CHEMISTRY

BOOKS - MODERN PUBLICATION CHEMISTRY (KANNADA ENGLISH)

NUCLEAR CHEMISTRY

Multiple Choice Questions

1. Emission of a $\beta -$ particle by an atom of the element results in the formation of:

A. isotope

B. isobar

C. isomer

D. isomorph.

Answer: B

2. The radioactive decay follows :

A. zero oder

B. first order

C. second order

D. order more than three.

Answer: B

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3. The group displacement law was proposed by :

A. Soddy and Thomson

B. Soddy and Rutherford

C. Soddy and Fajan

D. Rutherford.

Answer: C

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4. The nuclei which are not identical but have same number of nucleons represent :

A. isobars

B. isotopes

C. isomers

D. isotones.

Answer: A

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5. The positron is nearly as heavy as :

A. proton

B. neutron

C. electron

D. O-particle.

Answer: C

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6. An Isotone of $^{76}_{32}Ge$ is :

A. $^{77}_{32}Ge$

B. ${}_{33}^{77}As$

C. ${}_{34}^{77}Se$

D. ${}_{36}^{77}Se$

Answer: B

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7. The triad of nuclei that is isotonic is

A. ${}_{6}^{14}C, {}_{7}^{15}C, {}_{9}^{17}F$

B. ${}_{6}^{12}N, {}_{7}^{14}C, {}_{9}^{19}F$

C. ${}_{6}^{14}C, {}_{7}^{14}N, {}_{9}^{17}F$

D. ${}_{6}^{14}C, {}_{7}^{14}C, {}_{9}^{17}F$

Answer: A

8. Which of the following is an artificial man-made series?

A. Thorlum series

B. Neptunium series

C. Uranium series

D. Actinium series.

Answer: B

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9. In the reaction, $Po \xrightarrow{\alpha} Pb \xrightarrow{\beta} Bi$

If Bi belongs to group 15, to which group Po belongs ?

A. 14

B. 15

C. 13

D. 16

Answer: D

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10. Protactinium-234 $\left({}_{91}^{234}Pa\right)$ decays to ${}_{92}^{234}U$ with the emission of :

A. α-particle

B. β- particle

C. λ-ray

D. positron.

Answer: B

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11. Which of the following nuclear transformations is p, n type?

A. ${}_{7}^{14}N + {}_{0}^{1}n \rightarrow {}_{6}^{14}C + {}_{1}^{1}H$

B. ${}_{11}^{23}Na + {}_{1}^{1}H \rightarrow {}_{12}^{23}Mg + {}_{0}^{1}n$

C. ${}_{3}^{7}Li + {}_{1}^{2}H \rightarrow {}_{3}^{8}Li + {}_{1}^{1}H$

D. ${}_{4}^{9}Be + {}_{2}^{4}He \rightarrow {}_{6}^{12}Li + {}_{0}^{1}n$

Answer: B

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12. Consider the reaction:

$^{238}_{92}U + ^{1}_{0}n \rightarrow ^{239}_{92}M \rightarrow ^{239}_{93}Np + ^{0}_{-1}e$ M is :

A. U

B. Cf

C. Cm

D. Tc

Answer: A

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13. The age of minerals and rocks is estimated by:

A. Uranium-lead method

B. Tracer techniques

C. Carbon-14 dating method

D. Potassium-argon method.

Answer: A

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14. Which sub-atomic particle is more effective in bringing about artificial transmutation of elements ?

A. neutron

B. α-particle

C. deutron

D. electron.

Answer: A

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15. On passing through a magnetic field, the greatest deflection is experienced by :

A. α-particle

B. β- particle

C. γ-rays

D. All equal.

Answer: B

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16. Which particle is used to bombard ${}_{13}^{28}Al$ to give ${}_{15}^{31}P$ and neutron ?

A. proton

B. α-particle

C. Neutron

D. Deutron.

Answer: B

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17. In nuclear reactors, the moderator is :

A. Cadmium

B. Uranium-235

C. Uranium-238

D. Heavy water.

Answer: D

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18. The missing nucleide in the nuclear reaction :

$^{239}_{93}Np \rightarrow \ldots\ldots\ +^{0}_{-1}e$ is

A. $^{239}_{92}U$

B. $^{239}_{94}Pu$

C. $^{238}_{92}U$

D. $^{238}_{94}Pu$

Answer: B

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19. A sample of rock from moon contains equal number of atoms of uranium and lead ($t_{1/2}$ for $U = 4.5 \times 10^9$ years). The age of the rock would be :

A. 4.5×10^9 years

B. 9.0×10^9 years

C. 13.5×10^9 years

D. 2.25×10^9 years

Answer: A

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20. What will be the new neutron and proton ratio after a nucleoide $^{238}_{92}U$ loses an $\alpha -$ particle ?

