SNS COLLEGE OF ALLIED HEALTH SCIENCES- COIMBATORE 35

DEPARTMENT : RADIOGRAPHY AND IMAGNG TECHNOLOGY

SUBJECT : QUALITY CONTROL, RADIOBIOLOGY AND RADIATION SAFETY IN RADIODIAGNOSIS/ IMAGING OTHERTHAN X-ray RELATED

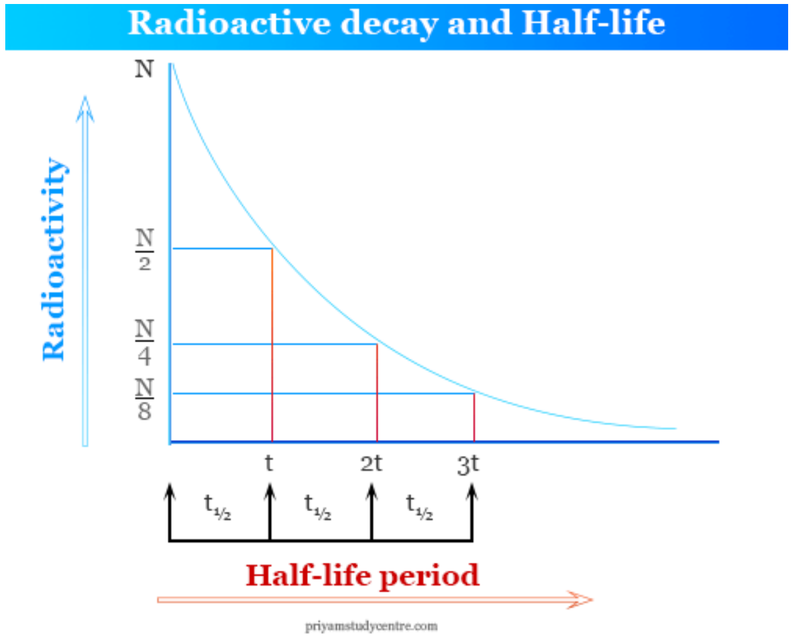
PAPER : PAPER II (UNIT 3 – RADIOACTIVITY)

TOPIC : 1. HALF LIFE
2. ACTIVITY
3. SPECIFIC ACIVITY

HALF LIFE

- It is time in which a given quantity of a radionuclide decays to half of its initial value (T ½)
- It is the time needed for half of the atomic nuclei of a radioactive decay.

  The rate of radioactive isotope decay is measured in half life. For example the half life of the Cobalt -60 is 5.26 Years.
- The relation between the half life (T ½) , and the decay constant is,
- **T ½ =0.693/ λ**



ACTIVITY AND SPECIFIC ACTIVITY

ACTIVITY

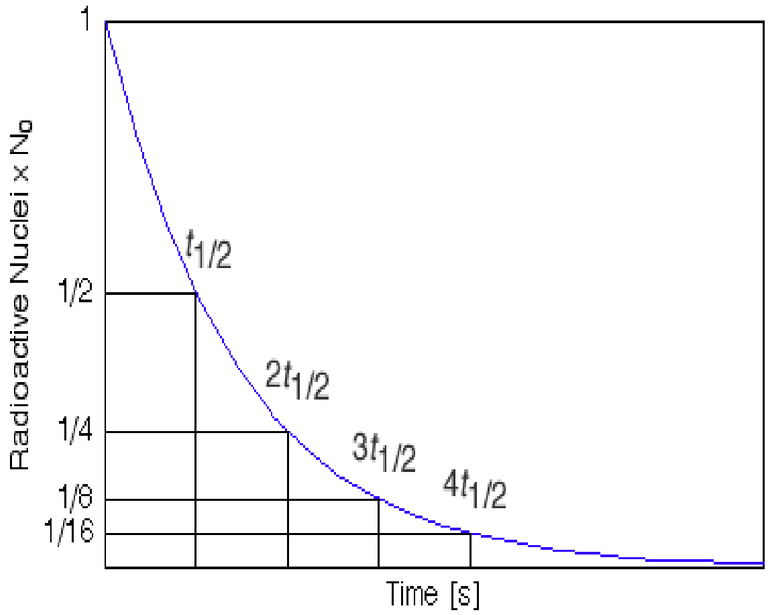
- The rate of disintegration (transformation) or decay of radioactive material.
- The units of activity are curie (Ci) and Becquerel (Bq)
- 1 Ci = $3.7 * 10^{10}$ disintegration per second which equals to $3.7 * 10^{10}$ Becquerel.

SPECIFIC ACTIVITY

- Specific activity is defined as the activity per unit mass of particular radionuclide. It is usually given in units of Bq/ kg, but another commonly used unit of activity is the curie (Ci)
- Allowing the specific activity to be given the unit Ci/ g.

EXPONENTIAL DECAY

- The exponential decay formula helps in finding the rapid decrease over a period of time, i.e the exponential decreases. The exponential decay formula is used to find the population decay, half-life, radioactive decay, etc.
- dN/dt = -λN the solution to this equation is,
- N (t) =$N_0 e^{-\lambda t}$.
- N (t) – quantity at time ; N_0 -initial quantity, that is, the quantity at time t=0



INTERROGATIONS

1. Define half life

2. What is activity ?

3. What is specific activity of an atom ?

REFERENCES

1. Radiologic science for technologist – 9th edition (2008) Stewart Carlyle Bushong, Mosby Elsevier, UK.
2. Text Book of Radiological Safety – K. Thaylan (2010) Jaypee Brothers and medical Publishers, New Delhi.
3. Quality Control in Diagnostic Imaging J.E.Gray

THANK YOU