

Uždavinių sprendimas. Radioaktyvumas.

1. Raskite ${}^7_3\text{Li}$ branduolio ryšio energiją, tenkančią vienam nukleonui.

$$m_p = 1,6726 \cdot 10^{-27} \text{ kg}$$

$$\Delta E = \Delta m \cdot c^2$$

$$m_n = 1,6749 \cdot 10^{-27} \text{ kg}$$

$$\Delta \square = (\square \cdot m_p + \square \cdot m_n - m_b) \cdot c^2$$

$$c = 3 \cdot 10^8 \text{ m/s}$$

$$\Delta \square = (\square \cdot 1,6726 \cdot 10^{-27} \text{ kg} + \square \cdot 1,6749 \cdot 10^{-27} \text{ kg} -$$

$$m_b({}^7_3\text{Li}) = 11,6466 \cdot 10^{-27} \text{ kg}$$

$$- 11,6466 \cdot 10^{-27} \text{ kg}) = \square \cdot 10^{-27} \text{ kg}$$

$$N = \square$$

$$Z = \square$$

$$\Delta E = \square \cdot 10^{-27} \text{ kg} \cdot \square \cdot 10^{16} = \square \cdot 10^{\square} \text{ J}$$

$$E_1 = \Delta E / \square; \quad E_1 = \square \cdot 10^{\square} \text{ J} / \square = \square \cdot 10^{\square} \text{ J}$$

2. Kokia mažiausia energija gali azoto ${}^{14}_7\text{N}$ branduolį suskaldyti į protonus ir neutronus?

$$m_p = 1,6726 \cdot 10^{-27} \text{ kg}$$

$$\Delta E = \Delta m \cdot c^2$$

$$m_n = 1,6749 \cdot 10^{-27} \text{ kg}$$

$$\Delta \square = (\square \cdot m_p + \square \cdot m_n - m_b) \cdot c^2$$

$$c = 3 \cdot 10^8 \text{ m/s}$$

$$\Delta \square = (\square \cdot 1,6726 \cdot 10^{-27} \text{ kg} + \square \cdot 1,6749 \cdot 10^{-27} \text{ kg} -$$

$$m_b({}^{14}_7\text{N}) = 23,2451 \cdot 10^{-27} \text{ kg}$$

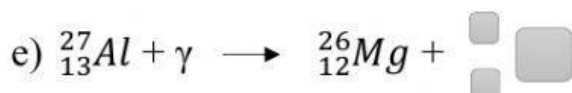
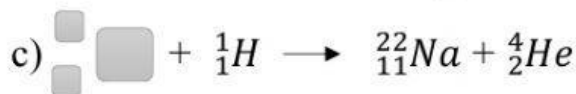
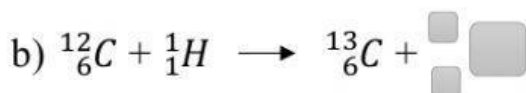
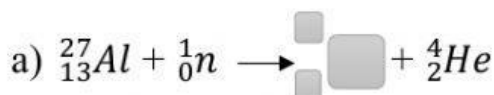
$$- 23,2451 \cdot 10^{-27} \text{ kg}) = \square \cdot 10^{-27} \text{ kg}$$

$$N = \square$$

$$Z = \square$$

$$\Delta E = \square \cdot 10^{-27} \text{ kg} \cdot \square \cdot 10^{16} = \square \cdot 10^{\square} \text{ J}$$

3. Parašykite šių branduolinių reakcijų lygčių trūkstamus žymenis:

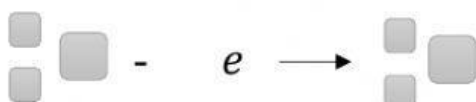


4. Kokio elemento branduolyje yra :

a) 3 protonai ir 4 neutronai;

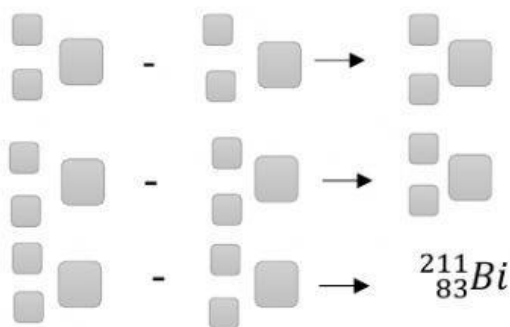
b) 5 protonai ir 6 neutronai.

5. Kuo virs ${}^{238}_{92}\text{U}$ po vieno α skilimo ir dviejų β skilimų? Parašykite reakcijų lygtis.



6. Izotopo ${}^{211}_{83}\text{Bi}$ branduolys atsirado iš kito branduolio po vieno α skilimo ir vieno β skilimo. Koks buvo pirminis branduolys? Parašykite reakcijų lygtis.