A. $\frac{146}{92}$

B. $\frac{148}{90}$

C. $\frac{144}{90}$

D. $\frac{150}{90}$

Answer: C

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21. Bismuth is the end product of the radioactive disintegration series known as:

A. 4n

B. 4n+1

C. 4n+2

D. 4n+3

Answer: B

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22. $^{226}_{88}Ra$ emits an o-particle and the daughter element is:

A. $^{230}_{90}Th$

B. $^{226}_{89}Ra$

C. $^{222}_{86}Rn$

D. $^{226}_{86}Rn$

Answer: C

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23. Which of the following is an example of induced radioactivity ?

A. $^{9}_{4}Be + ^{4}_{2}He \rightarrow ^{12}_{6}C + ^{1}_{0}n$

B. $^{24}_{12}Mg + ^{4}_{2}He \rightarrow ^{27}_{14}Si + ^{1}_{0}n$

C. $^{9}_{4}Be + ^{1}_{1}He \rightarrow ^{10}_{5}B + \gamma$

D. $^{2}_{1}H + \gamma \rightarrow ^{1}_{1}H + ^{1}_{0}n$

Answer: B

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24. If a radioactive nucleide of group 15 element undergoes $B\eta$-particle emission, the daughter element will be found in :

A. 16 group

B. 14 group

C. 13 group

D. same group

Answer: A

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25. Which of the following is considered as a synthetic element ?

A. Thorium

B. Lead

C. Plutonium

D. Uranium.

Answer: C

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26. In the series :

$$^{226}_{88}Ra \xrightarrow{-\alpha} {}^{222}_{86}Rn \xrightarrow{-\alpha} {}^{218}_{84}RaA \xrightarrow{-\alpha} {}^{214}_{82}RaB \xrightarrow{-B\eta} {}^{214}_{83}RaC$$

Ra belongs to which period?

A. V

B. VI

C. IV

D. II

Answer: A

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27. The energy released in nuclear reactions corresponding to 1 a.m.u. is about :

A. 280 MeV

B. 931.48 MeV

C. 8.314 kJ

D. 4.183 MeV.

Answer: B

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28. Uranium series is also known as:

A. 4n series

B. 4n+ 1 series

C. 4n+ 2 series

D. 4n+ 3 series.

Answer: C

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29. The number of a-particles emitted by ^{218}Ra in changing to stable isotope ^{206}Pb is :

A. 3

B. 4

C. 6

D. 2

Answer: A

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30. Radioisotopes have been used in treatment of certain diseases. For treatment of cancerous tumours, the radioisotope used was:

A. Co-60

B. U-235

C. Pu-239

D. Th-231

Answer: A

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31. The radiant energy of the sun is due to:

A. Disintegration

B. Nuclear fission

C. Nuclear fusion

D. Combustion.

Answer: C

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32. The phenomenon of nuclear fission was experimentally observed by :

A. Fermi

B. Becquerel

C. Strassman and Hahn

D. Planck.

Answer: C

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33. Which is used as a neutron absorber in nuclear reactors to control the chain reaction ?

A. Cadmium rods

B. Uranium carbide

C. Deutron

D. Heavy water

Answer: A

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34. Average life period is equal to :

A. 1/half life period

B. 1/decay constant

C. $(\text{half life period})^2$

D. Three-fourth life period.

Answer: B

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35. In the nuclear reaction :

$_{13}^{27}Al + _{2}^{4}He \rightarrow _{15}^{30}X + _{0}^{1}n$ the element X is :

A. S

B. C

C. P

D. Si

Answer: C

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36. If an element emits an alpha-particle, then the position of daughter element will be displaced in the periodic table by :

A. two positions on left

B. one position on left

C. one position on right

D. two positions on right.

Answer: A

37. The equipment used to carry out the fission reaction in a controlled manner is called :

A. moderator

B. nuclear reactor

C. nuclear fusion

D. thermonuclear fission.

Answer: B

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38. The radioactive isotope of carbon used in radio carbon dating is :

A. ${}_{6}^{12}C$

B. ${}_{6}^{13}C$

C. ${}_{6}^{14}C$

D. ${}_{6}^{16}C$

Answer: C

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39. The first positron emitter discovered was :

A. $^{30}_{15}P$

B. $^{30}_{14}Si$

C. $^{15}_{7}N$

D. $^{24}_{11}Na$

Answer: A

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40. The half life periods of four isotopes are given :

I = 6.7 years II = 8000 years

III = 5760 years $IV = 2.35 \times 105$ years. Which of these is most stable ?

A. I

B. II

C. III

D. IV

Answer: D

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41. Which of the following process results in emission of X-rays ?

A. β-emission

B. positron-emission

C. K- electron capture

D. α-emission

Answer: C

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42. Explain the principle behind the Hydrogen bomb.

A. Nuclear fusion

B. Nuclear fission

C. Nuclear disintegration

D. None of these

Answer: A

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43. The 4n series starts from thorium-232 and ends at :

A. Lead-208

B. Bismuth-209

C. Lead-206

D. Lead-207.

Answer: A

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44. In the reaction :

$$^{215}_{84}Po \rightarrow {}^{211}_{82}Pb + {}^{4}_{2}He$$

If Pb belongs to group 14, Po belongs to group

A. 15

B. 13

C. 16

D. 14

Answer: C

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45. One microgram of radioactive sodium, $^{24}_{11}Na$ with half life of 15 hour was injected into a living system. How long will it take for the radioactivity to fall to 25% of the initial value ?

