Nuclear Decay

Balancing Nuclear Equations

Student Question:

Identify the nuclide produced by electron capture by beryllium-7 (A = 4)

A) ${}^{7}_{3}Li$ **B)** ${}^{7}_{5}B$

C) ${}^{3}_{2}He$ **D)** None of the Above

Identify the nuclide produced by positron emission by sodium-22 (A = 11)

A) ${}^{22}_{10}Ne$ **B)** ${}^{22}_{12}Mg$

C) ${}^{18}_{9}F$ **D)** None of the Above

Nuclear Decay

Predicting Type of Nuclear Decay

Student Question:

What following processes does not help ${}^{145}_{64}Gd$ (proton rich) become more stable?

A) Electron Capture **B)** β emission

C) β+ emission **D)** p emission

Nuclear Radiation

Biological Effects of Radiation

Student Question:

Someone is exposed to a source of α radiation that results in a dose rate of 2.0 mrad·d^{-1}. If nausea begins after a does equivalent of about 100 rem, after what period will nausea become apparent?

A) 50 days
B) 2500 days
C) 50000 days
D) None of the above

Nuclear Radiation

Rates of Nuclear Decay

Student Question:

The decay constant for fermium-254 is 210 s^{-1}. What mass of the isotope will be present if a sample of mass 1.00 μg is kept for 10 ms?

A) 9.58×10^{-913} μg **B)** 0.37 μg

C) 0.75 μg **D)** None of the Above

Nuclear Radiation

Carbon Dating

Student Question:

A sample of carbon (250 mg) from wood found in a tomb in Israel underwent 2480 carbon-14 disintegration in 20 h. Estimate the time since death. A modern 1.0 g sample undergoes 1.84×10^4 disintegrations in the same time period. The half life of carbon-14 is 5.73×10^3 years.

A) 357 years
B) 5,105 years
C) 16,563 years
D) None of the Above

Nuclear Energy

Energy Released During Fission

Student Question:

Urammium-235 can undergo fission in the following reaction.

$$^{235}_{92}U + ^{1}_{0}n \rightarrow ^{135}_{52}Te + ^{100}_{40}Zr + ^{1}_{0}n$$

Calculate the energy released when 1.0 g of uranium-235 undergoes fission in this way. The masses needed are

$$^{235}_{92}U = 235.04u \quad ^{1}_{0}n = 1.0087u$$
$$^{135}_{52}Te = 134.92u \quad ^{100}_{40}Zr = 99.92u$$

A) 1.27×10^{-13} J **B)** 2.99×10^{-11} J

C) 76.5 GJ **D)** None of the Above