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Structure

Hydrogen, the nucleus consists of positively charged protons and neutral neutrons. A hydrogen nucleus contains a single proton. The number of protons in the nucleus is atomic number (Z) for each element. Each of 118 known elements has a unique number. The total number of protons and neutrons in the nucleus is its atomic mass (A). The ratio of neutrons to protons in the nucleus is the basis of radioactive decay.

Orbitals

Electrons are negatively charged particles that exist in the extranuclear region and are bound to the nucleus by electrostatic attraction. The Bohr model considers that electrons exist in discrete orbits or "shells" denoted by K, L, M, N, O and P , with the K -shell being closest to the nucleus.

Ionization

When the number of electrons in an atom is equal to the number of protons in its nucleus, the atom is electrically neutral. If a neutral atom loses an electron, it becomes a positive ion, and the free electron becomes a negative ion. This process of forming an ion pair is termed ionization. To ionize an atom, sufficient external energy must be provided to overcome the electrostatic forces and free the electron from the nucleus. High-energy particles, x-rays, and ultraviolet radiation have sufficient energy to displace electrons from their orbits and render atoms ionized. These radiations are referred to as ionizing radiations. In contrast, visible light, infrared and microwave radiations, and radio waves do not have sufficient energy to remove bound electrons from their orbits and are nonionizing radiations.

NATURE OF RADIATION

Radiation is the transmission of energy through space and matter. It may occur in two forms: (1) electromagnetic radiation (Table 1.1). Practical applications of electromagnetic radiation are listed in Table 1.1.