

Answer on Question #48953 – Chemistry – Inorganic Chemistry

Question:

What are radioactive tracers ? Give any two examples.

Answer:

A radioactive tracer, or radioactive label, is a chemical compound in which one or more atoms have been replaced by a radioisotope to allow easier detection and measurement.

Radioisotopes of hydrogen, carbon, phosphorus, sulphur, and iodine have been used extensively to trace the path of biochemical reactions. Radioactive tracers have applications in medicine, industry, agriculture, research, and many other fields of science and technology.

Plants take up phosphorus-containing compounds from the soil through their roots. By adding a small amount of radioactive phosphorus-32 to fertiliser and then measuring the rate at which radioactivity appears in the leaves, it is possible to calculate the rate of uptake of phosphorus from the soil. The information gathered could help plant biologists to identify plant types that can absorb phosphorus quickly. These plants may give better yields resulting in more food or fibre at less expense.

Radioactive isotopes and radioactively labelled molecules are used as tracers to identify abnormal bodily processes. This is possible because some elements tend to concentrate (in compound form) in certain parts of the body – iodine in the thyroid, phosphorus in the bones and potassium in the muscles. When a patient is injected with a compound doped with a radioactive element, a special camera can take pictures of the internal workings of the organ. Analysis of these pictures by a specialist doctor allows a diagnosis to be made.

The thyroid gland, situated in the neck, produces a hormone called thyroxine, which regulates the rate of oxygen use by cells and the generation of body heat. Within each molecule of thyroxine, there are 4 iodine atoms. If a patient is made to drink a solution of sodium iodide that has been doped with radioactive iodine-131, most of it will end up in the thyroid gland. A special camera can capture the radiation emitted by the iodine-131, and an image of the gland can be constructed. An assessment can then be made about the shape, size and functioning of the gland.