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ENGIN SERPERSU

EB PPT

BIOGRAPHY

Engin Serpersu is a Professor in the Department of Biochemistry Cellular and Molecular Biology at the University of Tennessee Knoxville. He has received his Ph D in Biochemistry from the Hacettepe University in Ankara Turkey in 1978. He has completed his B Sc Degree in Chemistry at the Middle East Technical University in Ankara Turkey. He received Alexander von Humboldt Fellowship to work as a postdoctoral fellow in the Institute for Biochemistry and Endocrinology at the Veterinary School of Justus Liebig University in Giessen Germany. He is serving as an editorial board member of two journals and reviewer of ~15 journals. He has published more than 80 papers and review articles and reviewed papers for journals including Nature Nature Structural Biology J Med Chem Biochemistry.

RESEARCH INTRESTS

Antibiotic Resistance Thermodynamics of enzyme–lig and complexes. Protein structure, function, and dynamics. Isothermal Titration Calorimetry . Role of solvent in enzyme Catalysis. Spectroscopy

SPECTROSCOPY

Set of methods where interaction of electromagnetic radiation with chemical molecules is measured to obtain characteristics, properties and quantity

Definitions

- Spectroscopy- the study of the light from an object.
- Spectrometer- an instrument which spreads out light making a spectra.
- Spectra- range of electromagnetic energy separated by wavelength.

Spectroscopy – Radiation Terminology

Wavelength (λ) - length between two equivalent points on successive waves
Wave number – the number of waves in a unit of length or distance per cycle - reciprocal of the wavelength
Frequency (v) – is the number of oscillations of the field per second (Hz)
Velocity (c) – independent of wavelength – in vacuum is 3.00 x 1010 cm/s (3.00 x 108 m/s)
Photon (quanta) – quantum mechanics nature of light to explain photoelectric effect

Spectroscopy

The higher energy **ultraviolet and visible wavelengths** affect the energy levels of the outer electrons.

Infrared radiation is absorbed by matter resulting in rotation and/or vibration of molecules.

Radio waves are used in nuclear magnetic Resonance and affect the spin of nuclei in a magnetic field.