1 H Hydrogen  Sun and Stars																	2 He Helium  Balloons	
3 Li Lithium  Batteries	4 Be Beryllium  Emeralds																	
11 Na Sodium  Salt	12 Mg Magnesium  Chlorophyll																	
19 K Potassium  Fruits and Vegetables	20 Ca Calcium  Shells and Bones	21 Sc Scandium  Bicycles	22 Ti Titanium  Aerospace	23 V Vanadium  Springs	24 Cr Chromium  Stainless Steel	25 Mn Manganese  Earthmovers	26 Fe Iron  Steel Structures	27 Ni Nickel  Magnets	28 Cu Copper  Coins	29 Zn Zinc  Electric Wires	30 Ga Gallium  Brass Instruments	31 Ge Germanium  Light-Emitting Diodes (LEDs)	32 As Arsenic  Semiconductor Electronics	33 Se Selenium  Poison	34 Br Bromine  Copiers	35 Kr Krypton  Photography Film	36 Xe Xenon  Flashlights	
37 Rb Rubidium  Global Navigation	38 Sr Strontium  Fireworks	39 Y Yttrium  Lasers	40 Zr Zirconium  Chemical Pipelines	41 Nb Niobium  Mag Lev Trains	42 Mo Molybdenum  Cutting Tools	43 Tc Technetium  Radioactive Diagnosis	44 Ru Ruthenium  Electric Switches	45 Rh Rhodium  Searchlight Reflectors	46 Pd Palladium  Pollution Control	47 Ag Silver  Jewelry	48 Cd Cadmium  Paint	49 In Indium  Liquid Crystal Displays (LCDs)	50 Sn Tin  Plated Food Cans	51 Sb Antimony  Car Batteries	52 Te Tellurium  Thermoelectric Coolers	53 I Iodine  Disinfectant	54 Xe Xenon  High-Intensity Lamps	
55 Cs Cesium  Atomic Clocks	56 Ba Barium  X-Ray Diagnosis	57 - 71		72 Hf Hafnium  Nuclear Submarines	73 Ta Tantalum  Mobile Phones	74 W Tungsten  Lamp Filaments	75 Re Rhenium  Rocket Engines	76 Os Osmium  Pen Points	77 Ir Iridium  Spark Plugs	78 Pt Platinum  Labware	79 Au Gold  Jewelry	80 Hg Mercury  Thermometers	81 Tl Thallium  Low-Temperature Thermometers	82 Pb Lead  Weights	83 Bi Bismuth  Fire Sprinklers	84 Po Polonium  Anti-Static Brushes	85 At Astatine  Radioactive Medicine	86 Rn Radon  Surgical Implants
87 Fr Francium  Laser Atom Traps	88 Ra Radium  Luminous Watches	89 - 103		104 Rf Rutherfordium	105 Db Dubnium	106 Sg Seaborgium	107 Bh Bohrium	108 Hs Hassium	109 Mt Meitnerium	110 Ds Darmstadtium	111 Rg Roentgenium	112 Cn Copernicium	113 Nh Nihonium	114 Fl Flerovium	115 Mc Moscovium	116 Lv Livermorium	117 Ts Tennessine	118 Og Oganesson
57 La Lanthanum  Telescope Lenses	58 Ce Cerium  Lighter Flint	59 Pr Praseodymium  Torchworkers' Eyeglasses	60 Nd Neodymium  Electric Motor Magnets	61 Pm Promethium  Luminous Dials	62 Sm Samarium  Electric Motor Magnets	63 Eu Europium  Color Televisions	64 Gd Gadolinium  MRI Diagnosis	65 Tb Terbium  Fluorescent Lamps	66 Dy Dysprosium  Smart Material Actuators	67 Ho Holmium  Laser Surgery	68 Er Erbium  Optical Fiber Communications	69 Tm Thulium  Laser Surgery	70 Yb Ytterbium  Scientific Fiber Lasers	71 Lu Lutetium  Photodynamic Medicine				
89 Ac Actinium  Radioactive Waste	90 Th Thorium  Gas Lamp Mantles	91 Pa Protactinium  Radioactive Waste	92 U Uranium  Nuclear Power	93 Np Neptunium  Radioactive Waste	94 Pu Plutonium  Nuclear Weapons	95 Am Americium  Smoke Detectors	96 Cm Curium  Mineral Analyzers	97 Bk Berkelium  Radioactive Waste	98 Cf Californium  Mineral Analyzers	99 Es Einsteinium	100 Fm Fermium	101 Md Mendelevium	102 No Nobelium	103 Lr Lawrencium				



7. Radioaktyviojo elemento aktyvumas per 8 paras sumažėjo 4 kartus.
Apskaičiuokite to elemento skilimo pusamžį.

8. **Išskiriama** ar **sugeriamo** energija, vykstant šiai branduolinei reakcijai?



$$E = m \cdot c^2$$

$$m_n = 1,6749 \cdot 10^{-27} \text{ kg}$$

$$E({}^2_1H) = \boxed{} \cdot 10^{-27} \text{ kg} \cdot \boxed{} \cdot 10^{\boxed{}} (\text{m/s})^2 =$$

$$c = 3 \cdot 10^8 \text{ m/s}$$

$$= \boxed{} \cdot 10^{\boxed{}} \text{ J}$$

$$m_b({}^2_1H) = 3,3432 \cdot 10^{-27} \text{ kg}$$

$$m_b({}^3_1H) = 5,0067 \cdot 10^{-27} \text{ kg}$$

$$E({}^1_0n) = \boxed{} \cdot 10^{-27} \text{ kg} \cdot \boxed{} \cdot 10^{\boxed{}} (\text{m/s})^2 =$$

$$= \boxed{} \cdot 10^{\boxed{}} \text{ J}$$

$$E({}^3_1H) = \boxed{} \cdot 10^{-27} \text{ kg} \cdot \boxed{} \cdot 10^{\boxed{}} (\text{m/s})^2 = \boxed{} \cdot 10^{\boxed{}} \text{ J}$$

Sudedame kairiosios pusės energijas

$$E(\text{kairioji}) = \boxed{} \cdot 10^{\boxed{}} \text{ J}$$

Palyginam abiejų pusių energijas

$$E(\text{kairioji}) \boxed{} E(\text{dešinioji})$$

Šios reakcijos metu energija yra