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 **Topic – APPLICATIONS OF RADIOISOTOPES**

Radioactivity has proved its importance in chemistry, medical sciences ( medicine), biology,geology and archaeology. Some important techniques have been developed about the age of earth, age of objects , determination of the mechanisms of chemical reactions and physiological processes, diagnosis of diseases like cancer etc. Following are important examples illustrate the useful applications of radioisotopes-

1. AGRICULTURE. – radio -isotopes are used in agriculture to find out how a particular element ( viz- nitrogen , phosphorus ) is consumed by a particular variety of plants. The radioisotopes find use in agro-research to develop high yielding crops. Raditions from radioisotopes are also used to disinfect and preserve food grains.
2. MEDICINE. – In medical science radioisotopes used as tracer for diagnosis of certain diseases like carcinogen cells / tissues etc. For instance a minute amount of cobalt-60 by mixing with nonradioactive isotope to the patient orally or through injection to diagnose cancerous cell. The Na-24 isotope used during blood analysis to increase blood clotting time and etc.
3. INDUSTRY. –Radioisotopes are widely used in industry for many important purposes are as follows
4. They are used to detect cracks in metals and rubbers .
5. They are used to find out thickness of metals , rubbers and plastics.
6. They are used to find out the extent of wear and tear of engine parts, industrial machinery etc.
7. ARCHAEOLOGICAL DATING- It is an important technique to estimate the age of anything made from wood, bones, leather, resins, shells etc

Some important examples of Radioisotopes

1. Cobalt- 60 ( Co-60 ):- it is used as a radioactive tracer in mrdicine for diagnosis of cancer and also its treatment. The gama rays given out by Co-60 destroy cancerous cells. The treatment of disease by means of radioisotopes called as RADIOTHERAPY.
2. Phosphorus-32 ( P-32 ):- Radioactive phosphorus is used to find out the mechanism of absorption of phosphorus by plants.
3. Iodine-131 ( I- 131 ) “- The radioactice iodine in the form of sodium salt is used as radioactive tracer and when taken internally in very small amounts concentrate in the thyroid gland and is capable of destroying cancerous cells.
4. Plutonium- 239 ( PU – 239 ):- This isotope of plutonium produced from Uranium -238 in chain reaction and used as a fuel in some nuclear reactors.
5. Radio carbon dating ( C – 14 )- This third isotope of carbon produced by the bombardment of N-14 neutrons produced by cosmic rays from the sun, reacts with oxygen to form carbondioxide of C- 14 .

7 N 14 + 0 n 1 → 6 C 14 + 1H 1

6 C 14 + O2 → 6C14 O2

The radioactive carbondioxide formed in the atmosphere mixes with non radioactive CO2 and is assimilated by plants continuously. As long as plants, trees and animals are alive , C-14 equillibrium is maintained in them because of continuous absorption of carbon dioxide. Thie moment a plant dies ,carbon dioxide intake stops and the radioactive C-14 present in dead species undergoes radioactivedecay and amount decreases with time. The calculation made on the basis of half life as it is specific such as for C-14 the half life is 5730 years and in that period the left amount is half of initial.