PHYSICS INMOTION
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Vocabulary List

Unit 7: Nuclear Physics

7A: Radioactive Decay

alpha decay - the radioactive decay process in which an alpha particle is emitted from the nucleus.

alpha particle - a positively charged particle that is emitted from a nucleus during alpha decay and consists of two neutrons and two protons.

antineutrino - the antiparticle of a neutrino that differs from a neutrino in the direction of its spin; a neutral subatomic particle that has almost no mass and is released from a radioactive nucleus during beta minus decay.

beta minus decay - a type of radioactive decay where a neutron decays into a proton, which remains in the nucleus, an electron, and an antineutrino.

beta particle - a particle that is emitted during beta decay. During beta minus decay the beta particle is an electron, during beta plus decay, the beta particle is a positron.

beta plus decay - a type of radioactive decay where a proton decays into a neutron, which remains in the nucleus, a positron, and a neutrino.

gamma decay - a type of radioactive decay in which a nucleus that is in an excited state releases gamma radiation.

gamma radiation - an electromagnetic wave that is released from a radioactive nucleus during gamma decay.

isotopes - A form of an element that has the same number of protons but a different number of neutrons. The atomic number for isotopes of a given element is the same but the mass number is different.

neutrino - the antiparticle of an antineutrino that differs from a neutrino in the direction of its spin; a neutral subatomic particle that has almost no mass and is released from a radioactive nucleus during beta plus decay.

radioactive decay - the spontaneous emission of charged particles and/or energy from an atom.

stable isotopes - Isotopes of an element that don't emit radioactive particles or radiation.

strong nuclear force - the strongest of the four fundamental forces also having the shortest range, this attractive force holds the protons and neutrons in the nucleus of an atom together.

unstable isotopes - isotopes of an element that undergo nuclear decay and emit particles, energy, or both.

weak nuclear force - one of the fundamental forces that is one million times weaker than the strong force, acts at distances of less than 10^{-18} meters, changes one type of quark to another that are found within protons and neutrons, and is responsible for beta decay.

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7B: Fission

binding energy (E) - the amount of energy used to keep a nucleus together; equal to the mass defect times the speed of light, squared.

critical mass - the minimum amount of fissile material that can undergo fission needed to maintain a nuclear chain reaction.

fission - the process of splitting an atom into smaller, lighter atoms, releasing energy.

mass defect (Δm) - the difference in mass between the particles within a nucleus and the particles by themselves, not bound within a nucleus.

radioactive decay - the spontaneous emission of charged particles and/or energy from an atom.

strong nuclear force - the strongest of the four fundamental forces also having the shortest range, this attractive force holds the protons and neutrons in the nucleus of an atom together.

7C: Fusion

binding energy (E) - the amount of energy used to keep a nucleus together; equal to the mass defect times the speed of light, squared.

fusion - when two light atomic nuclei come together, or fuse, to form a heavier nucleus, releasing energy.

mass defect (Δm) - the difference in mass between the particles within a nucleus and the particles by themselves, not bound within a nucleus.

proton-proton fusion - the multistep nuclear fusion process by which hydrogen fuses with hydrogen to form helium.

radioactive decay - the spontaneous emission of charged particles and/or energy from an atom.

7D: Half-life

carbon dating - a method of determining the age of substances that contain organic material by looking that the ratio of carbon-12 to carbon-14 they contain.

half-life - the time it takes for half of a radioactive substance to decay.

radioactive decay - the spontaneous emission of charged particles and/or energy from an atom.