

## Nuclear physics Properties of alpha, beta and gamma rays:

Properties	$\alpha$ rays	$\beta$ rays	$\gamma$ rays
What are they?	Helium nucleus ( ${}_2\text{He}^4$ ) consisting of two protons and two neutrons.	They are electrons ( ${}_{-1}\text{e}^0$ ), basic elementary particle in all atoms.	They are electromagnetic waves consisting of photons.
Charge	Positively charged particles. Charge of each alpha particle = $+2e$	Negatively charged particles. Charge of each beta particle = $-e$	Neutral particles. Charge of each gamma particle = zero
Ionising power	100 time greater than $\beta$ rays and 10,000 times greater than $\gamma$ rays	Comparatively low	Very less ionization power
Penetrating power	Low penetrating power (even stopped by a thick paper)	Penetrating power is greater than that of $\alpha$ rays. They can penetrate through a thin metal foil.	They have a very high penetrating power greater than that of $\beta$ rays. They can penetrate through thick metal blocks.
Effect of electric and magnetic field	Deflected by both the fields. (in accordance with Fleming's left hand rule)	Deflected by both the fields; but the direction of deflection is opposite to that for alpha rays. (in accordance with Fleming's left hand rule)	They are not deflected by both the fields.
Speed	Their speed ranges from 1/10 to 1/20 times the speed of light.	Their speed can go up to 9/10 times the speed of light.	They travel with the speed of light.