

CHEMISTRY

BOOKS - S DINESH & CO CHEMISTRY (HINGLISH)

NUCLEAR AND RADIO CHEMISTRY

Multiple Choice Questions

1. What will be the total number of electrons , protons and neutrons in the product formed by the loss of one α -particle $\frac{238}{92}U$? A. 326

B. 333

C. 324

D. 332

Answer: C



2. The nuclear radius as compared to the atomic radius,

is of the order of

A. 10^{-2}

B. 10^{-4}

C. 10^{-6}

D. 10^{-8}

Answer: B



3. The density of a nucleus is of the order of

A.
$$10^5 kgm^{\,-\,3}$$

- B. $10^{10} kgm^{-3}$
- C. $10^{17} kgm^{-3}$
- D. $10^{25} kgm^{-3}$

Answer: C



4. An isotone of $.^{76}_{32} Ge$ is-(a) $.^{77}_{32} Ge$ (b). $^{77}_{33} As$ (c). $^{77}_{34} Se$ (d). $^{78}_{34} Se$ A. $^{32}_{77}Ge$ B. $^{77}_{33}As$ C. $^{77}_{34}Se$

D. $^{78}_{34}Se$



Answer: B



6. An isobar of $._{20} Ca^{40}$ is

A. $^{49}_{18}Ar$

 $\mathsf{B.}\,{}^{38}_{20}Ca$

 $\mathsf{C}.\,{}^{42}_{20}Ca$

D. ${}^{38}_{18}Ar$

Answer: A

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7. An isotope of ^{231}Th can be converted into ^{227}Th by

the emission of

A. one α - particle

B. one β - particle

C. two α and one β - particle

D. one α and two β -particle

Answer: D



8. Two elements X and Y are isotonic having atomic weight 54 and 56 respectively. If the atomic number of X is 26, then the atomic number of Y will be

B. 27

C. 28

D. 30

Answer: C

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9. Which of the following are isodiapheres ?

A. A nuclide and its decay product after emission of

an alpha-particle

B. A nuclide and its decay product after emission of

a beta-particle

C. A nuclide and its decay product after emission of

gamma-rays

D. Spherical atoms having the same diameter.

Answer: A



10. The radiation from naturally occuring radioactive substance as seen after deflection by a magnetic field in one direction are :

A. Definitely α -particle

B. Definitely β -rays

C. Both α and β -rays

D. Either α or β -rays

Answer: D

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11. The instability of a nucleus is due to

A. high electron proton ratio

B. high neutron proton ratio

C. low electron proton ratio

D. low neutron electron ratio

Answer: B Watch Video Solution

12. Which one of the following pairs represents isotopes?

- A. $^{35}_{17}Cl,\,^{37}_{17}Cl$
- $\mathsf{B}.\,{}^2_1H,\,{}^3_2He$
- $\mathsf{C}.\,{}_1^2H,\,{}_2^3He$
- D. $^{76}_{32}Ge, ^{76}_{34}Se$

Answer: A



13. The first non-ratioactive light element which was shown to exhibit isotopy was

A. hydrogen

B. neon

C. helium

D. lithium

Answer: A



14. The first non-ratioactive heavy element, which was

shown to exhibity isotopy was

A. bismuth

B. lead

C. germanium

D. none of these

Answer: B



15. Nuclides having the same atomic and mass numbers

are known as

A. isomers

B. isotopes

C. isotones

D. isobars

Answer: A



16. Two nuclei are not identical but have the same number of nucleons. These are

A. isotones

B. isobars

C. isotopes

D. None of the above

Answer: B



17. Which one of the following pairs represents isobars?

A. ${}^2_1H, {}^3_2He$

 $\mathsf{B}.\,{}^3_1H,\,{}^3_2He$

C. ${}^{17}_{37}Cl, {}^{17}_{37}Cl$

D. ${}^1_1H, {}^2_{11}H$

Answer: B



18. Atom with the same atomic number and different mass numbers are called a)Isobars b)Isomersc)Isotones d)Isotopes

A. isobars

B. isomers

C. isotones

D. isotopes



19. The isotoic mass of $\frac{238}{92}U$ is 238.125 a.m.u. Its packing fraction is A. 5.25 B. 0.125

C. 12.5

D. 1.25

Answer: A



20. The two nuclides z^{A^m} and ${}_{z-2}B^{m-4}$ are known as

A. isotones

B. nuclear isomers

C. isomers

D. isodiapheres

Answer: D

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21. What is the packing fraction of ${}^{56}_{26}Fe$?