A. 22.5 hr

B. 3.75 hr

C. 30 hr

D. 60 hr

Answer: C

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46. The partlcles emitted 1n the decay of $^{238}_{92}U$ to $^{234}_{92}U$

A. 1,1

B. 1,0

C. 1,2

D. 2,1

Answer: A

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47. In the reaction :

$${}_{4}^{9}Be + X \rightarrow {}_{5}^{10}B + \gamma$$ X is:

A. proton

B. deutron

C. α-particle

D. neutron.

Answer: B

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48. If in the reaction of fluorine-19 with a neutron nitrogen-16 is formed, what is the other particle given off in the reaction ?

A. ${}_0^1n$

B. ${}_2^4He$

C. ${}_0^1e$

D. ${}_1^1H$

Answer: C

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49. Which of the following represents fusion reaction ?

A. $^{239}_{93}Np \rightarrow {}^{239}_{94}Pu + {}^{0}_{-1}e$

B. $^{9}_{4}Be + {}^{1}_{1}H \rightarrow {}^{10}_{5}B + {}^{0}_{0}\gamma$

C. $^{2}_{1}H + {}^{3}_{1}H \rightarrow {}^{4}_{2}He + {}^{1}_{0}n$

D. $^{12}_{6}C + {}^{1}_{1}H \rightarrow {}^{13}_{7}N + \gamma$

Answer: B

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50. In the reaction, the bombarding projectile X is :

$${}_{3}^{7}Li + X \rightarrow {}_{4}^{7}Be + {}_{0}^{1}n$$

A. α-particle

B. Proton

C. Neutron

D. Deutron.

Answer: A

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51. When the quantity of a radioactive substance is ncreased to two times, the number of atoms disintegrated per unit time is :

A. doubled

B. increased four times

C. not affected

D. reduced to half.

Answer: C

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52. The amount of substance which gives 3.7×10^7 dps is :

A. One Becquerel

B. One Curie

C. One millicurie

D. One Rutherford.

Answer: C

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53. In the decay series :

$$A \xrightarrow{-\alpha} B \xrightarrow{-\beta} C \xrightarrow{-\beta} D$$

A. A and B are isobars

B. A and Care isobars

C. A and D are isotopes

D. B and C are isotopes.

Answer: A

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54. A positron has a charge equal to that of

A. a proton

B. an electron

C. an α-particle

D. a neutron.

Answer: D

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55. The device used for the measurement of radioactivity is :

A. Nuclear reactor

B. Cyclotron

C. Mass spectrometer

D. G.M. counter.

Answer: B

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56. Which of the following is not a transuranic element?

A. Pu

B. Bi

C. Cm

D. Am.

Answer: B

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57. In a breeder reactor, which of the following is converted to fissionable fuel ?

A. U-235

B. Pu-239

C. U-238

D. Np-241

Answer: C

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58. Which of the following is a thermonuclear reation ?

A. $^{238}_{92}U + ^{1}_{0}n \rightarrow ^{239}_{93}Np + ^{0}_{-1}e$

B. $^{1}_{4}H \rightarrow ^{4}_{2}He \rightarrow \ + ^{0}_{+1}2e$

C. $^{238}_{92}U + ^{12}_{6}C \rightarrow ^{246}_{98}Cf + 4^{1}_{0}n$

D. $^{27}_{13}Al + ^{4}_{2}He \rightarrow ^{30}_{15}P + ^{1}_{0}n$

Answer: B

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59. The mass of 1 curie of U-234 is :

A. $3.7 \times 10^{10} g$

B. $2.348 \times 10^{-23} g$

C. $3.7 \times 10^{-10} g$

D. $1.438 \times 10^{-11} g$

Answer: D

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60. In a given reaction

$$_{} ZX^{A} \rightarrow_{Z+1} Y^{A} \rightarrow_{Z-1} K^{A-4} \rightarrow_{Z-1} K^{A-4}$$

Radioactive radiations are emitted in the sequence of

A. α, β, γ

B. β, α, γ

C. γ, α, β

D. β, γ, α

Answer: B

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61. ^{18}F undergoes 90% decay in 365 min. The decay constant for ^{18}F is :

A. $6.31 \times 10^{-3}\ \text{min}^{-1}$

B. $7.32 \times 10^{-3}\ \text{min}^{-1}$

C. $6.31 \times 10^{-4}\ \text{min}^{-1}$

D. $6.31 \times 10^{-2}\ \text{min}$

Answer: A

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62. If a radioactive element is placed in an evacuated container, its rate of disintegration will :

A. be increased

B. be decreased

C. change only slightly

D. remain unchanged.

Answer: D

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63. The half period of a radioactive element is 20 years. If a sample of this nucleide has an initial activity of 20000 dis/min, the activity after 80 years would be:

A. 2500 dis/min

B. 5000 dis/min

C. 20,000 dis/min

D. 1250 dis/min.

Answer: D

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64. During α-decay, n/p ratio :

A. decreases

B. increases

C. remains same

D. may increase or decrease.

Answer: B

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65. The substance used in Breeder reactor is :

A. $^{239}_{93}Np$

B. $^{239}_{94}Pu$

C. $^{238}_{92}U$

D. $^{239}_{92}U$

Answer: C

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66. During a β - decay

A. an atomic electron is ejected

B. an electron which is already present within the nucleus is ejected

C. a neutron in the nuclear decays emitting an electron

D. a part of binding energy of the nucleus is converted into an electron.

Answer: C

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67. Which of the following nuclei is unstable ?

