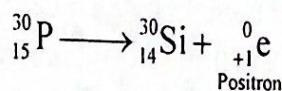
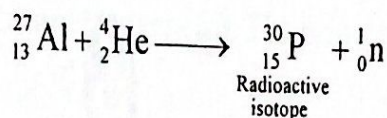


Artificial Radioactivity:

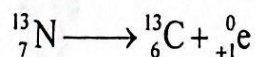
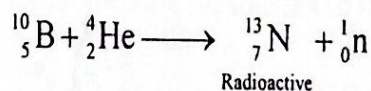
The process of converting of a stable nucleus by bombarding it with projectile such as α -particle, neutron, proton, deuteron etc. into radioactive nucleus is called artificial radioactivity or induced radioactivity.

Examples:

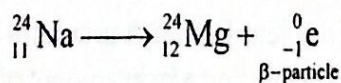
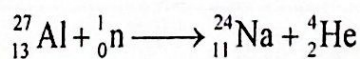
(1) When aluminium is bombarded with α -particle, radioactive isotope ($^{30}_{15}\text{P}$) is formed which decays spontaneously with the emission of positron, $^0_{+1}e$.



(2) When $^{10}_5\text{B}$ is bombarded with α -particle, $^{13}_7\text{N}$ is formed which is radioactive. $^{13}_7\text{N}$ decays spontaneously with the emission of positron.

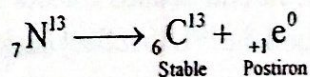
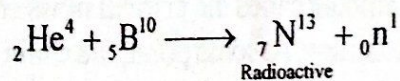
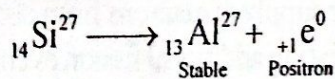
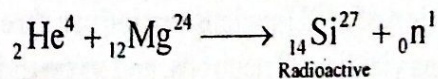


(3) When $^{27}_{13}\text{Al}$ is bombarded with neutron, radioactive is formed. decays spontaneously with the emission of β -particle.

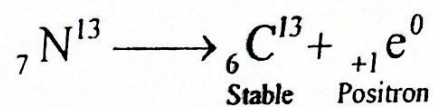
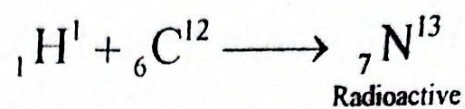


A few example of the bombardment reactions leading to the formation of radioactive isotope are given below:

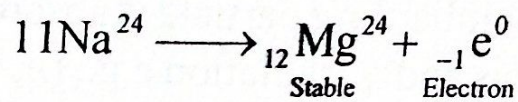
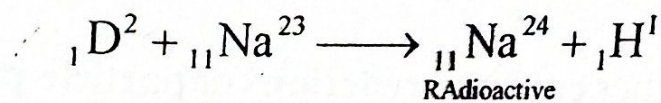
(i) Those involving bombardment with α -particles, e.g.,



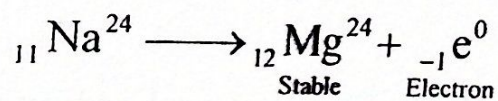
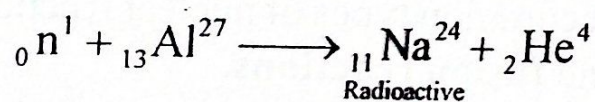
(ii) Those involving bombardment with protons, e.g.,



(iii) Those involving bombardment with deuterons, e.g.,



(iv) Those involving bombardment with neutrons, e.g.,



Property	α -rays	β -rays	γ -rays
1. Nature	These carry positive charge. Each α -particle carries two unit positive charge and four units mass, i.e., they are simply helium nuclei.	They carry negative charge. Each β -particle carries same charge and mass as that of an electron. Hence β -particles are same as electrons.	They carry no charge and have no mass. So they can not be considered as made up of particles. They are simply electromagnetic radiations like x-rays.
2. Velocity	Their velocity is $\frac{1}{10}$ the of velocity of light, i.e., their velocity is 3×10^9 cm/second.	Their velocity is 2.79×10^{10} cm/second.	Their velocity is same as that of velocity of light.
3. Penetrating Power	Being heavy particles, their penetrating power is smaller than β - and γ -rays. These penetrate the Al foil of the thickness of 0.002 cm.	Because of smaller mass and higher velocity, their penetrating power is nearly 100 times more than that of α -rays. These penetrate the Al foil of thickness of 0.2 cm.	Their penetrating power is even 100 times higher than β -rays. These penetrate Al foil of thickness of 100 cm.
4. Ionizing Power	Being heavy particles, they have high momentum and kinetic energy and hence high ionizing power.	Being much lighter particles than α -particles. They possess low momentum and kinetic energy and hence their ionizing power is $\frac{1}{100}$ th of the α -particles.	Because of no mass, their ionizing power is very poor.
5. Effect of Magnetic Field	These are deflected towards negative place.	These are deflected towards positive plate. β -rays are deflected to a much than α -rays because β - particles are much lighter than α -particles.	Being neutral, these are not affected by electric field.
6. Effect on photographic plate	Black end the photographic plate.	Blackened the photographic plate.	Black end the photographic plate.
7. Effect on ZnS Screen	Produce fluorescence on ZnS screen.	Produces fluorescence on ZnS screen.	Produces fluorescence on ZnS screen.