Attenuation coefficient

Is a measure of how easily a material can be penetrated by an incident energy beam (e.g. ultrasound or x-rays). It quantifies how much the beam is weakened by the material it is passing through.

The attenuation coefficient describes the extent to which the radiant flux of a beam is reduced as it passes through a specific material. It is used in the context of:

- X-rays or gamma rays, where it is denoted μ and measured in cm^{-1};
- neutrons and nuclear reactors, where it is called *macroscopic cross section* (although actually it is not a section dimensionally speaking), denoted Σ and measured in m^{-1};
- ultrasound attenuation, where it is denoted α and measured in $dB \cdot cm^{-1} \cdot MHz^{-1}$;[4][5]
- acoustics for characterizing particle size distribution, where it is denoted α and measured in m^{-1}.

The attenuation coefficient is called the "extinction coefficient" in the context of

- solar and infrared radiative transfer in the atmosphere, albeit usually denoted with another symbol (given the standard use of $\mu = \cos\theta$ for slant paths);

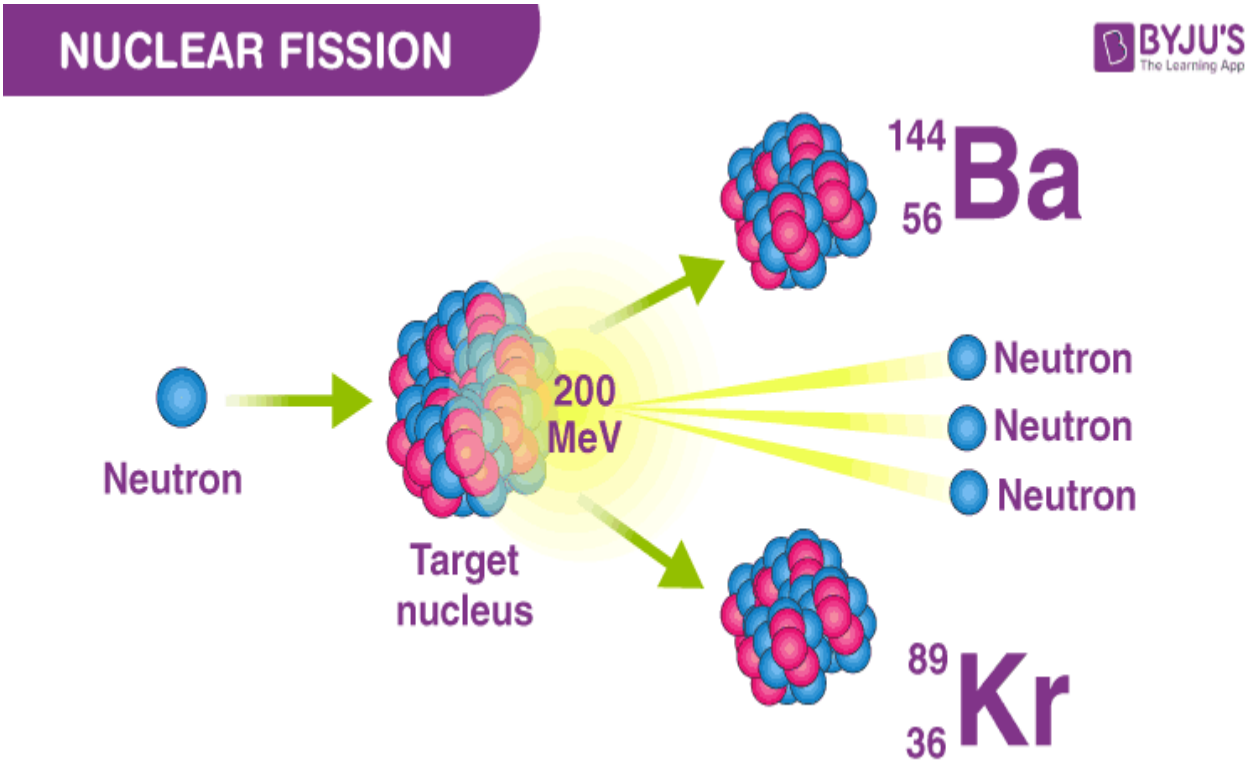
A small attenuation coefficient indicates that the material in question is relatively transparent, while a larger value indicates greater degrees of opacity. The attenuation coefficient is dependent upon the type of material and the energy of the radiation. Generally, for electromagnetic radiation, the higher the energy of the incident photons and the less dense the material in question, the lower the corresponding attenuation coefficient will be.

