Unit of Radioactivity

1. **Becquerel (Bq):**

    It is the S.I unit of radioactivity.
    - ✓ $1\,Bq = 1\,disintegration/second$

    [*It is defined as the one disintegration per second.*]

    The activity of a radioactive sample is said to be $1\,Bq$ if it undergoes $1\,disintegration$ in $1\,second$.

    1 Becquerel is defined as the amount of radioactive substance which undergoes $1\,disintegration$ in $1\,second$.

2. **Rutherford (Rd):**

    - ✓ $1\,Rd = 10^6\,disintegration/second$

    [*It is defined as the 10^6 disintegration per second.*]

    The activity of a radioactive sample is said to be $1\,Rd$ if it undergoes $10^6\,disintegration$ in $1\,second$.

    1 Rutherford is defined as the amount of radioactive substance which undergoes $10^6\,disintegration$ in $1\,second$.

3. **Curie (Ci):**

    - ✓ $1\,Ci = 3.7 \times 10^{10}\,disintegration/second$

    [*It is defined as the $3.7 \times 10^{10} disintegration$ per second.*]

    The activity of a radioactive sample is said to be $1\,Ci$ if it undergoes $3.7 \times 10^6\,disintegration$ in $1\,second$.

    1 Curie is defined as the amount of radioactive substance which undergoes $3.7 \times 10^{10}\,disintegration$ in $1\,second$.

$$1\,Ci = 3.7 \times 10^{10} Bq$$
$$1\,Ci = 3.7 \times 10^4 Rd$$

Radioactive dating:

The process of estimating the age of an ancient archeological and geological objects like the rocks, idols, meteorite, ancient fossil etc. through radioactive process is called radioactive dating.

Radio Carbon Dating:

The method of estimating the age of an ancient fossil by measuring the activity of radioactive carbon (C-14) isotope inside it is called carbon dating.

This method of dating can also be used to determine the age of wood, paper, clothes, and organic materials.

Carbon-14 is a radioactive isotope of carbon. The half-life of C-14 $is\,5730\,years$.

C-14 is continuously produced in the atmosphere when the neutron from the cosmic rays interacts with the atmospheric nitrogen as indicated by the nuclear reaction:

$$_0n^1 + {}_7N^{14} \rightarrow {}_6C^{14} + {}_1H^1$$

This radioactive carbon (C-14) thus produced is absorbed by living organisms (the plants and the animals which eat the plants)

As soon as the plants or animals die, no new carbon is taken in. Therefore, the proportion of C-14 is gradually reduced by radioactive beta decay as:

$$_6C^{14} \rightarrow {}_7N^{14} + {}_{-1}e^0 + \bar{\nu}$$

By measuring the activity of carbon-14 in remaining fossil part of organisms, the age of plants or animals can be estimated.

In this way, carbon dating can be used to estimate the age of archeological and geological Specimens with ages up to a few thousand years (approximately up to 50000 years).