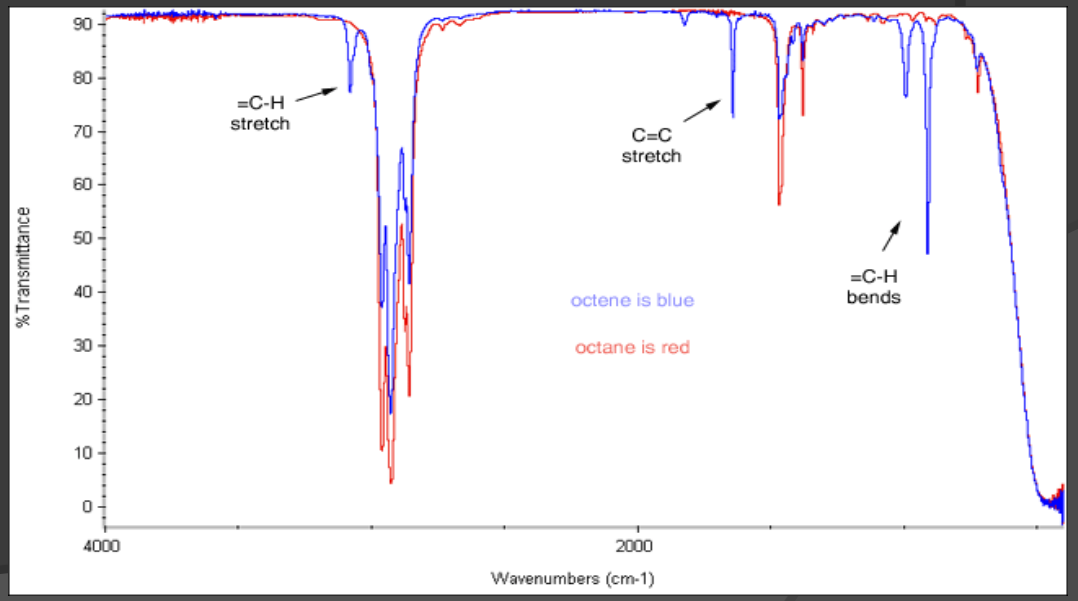


IR-Fourier spectrometer Spectrum BXII

It allows you to define:
1) The structure of molecules.
2) The chemical composition of substances.
3) The values of the forces acting between atoms in the molecule.
4) The distance between the molecules.
5) Identify the presence of impurities.



Every substance has it's own spectrum.



Conclusion

Our purposes were achieved:
Introduction with scientific methods was successful and practical mastery of the physical foundations of the methods were done.

Spectroscopy gives a person a lot of advantages for the study of an object. Without this scientific method people would spend more time and energy for doing experiments.

Thank you for your attention