SPECTROSCOPY – ELECTRON DISTRIBUTION

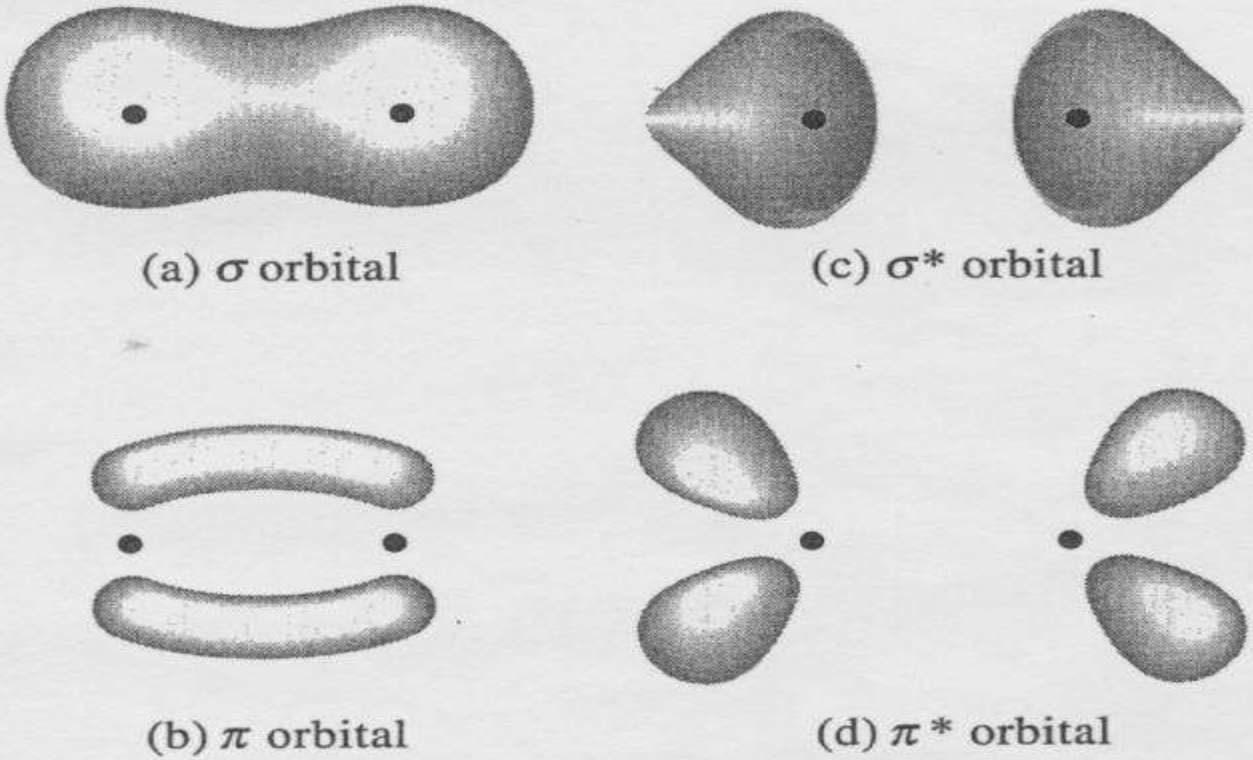


Figure 14-1 Electron distribution in sigma and pi molecular orbitals.

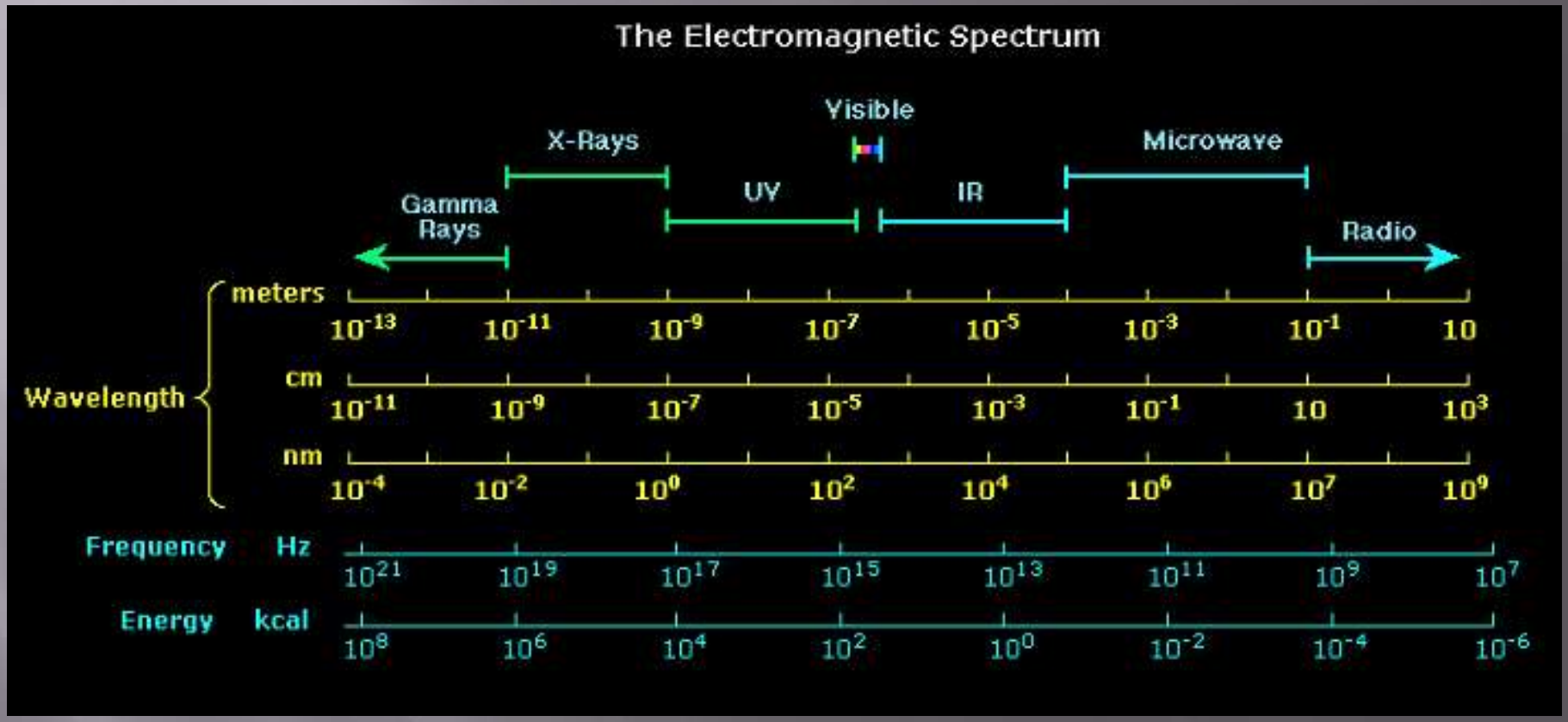
SPECTROSCOPY COLORS

TABLE 14.1

Colors of Different Wavelength Regions

Wavelength Absorbed, nm	*Absorbed Color*	*Transmitted Colo (Complement)*
380–450	Violet	Yellow-green
450–495	Blue	Yellow
495–570	Green	Violet
570–590	Yellow	Blue
590–620	Orange	Green-blue
620–750	Red	Blue-green

THE ELECTROMAGNETIC SPECTRUM



Important: As the wavelength gets shorter, the energy of the radiation increases.

