Nuclear chemistry practice test with answers pdf

PROBLEM \(\PageIndex{1}\) Type the following isotopes in the Recurring representation (e.g., \(\ce{^{14}_6C}) oxygen-14 copper-70 tantalum-175 franc-217 Reply la \(\ce{^^{14}_8O }\) Answer b \(\ce{^{70}_29Cu}\\ Answer c \(\ce{^{175}_73Ta}\) Answer l\(\ce{{217}_87Fr}\) Solution PROBLEM \(\PageIndex{2}\) Click for solution video for isotopes, fill in the missing information to complete the notation \((\ce{^{34}_{14}X}\ \(\ce{^{36}_P}\) \(\ce{^{57}_{X}Mn}\) \(\ce{{121}_{56}X}\) Reply a \(\ce{^{34}_{14}Si}\) Reply b \(\ce{^{36}_{15} P}\) Reply c \(\ce{^{57}_{25}Mn}\) Reply to la d \(\ce{^{121}_{56}Ba}\) PROBLEM \(\PageIndex{3}\) if available, including load for atoms with the following properties: 25 protons, 20 neutrons, 24 electrons 45 protons, 24 neutrons, 43 electrons 53 protons, 89 neutrons, 54 electrons 97 protons , 146 neutrons, 97 electrons Answer a \(\ce{^{45}_{25}M <^{+1}}}\) Answer b \(\ce{{^{69}_{45}Rh^{2}}\) reply c \(\ce{ce{ce ^{142}_{53}I^{−1}}\) Answer d \(\ce{^{243}_{97} See Solution PROBLEM \(\PageIndex{4}\) Which of the following kernels is included in the stability band? chlorine-37 calcium-40 204Bi 56Fe 206Pb 211Pb 222Rn carbon-14 Response (a), (b), (c), (d) and (e) PROBLEM \(\PageIndex{5}\) Which of the following kernels is included in the stability tape? argon-40 oxygen-16 122Ba 58Ni 205Tl 210Tl 226Ra magnesium-24 Answer (b), (e - very close) and (h) Solution PROBLEM \(\PageIndex{6}\) Type a brief description or description of each of the following: α <6> particle β particle positron γ beam nuclide mass number atomic number A collective term response b (α or \(\ce{4_2He}) or \(\ce{^4_2α}\)) high-energy helium nucleus; a helium atom that has lost two electrons and contains two protons and two neutrons Answer c (\(β\) or \(\ce{^0_{-1}e}\) or \(\ce{{-1}β})) is a high-energy electron electron response d antiparticle; has properties identical to an electron, except to have a short wavelength of reverse (positive) load Response e (γ or \(\ce{^0_0φ}\)), High-energy electromagnetic radiation exhibiting wave-particle consolation Respond to the f-core of a particular isotope The g sum of the number of neutrons and protons in the nucleus of an atom An atomic PROBLEM \(\PageIndex{7}\) Complete each of the following equations by adding missing types : \(\ce{{27}_{13}Al + ^4_2He⟶\ :? + ^1_0n}\) \(\ce{^{239}_{94}Pu +\, ? ⟶ ^{242}_{96}Cm + ^1_0n}\) \(\ce{^{14}_7N + ^4_2He⟶\:? + ^1_1H}\) \(\ce{^{235}_{92}U⟶\:? + ^{135}_{55}Cs + 4^1_0n}\) Reply \(\ce{^{27}_{13}Al + ^4_2He⟶ ^{30}_{15}P + ^1_0n}) Reply b \(ce{^{239}_{94}Pu + ^4_2He ⟶ ^{242}_{96}Cm + ^1_0n}\) Answer c \(\ce{{14}_7N + 4_2He⟶ {17}_8O ^1_1H^1_1H\) Reply \(\ce^{235} {92}_{96}⟶ u_{37} Rb + ^{135}_{55}Cs + 4^1_0n}\) PROBLEM \(\PageIndex{8}\) Complete each of the following equations: \(\ce{^7_3Li +\, ?⟶2^4_2He}\) \(\ce{^{14}_6C⟶ ^{14}_7N +\, ?