Energy in Nuclear Processes:

Given: E=Δmc2  1Mev=1.6x10-13J

1u=1.66x10-27kg 1u=930MeV/c2

1. Unit Conversions. Show all conversion factors.

A. 240mg to g B. 3.9x10-6kg to u C. 0.0067u to kg

D. 8.8u to MeV/c2 E. 0.0045mg to u F. 2.2x10-14kg to MeV/c2

G. 17MeV to J H. 9.0x107eV to MeV I. 7.11x10-11J to MeV

2. Use E=Δmc2 to find the energy equivalent to each of the following masses. Show all work. Give all answers in Joules.

A. 1.0kg B. 4.0x10-6kg C. 1.3x10-15kg D. 258kg

E. 0.00000072kg F. 3.44x10-17kg G. 9.0g H. 14mg

I. 14u J. 0.0037u K. 2.31x10-2u L. 6.2x105u

M. 35MeV/c2 N. 99MeV/c2 O. 0.04MeV/c2 P. 930MeV/c2

3. Use E=Δmc2 to find the energy equivalent to each of the following masses. Show all work. Give all answers in MeV.

A. 1.0kg B. 3.2x10-26kg C. 0.00077kg D. 2.004g

E. 0.0064u F. 4.733u G. 1.0u H. 122u

I. 17MeV/c2 J. 1.0MeV/c2 K. 228MeV/c2 L. 99MeV/c2

4. Find the energy involved in each of the following. Show all work. Give answers in the most appropriate units. Clearly state whether energy is absorbed or released.

A. A nuclear decay in which the mass of the reactants is 2.0kg and the mass of the products is 2.001kg

B. A nuclear fission reaction in which 24kg of reactant produces 23.4kg of product.

C. The fusion of two nuclei with a combined mass of 23.0034u into a single nucleus with a mass of 23.0032u.

D. An alpha decay of a 167.078 452u parent nucleus into an alpha particle, mα=4.001 567u and a daughter nucleus with md= 167.076 337u.

5. An endothermic nuclear fusion absorbs 26MeV of energy. The combined mass of the reactants is 77.890226u. Find the mass of the product. What element is most likely produced in this reaction?