

Radioisotopes

AIM

- to become familiar with some uses of radioactivity

NOTES

★ Uses of radioisotopes

- ☆ Based on chemical reactivity - radioisotopes can be used as tracers because radioactivity has no effect on chemical behavior

- ☆ P-31 in fertilizer is used to trace uptake of phosphorus by plants

- ☆ C-14 is used to map the path of carbon in metabolic processes

- ☆ Based on radioactivity

- ☆ diagnosis - radioisotopes with short half lives that concentrate in certain organs are administered as tracers

- ☆ Tc-99: location of tumors

- ☆ I-131: detection and treatment of thyroid disturbances

- ☆ cancer therapy - malignant cells are more sensitive to radioactivity than normal cells

- ☆ gamma radiation from cobalt 60 can be aimed at cancerous tumors

- ☆ food preservation - gamma radiation can destroy bacteria, yeasts, molds, and insect eggs

- ☆ measure thickness of industrial products - radiation intensity decreases as radiation passes through matter

- ☆ Based on half-life

- ☆ Radioactive dating

- ☆ Carbon dating

- ☆ Carbon-14 is radioactive and has a half life of 5,730 years

- ☆ Carbon dioxide in the air contains carbon-14

- ☆ Plants take in carbon dioxide and make carbohydrates as long as they are alive

- ☆ Animals eat plants as long as they are alive

- ☆ Each gram of carbon in a living organism emits about 15 disintegrations per minute (dpm)

- ☆ As soon as an organism dies, it stops taking in carbon, so its amount of C-14 begins to decrease as does the number of dpm

- ★ a reading of 7 dpm/g of carbon indicates an age of about 5700 y

- ☆ Uranium dating

- ☆ Uranium-238 is radioactive and has a half life of 10^9 years

- ☆ Uranium-238 is found in igneous rock

- ☆ Uranium-238 decays into lead-206

- ☆ After the rock cools, the amount of uranium-238 in the rock begins to decrease and the amount of lead begins to increase

- ★ the fraction of uranium left can be determined by comparing its mass to the mass of the lead

Answer the questions below by circling the number of the correct response

- Which radioactive isotope is used in geological dating? (1) U-238
(2) I-131 (3) Co-60 (4) Tc-99
- Brain tumors can be located by using an isotope of (1) C-14
(2) I-131 (3) Tc-99 (4) U-238
- Which radioactive isotope is used to study and treat the thyroid gland? (1) U-238 (2) I-131 (3) Co-60 (4) Tc-99