

FISSION PROCESS

Nuclear energy producing elements are Uranium, Thorium, Plutonium. Uranium is important nuclear fuel. It exists in three different forms U^{234} , U^{235} and U^{238} . U^{235} is called primary fuel - Naturally available in uranium ore 0.7%. Most unstable and suitable for chain reaction process sustain like anything. U^{233} and Pu^{239} are known as Secondary fuel. These are produced artificially from Th^{232} and U^{238} .

Radioactive element emits two substances one is alpha α particle and another one is neutron. Some other also emitted but they are very much very small sized.

Alpha particle is 4He nucleus. Atomic nucleus has positive (+) proton and neutral Neutron. So nucleus in overall carries positive charge. Therefore another particle with positive charge is (added) launched and be there due to attraction force of magnetism.

Positive particle and positive nucleus will repel each other. The alpha particle positive because it has two protons and two neutrons. Its positive protons give positive charge and repelled away from another positive nucleus. As only thing left is the neutron is electrically neutral it stays and not gets repelled.

The massive nucleus U^{235} breaks apart (fissions) there will be a net yield of high energy because some of masses of the fragmented nucleus is less than that of parent U^{235} . If the sum of the mass of two fragment nucleus is equal or greater than the parent U^{235} they will be more tightly bound in the uranium nucleus itself. Therefore decrease in the masses of the fragmented nucleus comes off as energy according to Einstein's equation.

Slow neutron or thermal neutron absorption is implemented in U^{235} fission reactors for triggering. Other fissionable isotopes induced to fission by slow neutrons are Plutonium Pu^{239} , Uranium U^{233} and Thorium Th^{232} . As there is isotopes formed due to fission fragments naturally binding energy per fragment is more than heavy nuclei. So the emission of neutrons and gamma rays and also the release of energy occurring during this process.

If nucleus is excited with sufficient energy and attain the post fission stage then only fission process is possible. The excited energy required for fission is called Critical energy and should always be more than that of neutron binding energy. The immediate products of a fission reaction Ba^{137} and Kr^{97} are termed as fission fragments and in total it is named as fission products.

The sum of the masses of fission products is less than the parent mass. This difference mass (0.1 percent of original mass) is converted to energy released according to Einstein's equation. When nucleus of heavy atom captures a neutron Fission process will occur or it happens simultaneously with splitting of fragments.