K Education Centre

AS Particle Physics

Particles and Antiparticles

Assignment Questions

Particles and Antiparticles :

Planck constant , h = 6.63 x 10^{-34} Js   Rest mass of electron = 9.11 x 10^{-31}kg   Rest energy of electron = 0.511 MeV

Q1 : Explain the production of positrons with the help of radioactive decay.

Q2: How is annihilation different from pair production?

Q3 : Write an equation showing annihilation of a electron and a positron.

Q4 : Explain the conservation of the charge in the case of pair production if electron and positron is produced by a photon . (Hint : Look at the charge of electron and positron)

Q5 : Calculate the number of photons produced by an laser if it produces photons with energy of 400 m J . Wavelength of photon is 650 nm

Q6 : Find the rest energy of an electron if photons produced in the annihilation have a frequency of f_{min} = 1.24 x 10^8 T Hz. (1 T Hz = 1 x 10^{12} Hz)

Q7 : In a radioactive decay of nucleus , a β$^+$ particle is emitted followed by a γ photon of wavelength of 8.30 x 10 $^{-13}$ m . Find the energy of the γ photon produced and state the rest mass of the β$^+$ particle in kg.

Q8 : In an experiment a gamma ray produces an electron and positron through pair production. If the electron and positron each have kinetic energy of 0.064 MeV immediately after they are created. Calculate the wavelength of the gamma ray.