Glossary

activity the rate of decay for radioactive nuclides

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

alpha rays one of the types of rays emitted from the nucleus of an atom

antielectron another term for positron

antimatter composed of antiparticles

atomic mass the total mass of the protons, neutrons, and electrons in a single atom

atomic number number of protons in a nucleus

barrier penetration quantum mechanical effect whereby a particle has a nonzero probability to cross through a potential energy barrier despite not having sufficient energy to pass over the barrier; also called quantum mechanical tunneling

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

beta rays one of the types of rays emitted from the nucleus of an atom

binding energy the energy needed to separate nucleus into individual protons and neutrons

binding energy per nucleon the binding energy calculated per nucleon; it reveals the details of the nuclear force—larger the BE/A, the more stable the nucleus

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

chart of the nuclides a table comprising stable and unstable nuclei

curie the activity of 1g of ^{226}Ra, equal to 3.70×10^{10} Bq

daughter the nucleus obtained when parent nucleus decays and produces another nucleus following the rules and the conservation laws

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

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

decay equation the equation to find out how much of a radioactive material is left after a given period of time

decay series process whereby subsequent nuclides decay until a stable nuclide is produced

electron capture the process in which a proton-rich nuclide absorbs an inner atomic electron and simultaneously emits a neutrino

electron capture equation equation representing the electron capture

electron's antineutrino antiparticle of electron's neutrino

electron's neutrino a subatomic elementary particle which has no net electric charge

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

gamma rays one of the types of rays emitted from the nucleus of an atom

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

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

ionizing radiation radiation (whether nuclear in origin or not) that produces ionization whether nuclear in origin or not

isotopes nuclei having the same Z and different Ns

magic numbers a number that indicates a shell structure for the nucleus in which closed shells are more stable

mass number number of nucleons in a nucleus

neutrino an electrically neutral, weakly interacting elementary subatomic particle

neutron a neutral particle that is found in a nucleus

nuclear radiation rays that originate in the nuclei of atoms, the first examples of which were discovered by Becquerel

nuclear reaction energy the energy created in a nuclear reaction

nucleons the particles found inside nuclei

nucleus a region consisting of protons and neutrons at the center of an atom

nuclide a type of atom whose nucleus has specific numbers of protons and neutrons

parent the original state of nucleus before decay

photomultiplier a device that converts light into electrical signals

positron the particle that results from positive beta decay; also known as an antielectron

positron decay type of beta decay in which a proton is converted to a neutron, releasing a positron and a neutrino

protons the positively charged nucleons found in a nucleus

quantum mechanical tunneling quantum mechanical effect whereby a particle has a nonzero probability to cross through a potential energy barrier despite not having sufficient energy to pass over the barrier; also called barrier penetration

radiation detector a device that is used to detect and track the radiation from a radioactive reaction

radioactive a substance or object that emits nuclear radiation

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

radioactivity the emission of rays from the nuclei of atoms

radius of a nucleus the radius of a nucleus is $r = r_0 A^{1/3}$

range of radiation the distance that the radiation can travel through a material

rate of decay the number of radioactive events per unit time

scintillators a radiation detection method that records light produced when radiation interacts with materials

solid-state radiation detectors semiconductors fabricated to directly convert incident radiation into electrical current

tunneling a quantum mechanical process of potential energy barrier penetration