TYPES OF SPECTROSCOPIES

- ULTRAVIOLET AND VISIBLE
- INFRARED SPECTROSCOPY
- NMR SPECTROSCOPY

Particle Nature of Radiation

Electromagnetic radiation is also described as having the properties of particles.

Molecules exist in a certain number of possible states corresponding to definite amounts of energy.

Molecules can absorb energy and change to a higher energy level called the excited state.

The amount of energy absorbed in this transition is exactly equal to the energy difference between the states.

Two modern applications of spectroscopy in space…

Mars Exploration Mission

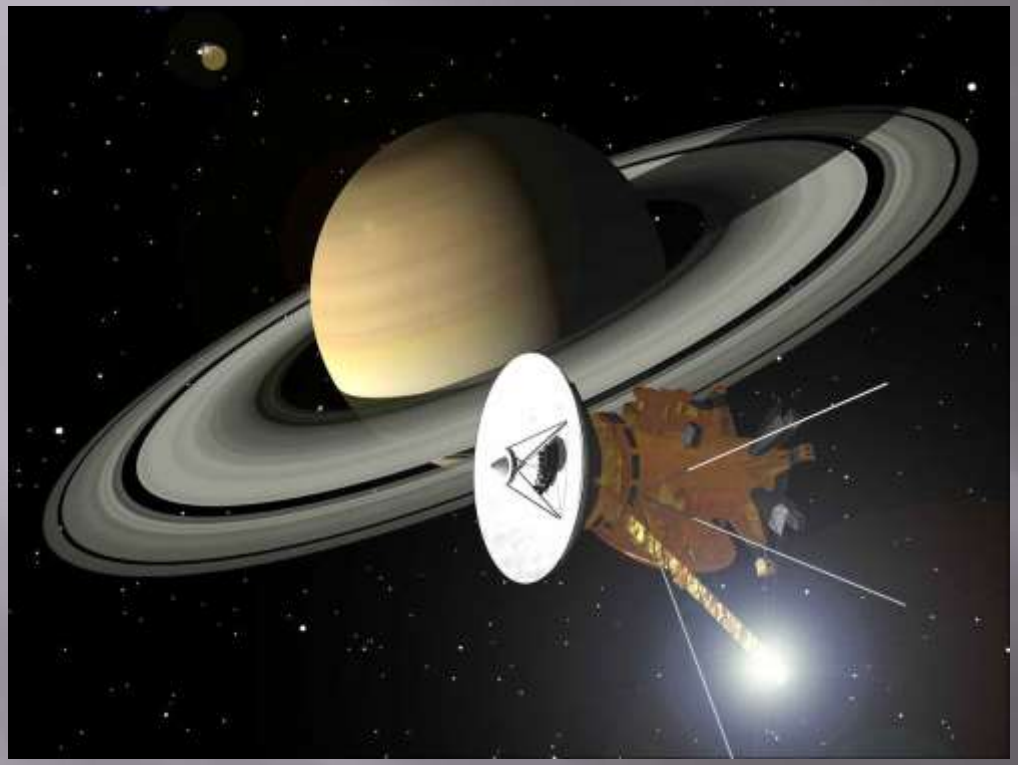
The Mars Exploration Rovers were launched with the goal of searching for and analyzing rock and soils on Mars. They utilized several spectrometers to analyze samples.

Mini-TES: **mini**ature **t**hermal **e**mission **s**pectrometer (examine rock, soil & atmosphere)

MB: **M**ossbauer **S**pectrometer (examine mineralogy of rocks & soils)

APXS: **A**lpha **P**article **X**-ray **S**pectrometer (analyze elements in rocks & soils)

Cassini-Hyugen's Mission



Mission: to gather information on Titan (Saturn's moon).

VIMS: **V**isual and **I**nfrared **M**apping **S**pectrometer (gather data about surface, rings & atmosphere of Titan and Saturn).

CIRS: **C**omposite **I**nfra**r**ed **S**pectrometer (searches for heat and by that gather information on the object's composition.

JOURNALS

1.Analytical & Bioanalytical Techniques

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SIGNATURE

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