A. $^{10}_{5}B$

B. $^{10}_{4}Be$

C. $^{14}_{7}N$

D. $^{16}_{8}O$

Answer: B

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68. The activity of radioactive isotope decreases with:

A. temperature

B. pressure

C. chemical environment

D. none of these.

Answer: D

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69. An isotope of ^{231}Th can be converted into ^{227}Th by the emission of :

A. one $\beta -$ particle

B. one α-particle

C. two $\alpha -$ and two β-particles

D. one α- and two β-particles.

Answer: D

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70. The reaction :

$_1^2D + _1^3T \rightarrow _1^2He + _0^1n$ is an example of

A. nuclear fission

B. nuclear fusion

C. artificial radioactivity

D. radioactive disintegration.

Answer: B

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71. The artificial radioactivity was first discovered by:

A. Rutherford

B. Sea Borg

C. Einstein

D. Irene Curie

Answer: B

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72. With time, the rate of radioactive disintegration :

A. increases

B. decreases

C. remains same

D. may increase or decrease.

Answer: B

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73. Which of the following transformations is not correct?

A. ${}_{3}^{7}Li + {}_{1}^{1}H \rightarrow {}_{4}^{7}Be + {}_{0}^{1}n$

B. ${}_{5}^{10}B + {}_{2}^{4}He \rightarrow {}_{7}^{13}N + {}_{0}^{1}n$

C. ${}_{83}^{209}Bi + {}_{1}^{2}H \rightarrow {}_{84}^{210}Po + {}_{0}^{1}n$

D. ${}_{13}^{27}Al + {}_{1}^{2}H \rightarrow {}_{12}^{25}Na + {}_{2}^{4}He$

Answer: D

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74. Which of the following transformations is n p type ?

A. ${}_{13}^{27}Al + {}_{1}^{2}H \rightarrow {}_{12}^{25}Mg + {}_{2}^{4}He$

B. ${}_{4}^{11}B + {}_{1}^{1}H \rightarrow {}_{6}^{11}C + {}_{0}^{1}n$

C. $^{7}_{3}Li + {}^{2}_{1}H \rightarrow {}^{8}_{3}Li + {}^{1}_{1}H$

D. $^{27}_{13}Al + {}^{1}_{0}n \rightarrow {}^{27}_{12}Mg + {}^{1}_{1}H$

Answer: D

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75. In the reaction :

$^{239}_{93}Np \rightarrow {}^{239}_{94}Pu + ?$

The missing particle is :

A. neutron

B. proton

C. positron

D. electron.

Answer: D

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76. During α-decay, n/p ratio :

A. increases

B. decreases

C. remains unchanged

D. may increase or decrease.

Answer: B

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77. The change ${}_{15}^{30}P \rightarrow {}_{14}^{30}Si$ requires the emission of :

A. $\alpha -$ particle

B. β- particle

C. Neutron

D. positron.

Answer: D

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78. Which of the following is used in dating archaeolo gical findings?

A. ${}_{92}^{235}U$

B. ${}_{6}^{14}C$

C. ${}_{1}^{3}H$

D. ${}_{8}^{18}O$

Answer: B

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79. The missing nucleide in the nuclear reaction :

$^{239}_{93}Np \rightarrow \ldots\ldots\ +^{0}_{-1}e$ is

A. Bi

B. Pu

C. U

D. Cm

Answer: B

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80. Which of the following radiations can be easily stopped by air?

A. α-rays

B. β-rays

C. γ-rays

D. all the above.

Answer: A

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81. Meson was discovered by :

A. Chadwick

B. Yukawa

C. Powell

D. Stassman and Hahn.

Answer: B

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82. Neutrino can be detected during the emission of:

A. α-rays

B. β-particle

C. protons

D. X-rays.

Answer: B

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83. In a neutron induced reaction of $^{235}_{93}U$, one of the products is $^{95}_{37}Rb$. In this process anther nucleide and three neutrons are also produced. The other nucleide is :

A. $^{137}_{56}Cs$

B. $^{90}_{38}Sr$

C. $^{144}_{54}Xe$

D. $^{140}_{56}Ba$

Answer: A

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84. The missing projectile in the reaction :

$^{2}_{1}H + ? \rightarrow {}^{1}_{1}H + {}^{1}_{0}n$ is :

A. proton

B. deutron

C. γ-ray

D. neutron.

Answer: C

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85. In the nuclear reaction ${}_{42}^{96}Mo + \ldots\ldots \rightarrow {}_{43}^{97}Tc + {}_{0}^{1}n$ the missing particle is :

A. deutron

B. proton

C. α-particle

D. tritium.

Answer: A

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86. Packing fraction is related to :

A. nuclear spin

B. electron spin

C. mass number

D. atomic number.

Answer: C

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87. When radium atom (belonging to group II) loses an α-particle forming a new element, the latter is placed in :

A. IV group

B. zero group

C. III group

D. I group.

Answer: B

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88. Which particle is used to bombard $^{28}_{13}Al$ to give $^{31}_{15}P$ and neutron ?

