

## **E=mc<sup>2</sup> : Equation of Life and Death**

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*“the world is a dangerous place to live.., not because of the people who are evil, but because of the people who do nothing about it..”*

*-Prof. Albert Einstein*

Albert Einstein, one of the greatest physicist and mathematician of the century, who gave out this famous equation  $E=mc^2$ . This is the only equation in world who did transform this world into a new scientific world. Although this equation looks simple and small, but it can really generate enormous energy which can even destroy this world. The interesting fact is that even Einstein did not know initially that his equation could really do this.

Albert Einstein was born at Ulm, Germany in 14<sup>th</sup> March 1879. In 1905, while working at Swiss Patent Office, Einstein published five outstanding research papers. And most interestingly these five papers changed the face of Physics. Out of these, the papers including Special and General Theory of Relativity, photoelectric effect influenced the world most, for which he was offered Nobel Prize in 1923. But he was continuously nominated for Nobel Prize for 14 times. After his grand success in those papers, he resigned from that office and joined as a professor of physics at university of Zurich. Many great scientist of that time appreciated his equations and he was getting popular day by day.

Perhaps the most important result of Einstein's theory of relativity is the mass-energy relation.

$E=mc^2$

the above equation tells us about the equivalence of mass and energy such that, mass can be converted into energy and vice-versa. This equation was published in 1905, but it came to application of public during the Second World War.

When Hitler came to power, he prepared his army for a grand win. At that time Germany was the heart of physics. All the important physics experiments were carried out there. Einstein mass energy equation was in use. Scientist thought to produce an atomic bomb by bombarding alpha nucleus to a heavier nucleus which will then create an enormous amount of energy. Warner Heisenberg was in the lead of the project. Although the mass of the reacting element is small, but since it is multiplied by a quantity, which is a large quantity. So, even a small mass can be converted to a high energy. Scientists were busy in this, but it was very hard to extract such colliding particles from an atom. Einstein himself was not sure of this. After many tireless hard works, German scientist discovered the way of bombardment. But they were not successful as because they bombarded a nucleus of heavy atom with an alpha particle. The alpha particles were itself a positive nucleus, so when it strikes a positively charged nucleus it repels, thereby reducing

the instability. Hitler was continuously trying to make the atomic bomb. At that time, Einstein was on holiday in Long island.

This mistake was discovered by a renowned scientist Leo Szilard, and he met Einstein to discuss this topic. Szilard discovered that instead of using alpha particles if we use a newly discovered particle by then 'neutron' in the reaction, then it would attach with each atom since it has no charge and spilt up to many neutrons when collided with other atoms. It would produce lots neutrons and made the atom unstable due to which the atoms would burst out, and since it is a chained reaction so, by Einstein's equation it would produce huge amount of energy.

Szilard convinced Einstein that lots of energy can be produced by his equation using some controlled chain reactions. And he forced Einstein to write a letter to US president Roosevelt informing about the making of atomic bomb. Finally, Einstein wrote a letter to US president mentioning that US should start producing atomic bomb before Germany does. Germany was the enemy of US. Influenced by Einstein's equation, US president ordered their group of scientist to start the project, which was famous as 'Manhattan Project'. Due to his valuable contributions, US offered American citizenship to Einstein. Since US used the new and correct way to produce atom bomb, so they were progressing much rapidly. The atom bomb was prepared to use it against Germany. But on May 7, 1945 Germany surrendered to the Allies. So, instead of using it on Germany, US dropped two atom bombs on Hiroshima and Nagasaki of Japan. At that time Japan was also an enemy of US. Although, the atom bomb ended the war, but the explosion resulted in destruction and human misery of unimaginable magnitude. Now-a-days also people in those city are mostly physically handicapped. The nuclear effect was terrible.

Although Einstein did not play any role in the project, but his small equation ruined a generation of Japanese people. Even Einstein could not believe the outcome of the bomb. His equation of hard work became an equation of death for many people. For many people Einstein appeared as the scientific devil in the world.

The Einstein's equation is not just an equation of destruction, but also an ultimate equation of creation. The other side of the equation tells us something else. That is the amount of energy can be condensed back to mass. At the dawn of the universe, millions and millions of years ago, there was a burst of energy that created the big bang. Those energy converted back to mass and created everything in the universe taking millions of years. We can say that this equation is the basis of our life and every thing around us, although there might be some biological evolution, but if we say the beginning then this equation may take the most vital place.

All in the sense exists because of the extra-ordinary equation of Einstein. But, very sadly, Einstein died by taking a guilty emotion of his equation of death, he could not listen that his equation was also an equation of life. In 1999, TIME magazine named this genius as the person of the century. Einstein ended his life in Princeton Hospital. Before his death, he quoted, "*politics is just for a moment....but equation is for eternity.*"

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