 $\textbf{A.} + 14 \cdot 167$

 $\mathrm{B.}+73\cdot90$

 $\mathrm{C.}-14\cdot\,167$

 $\mathsf{D.}-73\cdot90$

Answer: C



22. An isobar of
$${}^{40}_{20}Ca$$
 is

- A. ${}^{40}_{18}Ar$
- $\mathsf{B}.\,{}^{38}_{20}Ca$
- $\mathsf{C}.\,{}^{42}_{20}Ca$

D. $^{39}_{19}K$

Answer: A



23. Atoms of different elements having the same number of neutrons but differnet atomic numbers are called

A. isotopes

B. isotones

C. isobars

D. none of these

Answer: B



24. Nuclides having the same difference in mass number and atomic number, are known as

A. isotopes

B. isobars

C. isotones

D. isomers

Answer: C



25. When a radius atom, which is placed in the lind group loses an alpha-particle forming a new element , it should be placed in the group

A. Second

B. First

C. Fourth

D. Zero group



26. In the reaction, $Po \stackrel{-\alpha}{\longrightarrow} Pb \stackrel{-\beta}{\longrightarrow} Bi$, if Bi belongs

to group 15, to which group Po belongs?

A. 14

B. 15

C. 13

D. 16

Answer: D



27. $^{234}_{91}Pa ightarrow {}^{234}_{92}U$ occurs with the emission of

A. α -particles

B. β - particles

C. γ -rays

D. positron

Answer: B



28. In the following nuclear reaction

 $._{13} \, Al^{27} + ._2 \, He^4 o ._{15} \, P^{\, 30} + X, X$ will be

A. Sulphur

B. Carbon

C. Phosphorus

D. Silicon

Answer: C

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29. In the decay process:

 $A \xrightarrow{-\alpha} B \xrightarrow{-\beta} C \xrightarrow{-\beta} D$ a)A and B are isodiaphers b) A and C are isotones c)A and C are isotopes d)B, Cand D are isobars

A. A and B are isobars

B. A and C are isobar

- C. A and D are isotopes
- D. B and C are isotopes

Answer: C

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30. In a neutron induced reaction ${}^{235}_{92}U$, the product obtained is ${}^{95}_{37}Rb$, three neutrons and an element (new nuclide). The other new nuclide is

A. $^{138}_{55}Cs$

 $\mathsf{B.}\,{}^{140}_{56}Ba$

 $\mathsf{C}.\,{}^{144}_{54}Xe$

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

Answer: A



31. When $._{92} U^{238}$ decauys it emits an a-particle. The new nuclide in turn emits a beta-particele to give another nuclide X. The mass number and atomic number of X are. Respectively .

A. 234 and 91

B. 234 and 96

C. 232 and 88

D. 234 and 88

Answer: A

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32. If $._{92} U^{235}$ assumed to decay only by emitting two α -and one β -particles, the possible product of decays is a).₈₉ Ac^{231} b).₈₉ Ac^{235} c).₈₉ Ac^{236} d).₈₉ Ac^{227}

A. $_{98}AC^{211}$

B. $_{89}Ac^{235}$

C. $_{89}Ac^{235}$

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

Answer: D



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

a.
$$d + \left(rac{a-b}{2}
ight) - c$$
 b. $rac{a-b}{c}$
c. $d + \left(rac{a-b}{2}
ight) + c$ d. $2c - d + a = b$

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

B. $d+\frac{a-b}{2}+c$
C. $d+\left[\frac{a-b}{2}
ight]-c$
D. $2c-d+a-b$

Answer: C	
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34. If ${}^{235}U$ is bombarded with neutron, the atom will split into

A. Sr+Pb

B. Cs+Ra

C. Kr+Cd

D. Ba+Kr

Answer: D

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35. In the reaction

 ${}^9_2Be + X
ightarrow {}^{10}_5B + \gamma, X$ is

A. proton

B. deutron

C. α -particles

D. neutron

Answer: A



36. The reaction

 $._1\,D^2 + ._1\,T^3
ightarrow ._2\,He^4 + ._0\,n^1$

is an example of a)Nuclear fission b)Nuclear fusion c)Artifical radioactivity d)Radioactive disintegration