Nuclear fission , Nuclear fusion

There are two types of nuclear reactions called nuclear fission and nuclear fusion. Nuclear fission and fusion involve the disintegration and combination of the elemental nucleus. In the case of nuclear fission, an atom divides into two or more smaller or lighter atoms. Nuclear fusion occurs when two or more atoms join or fuse together to form a large or heavier atom.

What is Nuclear Fission?

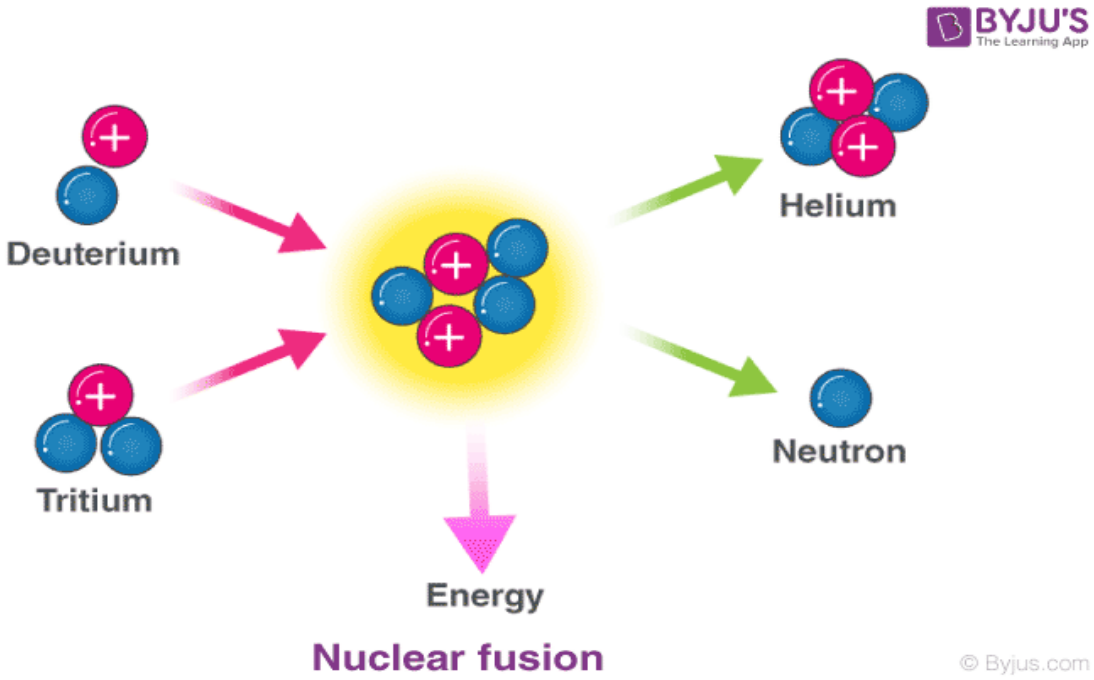
Nuclear fission is a nuclear reaction in which the nucleus of an atom is bombarded with low energy neutrons which split the nucleus into smaller nuclei. An abundant amount of energy is released in this process. Nuclear fission reactions are used in nuclear power reactors since it is easy to control and produces large amounts of energy.



When uranium-235 is bombarded with slow-moving neutrons, the heavy nucleus of the uranium splits and produces krypton-89 and barium-144 with the emission of three neutrons.

What is Nuclear Fusion?

Nuclear Fusion is a reaction that occurs when two or more atoms combine together to form to a single heavier nucelus. An enormous amount of energy is released in this process, much greater than the energy released during the nuclear fission reaction.



Fusion occurs in the sun where the atoms of (isotopes of hydrogen, Hydrogen-3, and Hydrogen-2) Deuterium and Tritium combine in a huge pressure atmosphere with extremely high temperatures to produce an output in the form of a neutron and an isotope of Helium. Also, the amount of energy released in fusion is way greater than the energy produced by fission.