A. deutron

B. α-particle

C. proton

D. positron.

Answer: B

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89. Lead containers are generally used for storing radioactive materials. This is because :

A. lead is stable

B. lead has high atomic mass

C. lead is a poor conductor

D. lead is a good absorber.

Answer: D

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90. The ^{14}C content of a piece of wood after it is cut from a tree :

A. decreases

B. increases

C. remains same

D. piece of wood does not have

Answer: A

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91. Nuclear energy is the result of conversion of :

A. neutrons to protons

B. protons to neutrons

C. protons to neutrons and electrons

D. mass into energy.

Answer: C

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92. The half-life period of a radioactive substance is 140 days. After 560 days, one gram of the element will be reduced to:

A. $\frac{1}{2}g$

B. $\frac{1}{4}g$

C. $\frac{1}{8}g$

D. $\frac{1}{16}g$

Answer: D

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93. During the fission of U-235, a large amount of energy of the order of 180 MeV is generated per nucleus fissioned. The amount of energy released by the fission of 0.235 g of U-235 is :

A. $6.932 \times 10^{23} kJ$

B. $1.08 \times 10^7 kJ$

C. $1.73 \times 10^{16} kJ$

D. $1.73 \times 10^7 kJ$

Answer: D

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94. The half life period of a particular isotope is 10 years. Its decay constant is:

A. 6.932year^{-1}

B. 0.6932year^{-1}

C. 0.06932year^{-1}

D. $0.006932 \text{year}^{-1}$

Answer: C

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95. The half life period of a radioactive isotope of X is 15 hours. How long will it take for its activity to be reduced to 1/16 of its original value ?

A. 30 hours

B. 45 hours

C. 60 hours

D. 120 hours

Answer: C

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96. The half life period of a radioactive substance is 5.27 years (decay constant $= 2.5 \times 10^{-7}\ \text{min}^{-1}$). The decay activity of 2.0 g of the sample is about :

A. 5×10^{10} dpm

B. 7.5×10^{15} dpm

C. 5×10^{5} dpm

D. 7.5×10^{20} dpm.

Answer: C

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97. A certain radioactive substance has half life period of 10 days. How long will it take for its activity to reduce to 1/8 of its original value ?

A. 40 days

B. 20 days

C. 1.25 days

D. 30 days

Answer: D

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98. The activity of an old piece of wood is just one fourth of a fresh piece of wood. If half life period of ^{14}C is about 6000 years, the age of old piece of wood is:

A. 6000 years

B. 3000 years

C. 9000 years

D. 12000 years

Answer: D

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99. Eight grams of a radioactive substance is reduced to 0.5 g after 1 hour. The half life period of the radioactive substance is :

A. 15 min

B. 30 min

C. 45 min

D. 10 min

Answer: A

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100. A radioactive substance having a half life period of 5 days was received after 20 days. It was found that there was 3 g of the isotope in the container. The initial weight of the isotope when placed was:

A. 12 g

B. 24 g

C. 36 g

D. 48 g

Answer: D

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101. Carbon-14 has a half life period of 5760 years. 100 mg of sample containing C-14 is reduced to 25 mg in:

A. 18270 years

B. 11520 years

C. 17280 years

D. 5760 years

Answer: B

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102. Wooden artifact and freshly cut tree are having 7.6 and 15.2 counts min-1 ga^{-1} of carbon

$\left(t^{1/2} = 5700 \text{years}\right)$ respectively. Calculate the age of the artifact.

A. 5760 years

B. 2880 years

C. 17280 years

D. 5760 years

Answer: A

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103. The half life period of a radioactive substance having radioactive disintegration constant $231 \sec^{-1}$

is :

A. 3.0×10^{-2} sec

B. 3.0×10^{-3} sec

C. 3.3×10^{-2} sec

D. 3.3×10^{-3} sec.

Answer: B

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104. Starting with 10 g of a radioactive substance 0.1 gis left after 10 days. The rate constant for the decay is:

A. 0.9212day^{-1}

B. 0.4606day^{-1}

C. 100day^{-1}

D. 0.001day^{-1}

Answer: B

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105. The half life period of a radioactive nucleide is 1 hour. In three hours its activity will be reduced by a factor of:

A. $\frac{1}{9}$

B. $\frac{1}{6}$

C. $\frac{1}{27}$

D. $\frac{1}{8}$

Answer: D

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106. The half life period of a radioactive element is 120 days. Starting with 1 g, the amount of element decayed in 600 days will be :

A. $\frac{1}{16}g$

B. $\frac{15}{16}g$

C. $\frac{1}{32}g$

D. $\frac{31}{32}g$

Answer: D

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107. A certain nucleide has half life period of 30 min. If a sample containing 6×10^{10} atoms is allowed to decay for 90 min, how many atoms will remain ?

