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Analytical Chemistry II – Quiz (23rd April, 2020)

1) Why does a deuterium lamp produce a continuum spectrum rather than a line spectrum in the UV?

In a deuterium lamp, the lamp energy from the power source produces an excited deuterium molecule that dissociates into two atoms in the ground state and a photon of radiation. As the excited deuterium relaxes, its quantized energy is distributed between the energy of the photon and the energies of the two atoms. The latter can vary from nearly zero to the energy of the excited molecule. Therefore, the energy of the radiation, which is the difference between the quantized energy of the excited molecule and the kinetic energies of the atoms, can also vary continuously over the same range. Consequently, the emission spectrum is a spectral continuum.

2) Define the following terms related to molecular emission (luminescence) spectroscopy:

- vibrational relaxation: It is the process by which a molecule loses its excess vibrational energy without emitting radiation.

- predissociation: It occurs when a molecule changes from a higher electronic state to an upper vibrational level of a lower electronic state in which the vibrational energy is great enough to rupture the bond.