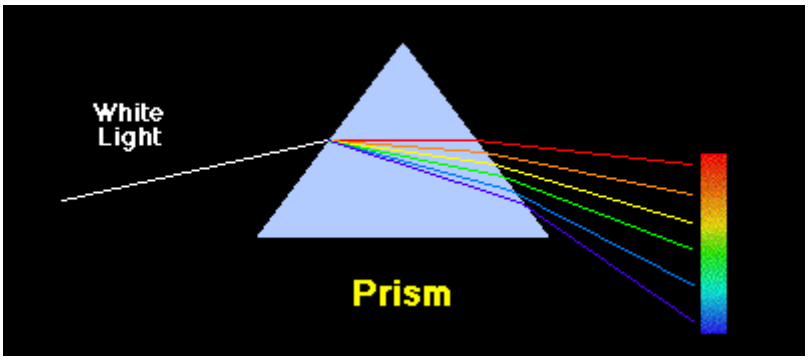
Answer on Question #41207 – Chemistry - Other

Question:

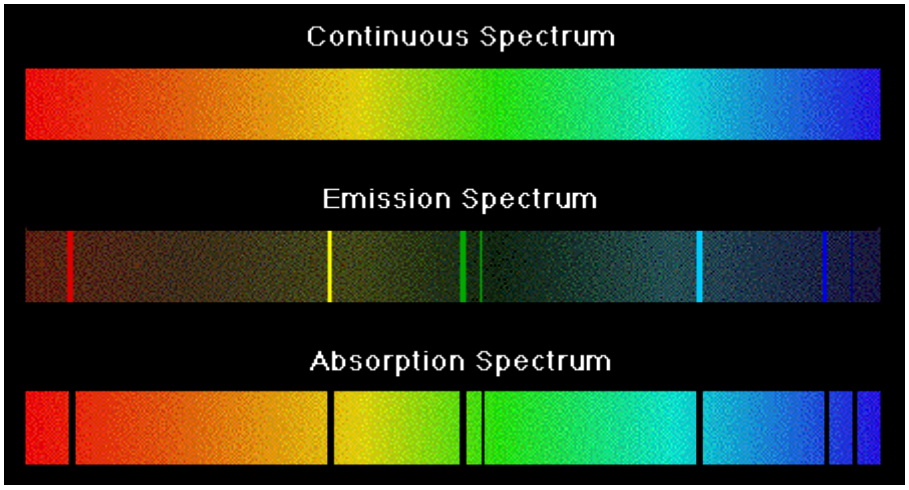
What do you mean emission and absorption sperctra of hydrogen atom.

Answer:

Isolated atoms can **absorb and emit** packets of electromagnetic radiation having discrete energies dictated by the detailed atomic structure of the atoms. When the corresponding light is passed through a prism or spectrograph it is separated spatially according to wavelength, as illustrated in the following image.



The corresponding spectrum may exhibit a continuum, or may have superposed on the continuum bright lines (an emission spectrum) or dark lines (an absorption spectrum), as illustrated in the following figure.

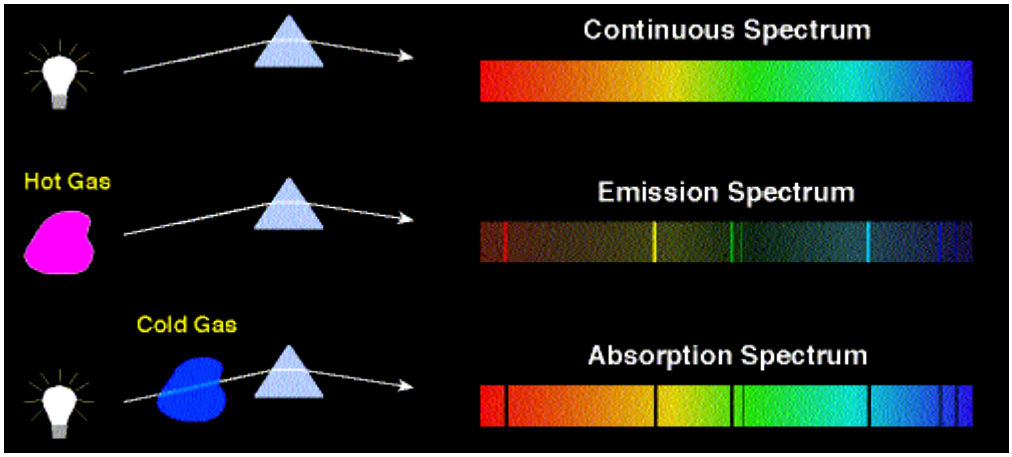


Thus, **emission spectra** are produced by thin gases in which the atoms do not experience many collisions (because of the low density). The emission lines correspond to photons of discrete energies that are emitted when excited atomic states in the gas make transitions back to lower-lying levels.

A continuum spectrum results when the gas pressures are higher. Generally, solids, liquids, or dense gases emit light at all wavelengths when heated.

An **absorption spectrum** occurs when light passes through a cold, dilute gas and atoms in the gas absorb at characteristic frequencies; since the re-emitted light is unlikely to be emitted in the same direction as the absorbed photon, this gives rise to dark lines (absence of light) in the spectrum.

The origins of these three types of spectra are illustrated in the following figure.



The spectrum of hydrogen is particularly important in astronomy because most of the Universe is made of hydrogen. Emission or absorption processes in hydrogen give rise to series, which are sequences of lines corresponding to atomic transitions, each ending or beginning with the same atomic state in hydrogen. Thus, for example, the Balmer Series involves transitions starting **(for absorption)** or ending **(for emission)** with the first excited state of hydrogen, while the Lyman Series involves transitions that start or end with the ground state of hydrogen; the adjacent image illustrates the atomic transitions that produce these two series in emission.

Because of the details of hydrogen's atomic structure, the Balmer Series is in the visible spectrum and the Lyman Series is in the the UV. The following image illustrates some of the transitions in the Balmer series.