A. 2×10^{10} atoms

B. 4.5×10^{9} atoms

C. 7.5×10^{9} atoms

D. 1.5×10^9 atoms.

Answer: C

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108. If the mass defect of ${}_4^9X$ is a.m.u., then binding energy per nucleon is (1 a.m.u. = 931.5 MeV):

A. 9.315 MeV

B. 931.5 MeV

C. 83.8 MeV

D. 8.38 MeV.

Answer: A

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109. The most stable nuclei have mass number :

A. less than 50

B. about 56

C. about 180

D. greater than 180.

Answer: B

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110. The isotopic mass of $^{238}_{92}U$ is 238.125 a.m.u. Its packing fraction is :

A. 5.25

B. 0.125

C. 12.5

D. 1.25

Answer: A

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111. The total number of α and β particles lost in the process of transformation of:

$^{238}_{92}U$ to $^{206}_{82}Pb$ is :

A. 6

B. 8

C. 10

D. 14

Answer: B

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112. An isotope ${}_{a}^{b}X$ undergoes x alpha and y beta disintegrations to from a stable isotope ${}_{a-10}^{b-32}Y$ The values of x and y are :

A. 6,6

B. 8,6

C. 6,8

D. 4,6

Answer: B

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113. Which of the following statements is not correct?

A. When an atom emits B-particle, it forms isobar.

B. When a parent element emits one α-particle followed by the emission of two β-particles, the daughter element formed will be isotope of the parent element.

C. During the emission of γ-rays, there is neither any change in mass number nor of atomic number.

D. When $^{232}_{92}Th$ changes to $^{208}_{82}Pb$ it emits 6 β-particles.

Answer: D

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114. During the transformation of ${}_{a}^{c}X$ to ${}_{d}^{b}Y$ the number of β-particles emitted are :

A. $\frac{a-b}{4}$

B. $d+\frac{a-b}{2}+c$

C. $d+\left(\frac{a-b}{2}\right)-c$

D. $2c-d+a-b$

Answer: C

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115. In the nuclear reaction :

$_{84}^{215}Po \xrightarrow{-\alpha} Pb \xrightarrow{-\alpha} Bi \xrightarrow{-\beta} Po$, the mass number of product is :

A. 84

B. 207

C. 215

D. 213

Answer: B

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116. The product obtained when $^{230}_{90}Th$ undergoes 2α decays in successive steps is :

A. Radium

B. Radon

C. Bismuth

D. Polonium.

Answer: B

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117. A radioactive sample has half life of 1500 years. A sealed tube containing 1 g of a sample will contain ... g of the sample after 3000 years. The missing figure is :

A. 1 g of the sample

B. 0.5 g of the sample

C. 0.25 g of the sample

D. 0.00 g of the sample.

Answer: C

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118. The half life period of a radioactive substance is 15 minutes. What per cent of radioactivity of that material will remain after 45 minutes ?

A. 1

B. 12.5

C. 1.5

D. 7.5

Answer: B

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119. Aradioactive isotope decays at such a rate that after 96 minutes only 1/8th of the original substance is left. The half life period of the nucleide is :

A. 12

B. 24

C. 32

D. 48

Answer: C

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120. Aradioactive isotope has $t_{1/2}$ of 10 days. If today 125 g of it is left, what was its weight 40 days earlier ?

A. 600 g

B. 1000 g

C. 1250 g

D. 2000 g

Answer: D

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121. In a radioactive decay, an emitted electron comes from :

A. inner orbital of the atom

B. outermost orbital of the atom

C. nucleus of the atom

D. orbit having principal quantum number one.

Answer: C

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122. An element Xloses one and twoßparticles in three successive stages. The resulting element will be:

A. an isobar of X

B. an isotope of X

C. an isotone of X

D. X itself.

Answer: B

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123. 8 g of the radioactive isotope, cesium-137 were collected on Feb. 1 and kept in a sealed tube. On July 1, it was found that only 0.25 g of it remained. So the half life period of the isotope is:

A. 37.5 days

B. 30 days

C. 25 days

D. 50 days.

Answer: B

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124. The change :

$^{30}_{15}P \rightarrow {}^{30}_{14}Si$ requires the emission of

A. α-particle

B. β- particle

C. neutron

D. positron.

Answer: D

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125. The isotopes of elements were discovered by :

A. Soddy

B. Curie

C. Chadwick

D. Thomson.

Answer: D

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126. Half life for radioactive ^{14}C is years. In how many years, 200 mg of ^{14}C sample will be reduced to 25 mg ?

A. 23040 years

B. 17280 years

C. 115200 years

D. 5760 years.

Answer: B

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127. Which of the following is used in cancer chemotherapy?