} \(\ce{^{27}_{13}Al + ^4_2He⟶\,?? + ^1_0n}\) \(\ce{^{250}_{96}Cm ⟶\, ? + ^{98}_{38}Sr + 4^1_0n}\) Reply to a \a (\2 {{^7_3Li +^1_1H ⟶2^4_2He}\) Reply to la b \(\ce{^{14}_6C⟶ ^{14}_7N +^0_{-1}e}\) Reply to \(\ce{{27} {14}_6C⟶ <2> <4>_{13}Al + ^4_2He⟶^30_15P + ^1_0n Reply d \(\ce{{250}_{96}Cm ⟶^148_{ 58}Ce + ^{98}_{38}Sr + 4^1_0n}\) PROBLEM \(\PageIndex{9}\) Write a balanced equation for each of the following nuclear reactions: 1 with α particle bombardment 17O production from 14N from 4N neutron bombardment from 233 to 233 from 238U from 238U \(\ce{^2_1H}\) bombardment response a \(\ce{^{14}_7N + He^2 ⟶ ^{17}_8O + ^1_1H}\) Answer b \(\ce{^{14}_7N + ^1_0n⟶ ^{14}_6N + ^1_1H {98} <2>}\) Reply \(\ce{^{232}_{90}Th + ^1_0n⟶ ^{233}_{90}Th}\ Reply la d \(\ce{^{238}_{92}U + 2^_ 1H⟶ ^{239}_{92}U + ^1_1H}\) Problem \(\PageIndex{10}\) Click here for a video of the problem prepared from Technetium-99 98Mo. Mobdenum-98 is a neutron to give mobibdenum-99, technetium-99 represented as an unstable isotope, 99Tc*, which burnes a particle β to give an exciting form. This excited core eales γ beam, relieving it to the ground state represented as 99Tc. The ground condition of 99Tc then ea β a particle. Write down the equations for each of these nuclear reactions. Answer \(\ce{^{98}_{42}Mo + ^1_0n \rightarrow ^{99}_{42}Mo}\) \(\ce{^{99}_{42}Mo} \rightarrow ^0_{0}-1}e + ^{99}_{43}Tc^*\) \(\ce{^{99}_{43}Tc}^* \rightarrow ^0 _{0}\gamma + ^{99}_{43}Tc\) \ (\ce{^{99}_{43}Tc \rightarrow ^0_{-1}e + ^{99}_{44}Ru}\ PROBLEM \(\PageIndex{11}\) What changes occur in the atomic number and mass of a nucleus in each of the following destabilation scenarios? an α particle is emitted, β particle is emitted, γ an electron is captured that emits a positron that emits radiation. Because α is the same as a \((ce{^4_2He}\) nucleus, the number of masses decreases by 4 and the number of atoms decreases by 2. Answer b β \(\ce{^0_{-1}e}\, the mass number does not change, but the number of atoms increases by 1. Answer c does not γ number and atomic number because there is no mass (energy) of the earth's ray. Answer d Positron β is the opposite of a particle, \(\ce{^0_{1}e}\), the mass number does not change, but the atomic number 1 Response e Has the same effect on the nucleus as the positron osmation: The atomic number decreases and the mass number does not change. PROBLEM \ (\PageIndex{12}\) What is a kernel change resulting from the following de de-deseed scenarios? conversion of β+ particle capture of an electron β particle osmonic to emission Conversion of a neutron into proton: \(\ce{^1_0n ⟶ ^1_1p + ^0_{1}e}\) Respond to a b transformation of a proton into a neutron; positron has the same mass and when the n:p ratio of a nucleus is too low, a positive charge the same size as the negative charge of the electron is converted to a neutron by releasing a proton positron: \(\ce{^^1_1p ⟶ ^1_0n + ^0_{1}e}\) Answer c In a