

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?

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

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

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

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

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

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

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

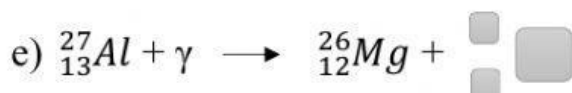
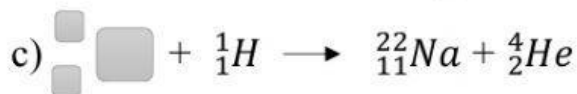
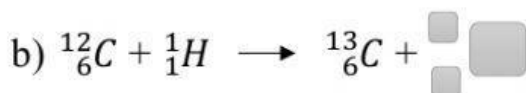
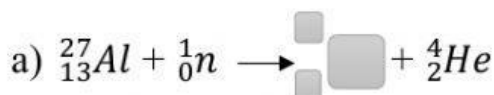
$$- 23,2451 \cdot 10^{-27} \text{ kg}) = \square \cdot 10^{-27} \text{ kg}$$

$$N = \square$$

$$Z = \square$$

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

3. Parašykite šių branduolinių reakcijų lygčių trūkštamus žymenis:

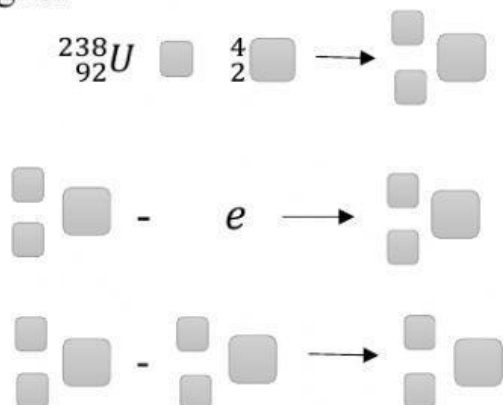


4. Kokio elemento branduolyje yra :

a) 3 protonai ir 4 neutronai;

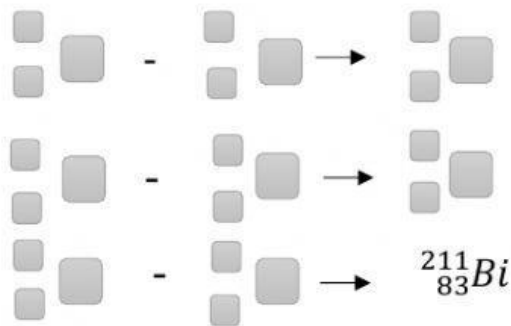
b) 5 protonai ir 6 neutronai.

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	5 B Boron Sports Equipment	6 C Carbon Basis of Life's Molecules	7 N Nitrogen Protein	8 O Oxygen Air	9 F Fluorine Toothpaste	10 Ne Neon Advertising Signs	11 Na Sodium Salt	12 Mg Magnesium Chlorophyll	13 Al Aluminum Airplanes	14 Si Silicon Stone, Sand, and Soil	15 P Phosphorus Bones	16 S Sulfur Eggs	17 Cl Chlorine Swimming Pools	18 Ar Argon Light Bulbs	19 K Potassium Fruits and Vegetables	20 Ca Calcium Shells and Bones	21 Sc Scandium Bicycles	22 Ti Titanium Aerospace	23 Cr Chromium Spirings	24 Mn Manganese Stainless Steel	25 Fe Iron Earthmovers	26 Co Cobalt 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 Rb Rubidium Flashlights	37 Sr Strontium Global Navigation	38 Y Yttrium Fireworks	39 Zr Zirconium Lasers	40 Nb Niobium Chemical Pipelines	41 Mo Molybdenum Mag Lev Trains	42 Tc Technetium Cutting Tools	43 Ru Ruthenium Radioactive Diagnosis	44 Rh Rhodium Electric Switches	45 Pd Palladium Searchlight Reflectors	46 Ag Silver Pollution Control	47 Cd Cadmium Jewelry	48 In Indium Paint	49 Sn Tin Liquid Crystal Displays (LCDs)	50 Sb Antimony Plated Food Cans	51 Te Tellurium Car Batteries	52 I Iodine Thermoelectric Coolers	53 Xe Xenon Disinfectant	54 Kr Krypton High-Intensity Lamps	55 Cs Cesium Atomic Clocks	56 Ba Barium X-Ray Diagnosis	57-71 Lanthanides	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 Actinides	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 Medicine	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?



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

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

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

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

$$= \text{[]} \cdot 10^{\text{[]}} \text{ J}$$

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

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

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

$$= \text{[]} \cdot 10^{\text{[]}} \text{ J}$$

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

Sudedame kairiosios pusės energijas

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

Palyginam abiejų pusių energijas

$$E (\text{kairioji}) \text{ [] } E (\text{dešinioji})$$

Šios reakcijos metu energija yra