

Key Terms

activity rate of decay for radioactive nuclides

alpha decay type of radioactive decay in which an atomic nucleus emits an alpha particle

anger camera common medical imaging device that uses a scintillator connected to a series of photomultipliers

atomic number number of protons in a nucleus

becquerel SI unit for rate of decay of a radioactive material

beta decay type of radioactive decay in which an atomic nucleus emits a beta particle

carbon-14 dating radioactive dating technique based on the radioactivity of carbon-14

chain reaction self-sustaining sequence of events, exemplified by the self-sustaining nature of a fission reaction at critical mass

critical mass minimum amount necessary for self-sustained fission of a given nuclide

decay constant quantity that is inversely proportional to the half-life and that is used in the equation for number of nuclei as a function of time

energy-level diagram a diagram used to analyze the energy levels of electrons in the orbits of an atom

excited state any state beyond the $n = 1$ orbital in which the electron stores energy

Fraunhofer lines black lines shown on an absorption spectrum that show the wavelengths absorbed by a gas

gamma decay type of radioactive decay in which an atomic nucleus emits a gamma ray

Geiger tube very common radiation detector that usually gives an audio output

ground state the $n=1$ orbital of an electron

half-life time in which there is a 50 percent chance that a nucleus will decay

Heisenberg uncertainty principle fundamental limit to the precision with which pairs of quantities such as momentum and position can be measured

hydrogen-like atom any atom with only a single electron

isotope nuclei having the same Z and different N 's

liquid drop model model of the atomic nucleus (useful only to understand some of its features) in which nucleons in a nucleus act like atoms in a drop

mass number number of nucleons in a nucleus

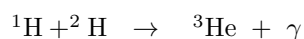
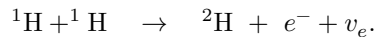
nuclear fission reaction in which a nucleus splits

nuclear fusion reaction in which two nuclei are combined, or fused, to form a larger nucleus

nucleons particles found inside nuclei

planetary model of the atom model of the atom that shows electrons orbiting like planets about a Sun-like nucleus

proton-proton cycle combined reactions



and



that begins with hydrogen and ends with helium

rad amount of ionizing energy deposited per kilogram of tissue

radioactive substance or object that emits nuclear radiation

radioactive dating application of radioactive decay in which the age of a material is determined by the amount of radioactivity of a particular type that occurs

radioactive decay process by which an atomic nucleus of an unstable atom loses mass and energy by emitting ionizing particles

radioactivity emission of rays from the nuclei of atoms

radiopharmaceutical compound used for medical imaging

relative biological effectiveness (RBE) number that expresses the relative amount of damage that a fixed amount of ionizing radiation of a given type can inflict on biological tissues

roentgen equivalent man (rem) dose unit more closely related to effects in biological tissue

Rutherford scattering scattering of alpha particles by gold nuclei in the gold foil experiment

Rydberg constant a physical constant related to atomic spectra, with an established value of

$$1.097 \times 10^7 \text{m}^{-1}$$

scintillator radiation detection method that records light produced when radiation interacts with materials

strong nuclear force attractive force that holds nucleons together within the nucleus

tagged having a radioactive substance attached (to a chemical compound)

therapeutic ratio the ratio of abnormal cells killed to normal cells killed

transmutation process of changing elemental composition