Additional Practice

These are additional practice questions from sections that were not represented on quuizzes as well as they could have been.

Use energy methods to calculate the distance of closest approach for a head-on collision between an alpha particle having an initial energy of 0.5MeV and a gold nucleus ^{197}Au. Assume the gold nucleus remains at rest during the collision.

a) 50fm
b) 500fm
c) 5000fm
d) 50 picometer
e) 500 picometer

B

What's the binding energy per nucleon for ^{56}Fe. Use as inputs:
$m_{proton} = 1.6726 \times 10^{-27}kg$
$m_{neutron} = 1.6749 \times 10^{-27}kg$
$m_{Fe} = 55.9u$
$Z_{fe} = 26$
$1u = 1.6605 \times 10^{-27}kg$
$c = 2.9979 \times 10^{8}$ m/s

C

a) 1.11MeV
b) 7.07MeV
c) 8.79MeV
d) 7.57MeV

Find the energy released in the alpha decay of:

$^{238}_{92}U \rightarrow {}^{YY}_{xx}Th + {}^{4}_{2}He$

First calculate the A,Z numbers to determine which isotope of Thorium to use, then use as inputs accordingly:

$m_{uranium} = 238.050788u$

$m_{thorium} = 234.043601u$ or $232.038055u$ depending on isotope.

$m_{He} = 4.002u$

$1u = 1.6605 \times 10^{-27}kg$ or $1u = 931.494\ MeV/c^2$

$c = 2.9979 \times 10^{8}\ m/s$

B

a) 2MeV
b) 4MeV
c) 6MeV
d) 8MeV
e) 10MeV

Identify the unknown particles X, Y in the reaction:

$2\ {}^{1}_{1}H \rightarrow {}^{2}_{1}H + X + Y$

A

a) e+ and neutrino
b) e- and anti-neutrino
c) Alpha particle and photon
d) e+ and photon
e) e- and photon

What time interval elapses while 90% of the sample decays?
Assume a half life of 26 hours.

D

a) 30 hours
b) 50 hours
c) 70 hours
d) 90 hours
e) 110 hours

X-rays of wavelength 0.0850 nm are scattered from the atoms of a crystal.
The second order maximum in the Bragg reflection occurs for an angle theta
of 21.5 degrees. What is the spacing between adjacent atomic planes in the crystal?

E

a) 2nm
b) 1.5nm
c) 1nm
d) 0.5nm
e) 0.2nm