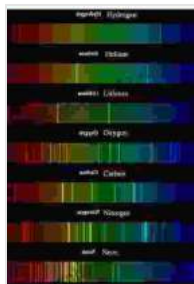


Unveiling the Secrets of Neutral Noble Gases: A Journey through the Infrared Spectral Range



Atomic Emission Spectra of Neutral Noble Gases in the Infrared Spectral Range (Springer Series in Chemical Physics Book 122)

★★★★★ 5 out of 5

Language : English
File size : 35379 KB
Text-to-Speech : Enabled
Screen Reader : Supported
Enhanced typesetting : Enabled
Print length : 176 pages



Atomic emission spectroscopy is a powerful analytical technique that provides insights into the composition and structure of matter. When an atom is excited, it absorbs energy and transitions to a higher energy state. As the atom returns to its ground state, it releases the energy it absorbed as photons of light. The wavelength of the emitted light corresponds to the energy difference between the excited and ground states.

The infrared spectral range, which spans wavelengths from 700 nm to 1 mm, provides valuable information about molecular vibrations and rotations. In this article, we will explore the atomic emission spectra of neutral noble gases in the infrared spectral range. These spectra offer a

wealth of information about the electronic structure and bonding characteristics of these elements.

Experimental Methods

The atomic emission spectra of neutral noble gases were recorded using a Fourier transform infrared (FTIR) spectrometer. The noble gases were introduced into a discharge cell, which was then excited using an electrical discharge. The emitted light was collected and directed into the FTIR spectrometer, which measured the intensity of the light at different wavelengths.

Results and Discussion

The atomic emission spectra of neutral noble gases in the infrared spectral range consist of a series of sharp lines. The wavelength of each line corresponds to a specific electronic transition within the atom. The following table lists the observed wavelengths and assignments for the atomic emission lines of neutral helium, neon, argon, krypton, and xenon:

Noble Gas	Wavelength (nm)	Assignment
Helium	1083.0	2s-3p
Neon	1215.6	2p-3s
Argon	1696.5	3s-4p
Krypton	2064.8	4s-5p
Xenon	2650.8	5s-6p

The intensities of the atomic emission lines depend on a number of factors, including the temperature and pressure of the gas, as well as the excitation conditions. In general, the lines corresponding to the strongest electronic transitions are the most intense.

The atomic emission spectra of neutral noble gases can be used to determine a number of important physical properties of these elements. For

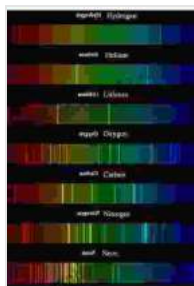
example, the wavelength of the strongest emission line can be used to calculate the ionization energy of the atom. Additionally, the relative intensities of the emission lines can be used to determine the temperature of the gas.

Applications

The atomic emission spectra of neutral noble gases have a wide range of applications in science and technology. These spectra are used to:

- * Identify and characterize noble gases in various materials.
- * Determine the temperature and pressure of noble gases in different environments.
- * Study the electronic structure and bonding characteristics of noble gases.
- * Develop new materials and technologies based on noble gases.

The atomic emission spectra of neutral noble gases in the infrared spectral range provide a wealth of information about the electronic structure and bonding characteristics of these elements. These spectra have a wide range of applications in science and technology, and they continue to be a valuable tool for researchers and engineers.

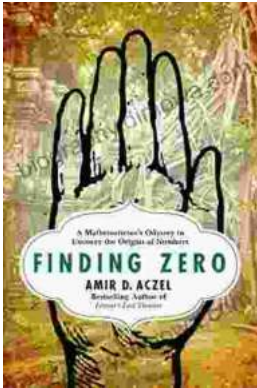


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