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|  | X-RAY SPECTRA AND MEDICAL USES OF X-RAYS | | |  |
|  |  | by |  |  |
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# Characteristic X-rays

Characteristic X-rays correspond to the type of X-rays which are emitted when the vacancy of the inner shell of an atom is filled by the outer shell electrons. The X-rays released during this process are such that they are characteristic to each of the elements. These rays are produced when high energy particles, such as photons i.e. ions or electrons, are bombarded with particles of higher energy. When an electron, which is bound in an atom, is struck by an incident particle, there is an ejection of the target electron from the atom’s inner shells. After the ejection of the electrons, the atom is left with a vacant energy level, which is also called the core hole. The electrons of the outer-shells fall in the inner shells, which emits the quantized photons with the energy levels which are equivalent to the difference in energy between the lower and higher states. Different set of energy levels are constituted by every element, hence the transitioning to the lower from higher energy levels produce the X-rays with the frequencies which are characteristic to every element (Campbell *et al.*, 1985).

The particular element emitting the Characteristic X-rays can be identified by studying the X-rays which are produced by the element. This process is utilized in several techniques, which includes the particle induced X-ray emission, wavelength dispersive X-ray spectroscopy and X-ray fluorescence spectroscopy.

# Bremsstrahlung radiations

Bremsstrahlung radiations relate to the electromagnetic radiations which are generated as the charged particle decelerates while deflected by another charged particle, which is particularly an electron by the nucleus of an atom. There is a loss of kinetic energy by the moving particle, converted in to a photon, hence keeping up with the law of conservation of energy. This type of radiation has a spectrum which is continuous, becoming more and more intense with the intensity of the peaks shifting towards the frequencies which are higher, with the greatly changing energy levels of the decelerated particles.

Bremsstrahlung radiations can also be known as the radiations which are produced by the deceleration of the charged particles, including the cyclotron radiations in which the photons are emitted by a non-relativistic particle, synchrotron radiations in which the photons are emitted by the relativistic particles and the emissions of positrons and electrons during the beta decay (Gruia, 2017). Bremsstrahlung radiations are sometimes known as the free/free radiations. This term refers to the fact that it relates to the emissions which are caused by the particles which are free and not part of any molecule or atom, an ion both after and before the deflection which is caused by the emission.

Bibliography

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