A. Ni

B. Po

C. Co

D. Rn

Answer: C

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128. A radioactive substance having a half life period of 3 days was received after 12 days. It was found that there was 3 g of the isotope in the container. The initial weight of the isotope when placed was :

A. 12 g

B. 24 g

C. 36 g

D. 48 g

Answer: D

129. A radioactive element has a half life of one day. After three days, the amount of element left will be:

A. 1/2 of the original amount

B. 1/4 of the original amount

C. 1/8 of the original amount

D. 1/16 of the original amount.

Answer: C

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130. The missing particle in the reaction :

$^{253}_{99}Es + {}^{4}_{2}He \rightarrow {}^{256}_{101}Md + \ldots\ldots$ is

A. Deutron

B. Proton

C. Neutron

D. β-particle.

Answer: C

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Watch Video Solution

131. A radioactive substance has $t_{1/2}$ 60 minutes. After 3 hrs, what percentage of radioactive substance will remain ?

A. 0.5

B. 1.75

C. 0.25

D. 0.125

Answer: D

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132. Carbon-14 dating method is that the :

A. Carbon-14 fraction is the same in all objects

B. Carbon-14 is highly insoluble

C. Ratio of carbon-14 and carbon-12 are constant

D. All the above.

Answer: C

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133. The half-life of a radioactive nucleide 'X is 24 hours, the time required for 12.5% of the original X to

remain is :

A. 1 days

B. 2 days

C. 3 days

D. 4 days

Answer: C

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134. Carbon-14 has a half life period of 5760 years. 100 mg of sample containing C-14 is reduced to 25 mg in:

A. 11520 years

B. 2880 years

C. 1440 years

D. 17280 years.

Answer: A

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135. If amount of radioactive substance is increased three times, the number of disintegrating atoms per unit time will:

A. be doubled

B. be tripled

C. one third

D. unchanged.

Answer: B

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136. A radioactive sample has half life of 1500 years. A sealed tube containing 1 g of a sample will contain ... g of the sample after 3000 years. The missing figure is :

A. 1g

B. 0.5 g

C. 0.25 g

D. 0 g

Answer: C

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137. $^{235}_{92}U + n \rightarrow {}^{235}_{92}U \rightarrow$ fission product + Neutron $3.20 \times 10^{-11} J.$

The energy released when 1 g of $^{235}_{92}U$ undergoes fission is

A. $12.75 \times 10^{8} kJ$

B. $18.60 \times 10^{9} kJ$

C. $8.21 \times 10^7 kJ$

D. $6.55 \times 10^6 kJ$

Answer: C

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138. The radioactive decay of ${}^{88}_{35}X$ by a β-emission produces an unstable nucleus which spontaneously emits a neutron. The final product is :

A. ${}^{88}_{37}X$

B. ${}^{89}_{35}Y$

C. ${}^{88}_{34}Z$

D. ${}_{36}^{87}W$

Answer: D

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139. A radioactive element (atomic mass = 90 a.m.u.) has half life of 28 years. The number of disintegration per second is :

A. 5.24×10^{8}

B. 5.24×10^{10}

C. 5.24×10^{-10}

D. 5.24×10^{12}

Answer: B

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140. The introduction of a neutron into the nuclear composition of an atom would lead to a change in:

A. the number of electrons

B. the chemical nature of the atom

C. its atomic number

D. its atomic weight.

Answer: D

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141. The half life of a radioactive isotope is three hours. If the initial mass of the isotope was 300 g, the mass which remained undecayed in 18 hours would be :

A. 2.34g

B. 1.17 g

C. 9.36 g

D. 4.68 g

Answer: D

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142. In the following radioactive decay :

$_{92}X^{232} \rightarrow_{89} Y^{220}$

how many α and β-particles are ejected?

A. 3α and 3β

B. 5α and 3β

C. 3α and 5β

D. 5α and 5β

Answer: A

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143. A human body required 0.01M activity of a radioactive substance after 24 hours. Half life of the radioactive substance is 6 hours. The injection of maximum activity of the radioactive substance that can be injected is :

A. 0.08

B. 0.04

C. 0.16

D. 0.32

Answer: C

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144. ${}_{92}^{235}U$ nucleus absorbs a neutron and disintegrates into ${}_{54}Xe^{139}$, ${}_{38}Sr^{94}$ x. What will be the product x ?

A. 3 neutrons

B. 2 neutrons

C. α-particle

D. β-particle.

Answer: A

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145. The radio isotope, tritium $\left({}_{1}^{3}H\right)$ has a half life period of 12-3 years. If the initial amount of tritium is 32 mg, how many milligrams of it would remain after 49-2 years?

