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
         ★ 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

1. Which radioactive isotope is used in geological dating?  (1) U-238
   (2) I-131  (3) Co-60  (4) Tc-99

2. Brain tumors can be located by using an isotope of  (1) C-14
   (2) I-131  (3) Tc-99  (4) U-238

3. Which radioactive isotope is used to study and treat the thyroid gland?  (1) U-238  (2) I-131  (3) Co-60  (4) Tc-99

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