Brackett Series Encyclopedia Article

Brackett Series

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The middle of the nineteenth century saw a surge in the spectroscopic investigation and identification of the elements. German chemist Robert Bunsen (1811-1899) and German physicist Robert Kirchhoff (1827-1887) discovered the process of chemical analysis called **spectroscopy**. Swedish physicist Anders Ångström (1814-1874) measured the wavelengths of the **hydrogen** spectrum. Swiss mathematician and physicist Johann Balmer (1825-1898) calculated the mathematical relationship between the wavelengths and showed that they form a simple series. And, at the turn of the century, German physicist **Max Planck** (1858-1947) made sense of it all with his "quantization" of light.

In 1906, the American physicist Theodore Lyman (1874-1954) observed additional lines in the spectrum of hydrogen in the far ultraviolet region with the same mathematical relation calculated previously by Balmer except that these lines required an "n-value" of "1". This led to further investigations and the discovery of other spectroscopic series, all of which have been named after their discoverers. The **Brackett series** (discovered by American physicist F.S. Brackett) are electronic transitions between the n = 4 state (an excited **energy** state) and higher energy levels. The energy gap is so small that these absorptions occur in the infrared portion of the spectrum and are only visible using specialized instruments. However, they provide further evidence for the discrete nature of the electronic states in the **atom** and confirmation of the principles expressed in Bohr's theory of the atom and subsequently, quantum mechanics.