A. 1mg

B. 2 mg

C. 4 mg

D. 8 mg

Answer: B

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146. The radioactive isotope ${}^{60}_{27}Co$ which is used in the teratment of cancer can be made by (n,p) reaction. For this reaction, the target nucleus is :

A. ${}^{59}_{27}Co$

B. ${}^{60}_{28}Ni$

C. ${}^{60}_{27}Co$

D. ${}^{59}_{28}Ni$

Answer: B

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147. A nucleide of an alkaline earth metal undergoes radioactive decay by emission of three a-particles in succession. The group of the periodic table to which the resulting daughter element would belong is:

A. Group 4

B. Group 6

C. Group 14

D. Group 16

Answer: C

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148. If it is assumed that ${}_{92}^{235}U$ decays only by emitting α-and β-particles, the possible product of the decay is :

A. ${}_{89}^{225}Ac$

B. ${}_{89}^{227}Ac$

C. ${}_{89}^{230}Ac$

D. ${}_{89}^{231}Ac$

Answer: B

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149. The β- decay of a radioactive element results in formation of its :

A. isotope

B. isobar

C. isodiapher

D. nuclear isomer.

Answer: B

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150. In the radioactive decay:

$${}_{Y}X^{Z} \xrightarrow{-(8\alpha \text{ and } 6\beta)} {}_{82}Pb^{206}X$$, y and z are

A. U, 92 and 235

B. Th, 90 and 232

C. Pu, 94 and 238

D. U, 92 and 238.

Answer: D

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151. Which of the following has highest value of radioactivity ?

A. 1g of Ra

B. 1 g of $RaSO_4$

C. 1g of $RaBr_2$

D. 1g of $Ra(HPO_4)$

Answer: A

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152. The relative penetrating power of α, β, γ and neutron (n) follows the order :

A. $\alpha > \beta > \gamma > n$

B. $n > \gamma > \beta > \alpha$

C. $\beta > \alpha > n > \gamma$

D. None of these.

Answer: D

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153. A β-particle is emitted by a radioactive nucleus at the time of conversion of

A. by conversion of proton to neutron

B. from outer most orbit

C. by conversion of neutron to proton

D. β- particle is not emitted.

Answer: C

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154. ${}^{23}_{11}Na$ is more stable isotope of Na. Find out the process by which ${}^{24}_{11}Na$ can undergo radioactive decay:

A. β-emission

B. α-emission

C. β^+ emission

D. K-electron capture

Answer: A

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155. The radioactive nucleide $^{134}_{90}Th$ undergoes two successive $\beta -$ deacys followed by one α- decay. The atomic number and mass number respectively of the resulting radionucleide is :

A. 94 and 230

B. 90 and 230

C. 92 and 230

D. 92 and 234

Answer: B

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156. Consider the following nuclear reaction :

$$^{238}_{92}M \rightarrow {}^{x}_{y}N + 2^{4}_{2}He$$

$$^{x}_{y}N \rightarrow {}^{A}_{B}L + 2\beta^{+}$$

The number of neutrons in the element L is

A. 140

B. 144

C. 142

D. 146

Answer: B

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157. The half life of a radioisotope is 4 hr. If the initial mass of the isotope was 200 g, the mass remaining after 24 hr undecayed is:

A. 3.125 g

B. 2.084 g

C. 1.042 g

D. 4.167 g

Answer: A

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158. A photon of hard gamma radiation knocks a. proton out of ${}_{12}^{24}Mg$ nucleus to form :

A. the isotope of parent nucleus

B. the isobar of parent nucleus

C. the nucleide ${}_{11}^{23}Na$

D. the isobar of ${}_{11}^{23}Na$

Answer: C

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159. In the transformation of ${}_{92}^{238}U$ to ${}_{92}^{234}U$, if one emission is an α-particle, what should be the other emission ?

A. Two β^- and one β^+

B. One β^- and one γ

C. One β^+ and one β^-

D. Two β^-

Answer: D

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160. A positron is emitted from ^{23}Na. The ratio of atomic mass and atomic number of the resulting nucleide is :

A. $22/10$

B. $22/11$

C. $23/10$

D. $23/12$

Answer: C

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161. Which of the following nuclear reactions will generate an isotope ?

A. Positron emission

B. α-particle emission

C. β-particle emission

D. neutron particle emission.

Answer: D

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162. A radioactive element gets spilled over the floor of a room. Its half-life period is 30 days. If the initial activity is ten times the permissible value, after how many days will it be safe to enter the room ?

A. 300 days

B. 10 days

C. 100 days

D. 1000 days.

Answer: C

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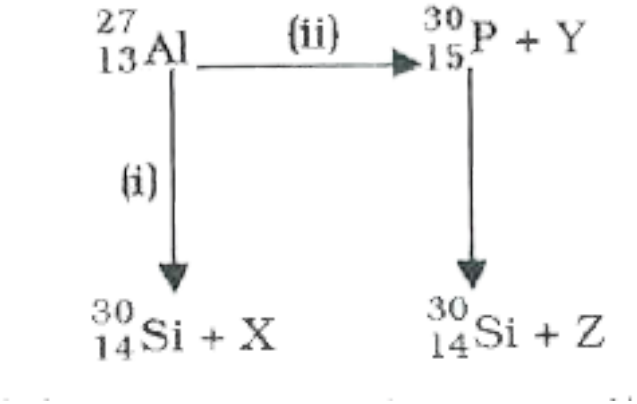
163. Bombardment of aluminium by α-particles lead to its artificial disintegration in two ways, (and (it) as shown. Products X, Y and Z respectively are:



A. proton, neutron, positron

B. neutron, positron, proton

C. proton, positron, neutron

D. positron, proton, neutron

Answer: A

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