SNS COLLEGE OF ALLIED HEALTH SCIENCES- COIMBATORE 35

DEPARTMENT : RADIOGRAPHY AND IMAGNG TECHNOLOGY

SUBJECT : GENERAL PHYSICS, RADIATION PHYSICS AND PHYSICS OF DIAGNOSTIC RADIOLOGY

PAPER : PAPER II (UNIT 4 – INTERACTIONS OF RADIATION WITH MATTER)

TOPIC : 2. LINEAR AND MASS ATTENUATION COEFFICIENT

LINEAR ATTENUATION COEFFICIENT

- Linear Attenuation Coefficient The linear attenuation coefficient is defined as the reduction in the radiation intensity per unit path length and its unit is cm-1. It refers the fraction of photons removed from a monochromatic radiation beam. The above equation may be simplified and rewritten as:
- $\mu = - I / X \quad log_e \, 1 / I_0$
- The term l/o represent the fraction of photons removed, per unit thickness of the medium. Since the relation is logarithmic, higher numbers of photon are removed at the initial thickness of the absorber and lesser number at later thickness.
- That is why the relationship is exponential and the radiation intensity never reduces to zero.
- The linear attenuation coefficient depends on the energy of the photons and material density. Hence, linear attenuation coefficient varies with density for the same material.
- In diagnostic energy range (30-100 keV), the linear attenuation coefficient decreases with increasing energy except at K-edges. The u for soft tissue ranges from 0.35 to 0.16 cm^1.

MASS ATTENUATION COEFFICIENT

- Mass Attenuation Coefficient The mass attenuation coefficient is obtained by dividing the linear attenuation coefficient by the density (p) and has the symbol u/p and unit cm^2/g.
- The mass attenuation coefficient is independent of density. It is used to quantify the attenuation of materials independent of their physical state.
- The product px is called mass thickness, and it is expressed in g/cm^2.

INTERROGATIONS

1. What is Linear attenuation coefficient ?
2. Formula Explanation of Linear attenuation coeeficient
3. Define Mass attenuation coefficient

REFERENCES

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2. Ball and mores essential physics radiographers, IV edition, Blackwell publishing.
3. Basic Medical Radiation physics – Stanton.
4. Christensen’s Physics of Diagnostic Radiology – Christensen.
5. The physics of Radiology and Imaging – K Thayalan.

THANK YOU