proton-rich nucleus, an inner atomic electron can be absorbed. In its simplest form, this converts a proton to a neutron: \(\ce{^1_1p + ^0_{-1}e ⟶ ^1_0p}\) PROBLEM \(\PageIndex{13}\) Of unstable heavy recurrents (atomic number > 83) if you explain how it can deseed and create more stability by deseeding ,a) they are below the stability band and (b) they are below the stability band and (b) they are below the stability band. , those above the stability band will pass beta de de-de desti. Problem of alpha decay of heavy nuclei passing the stability group \(\PageIndex{14}\) Which of the following nuclei is most likely to decay with positron osmation? Explain your choice. Chromium-53 manganese-51 iron-59 Answer Manganese-51 is most likely to rot with positron emissions. n:p ratio for Cr-53 \(\dfrac{29}{24}\) = 1.21; For Mn-51\(\dfrac{26}{25}\) = 1.04; For Fe-59, \(\dfrac{33}{26}\) = 1.27. Positron decay occurs when the ratio of n:p is low. Mn-51 has the lowest n:p ratio and is therefore most likely to rot with positron osm effect. Additionally,\ce{^{53}_{24}Cr}\) is corrupted by a stable isotopve \(\ce{^{59}_{26}Fe}\) beta emission. PROBLEM \(\PageIndex{15}\) The following kernels are not included in the stability band. How are they expected to rot? Explain your answer. \(\ce{^{34}_{15}P}\) \(\ce{^{239}_{92}U}\) \(\ce{^{38}_{20}Ca}\) \(\ce{{3_1H}\) \ (\ce{^{245}_{94}Pu}\) A response over the stability band beta destabilisation expected Answer b Beyond the stability band, heavy kernels pass alpha de decon decon decon decon deconte under permission, positron debunking expected above stability band, beta destabilisation expected Response e Beyond stability band , write a nuclear reaction for{16} each step in the form of heavy kernels alpha de de de de de de de debunking problem \((\ce{^{218}_{84}Po}) \(\ce{{238}_{92}U}\) continues with a series of decay reactions that include the step-shaped ossion of α, β, β, α, α, α, α particles. Yanıt \(\ce{^{238}_{92}U⟶ ^{234}_{90}Th + ^4_2He}) \(\ce{^{234}_{90}Th⟶ ^{234}_{91}Pa + ^0_{-1}e}\) \(ce{^{234}_{91}Pa⟶^{234}_{92}U + ^0_{-1}e}\) \(\ce{{234}_{92}U⟶ {230}__{90}{90} 4_2He{90} \(\ce{^{230}_{90}Th⟶ ^{226}_{88}Ra + ^4_2He} \) \(\ce {^{226}_{88}Ra⟶^{222}_{86}Rn + ^4_2He}\) \(\ce{^{222}_{86}Rn⟶^{218}_{84}Po + ^4_2He}\ PROBLEM \(\PageIndex{17}\\ \\ ce{^{208}_{82}Pb}\) from \(\ce{{228}_{90}Th}\) , α, α, α, α, β, β, α continues with a series of decay reactions that involve the release of particles as steps. Answer \(\ce{^{228}_{90}Th \rightarrow ^4_2He + ^{224}_{88}Ra}\) \(\ce{^{224}_{88}Ra \rightarrow ^4_2He + \rightarrow ^4_2He + ^{216}_{84}Po}\) \(\ce{^{216}_{84}Po \rightarrow ^4_2He + ^{212}_{82}Pb}\) \(\ce{^{212}_{82}Pb \rightarrow ^0_{-1}e + ^{212} _{83}Bi}\) \(\ce{^{212}_{83}Bi \rightarrow ^0_{-1}e + ^{212}_{84}Po}\) \(\ce{^{212}_{84}Po \rightarrow ^4_2He + ^{208}_{82}Pb}\) Click here to see the video of solution contributers