A. nuclear fission

B. nuclear fusion

C. artifical radioactivity

D. radioactive disintegration

Answer: B



37. Which of the following projectiles is the best for bombarding the nuclide? a) α -particle b)Proton c)Deuteron d)Neutron

A. α -particles

B. proton

C. deutron

D. neutron



38. Helium may be produced by the fusion of isotopes

of

A. Radium

B. Uranium

C. Plutonium

D. Hydrogen



39. When a stable element is rendered radioactive by artifical transmutation, the phenomenon is called

A. Ionisation

B. Nuclear fission

C. Nuclear fusion

D. Artifical radioactivity


40. The radioactive decay follows zero – order kinetics.

A. zero order

B. first order

C. second order

D. third order

Answer: A



41. The subatomic particle more effective in bringing

artifical transmutation of element is

A. 1_0n

 $\mathsf{B}.\,{}^1_2He$

 $\mathsf{C}.\,{}_1^2H$

D. $^0_{-1}e$

Answer: A



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

A. 4n

B. 4n+1

C. 4n+2

D. 4n+3

Answer: B



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

A. Ph-208

B. Bi-209

C. Pb-206

D. Pb-207

Answer: A



44. In the given reaction

 $\cdot_{z} X^{A}
ightarrow \cdot_{z+1} Y^{A}
ightarrow \cdot_{z-1} K^{A-4}
ightarrow \cdot_{z-1} K^{A-4}$

Radioactive radiations are emitted in the sequence.

A.
$$lpha,eta,\gamma$$

 $\mathrm{B.}\,\beta,\alpha,\gamma$

 $\mathsf{C}.\,\gamma,\alpha,\beta$

 $\mathrm{D.}\,\beta,\gamma,\alpha$

Answer: B



45. ${}_{.89} Ac^{227}$ is a member of actinium series. Another

member of the same series of

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

 $\mathrm{B.}_{90}TH^{232}$

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

D. $_{15}P^{34}$

Answer: A

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

A. bismuth

B. Thorium

C. Any isotope of lead

D. Any isotope of calcium



Answer: B



48. The easily fissionable isotope of uranium is with the number

A. 235

B. 236

C. 237

D. 238

Answer: A



49. A possible material for use in nuclear reactors is

A. carbon-14

B. Ziroconium

C. Beryllium

D. Plutonium

Answer: D



50. The fissile material ${}_{94}Pu^{239}$ is produced from

A.
$$^{233}_{92}U$$

 $\mathsf{B}.\,{}^{235}_{92}U$

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

D. Any of these

Answer: C



51. Which of the following is a fission reaction ?

A.
$${}^1_1H + {}^1_1H + 2{}^1_0n
ightarrow {}^4_2He$$
 + Energy

B.
$${}^{239}_{92}U + {}^1_0n
ightarrow {}^{141}_{56}Ba + {}^{92}_{36}Kr + {}^1_{0}n$$

C.
$${}^{239}_{92}U + {}^1_0n
ightarrow {}^{239}_{92}U + {}^1_1\lambda$$

D.
$${}^{59}_{27}Co+{}^2_1H
ightarrow{}^{60}_{27}Co+{}^1_1H$$



A. 1 %

B. 3%

 $\mathsf{C}.\,0.7\,\%$

D. 7%

Answer: C



53. In a radioactive decay, an emitted electron comes from

A. Outermost orbit of the atom

B. Inner shells of the atom

C. Nucleus of the atom

D. None of these

Answer: C



54. Which of the following nuclear change is incorrect?

a).
$$_{20} \, Ca^{40} + ._0 \, n^1 o ._{19} \, K^{40} + ._1 \, H^1$$
 b)

$$._{12}~Mg^{24}+lpha
ightarrow ._{14}~Si^{27}+._{0}~n^{1}$$
 c)

$$._{48} \ Cd^{113} + ._0 \ n^1
ightarrow ._{48} \ Cd^{112} + ._{-1} \ e^0$$
 d)

 $._{20}~Co^{43}+lpha
ightarrow ._{21}~Si^{46}+._{1}~H^{1}$

A.
$${}_{20}Ca^{40} + {}_0n^1 o {}_{19}K^{40} + {}_1H^1$$

B.
$$_{12}Mg^{24}+lpha
ightarrow {}_{14}Si^{27}+{}_{0}n^{1}$$

C.
$${}_{48}Cd^{113} + {}_0n^1 o {}_{48}Cd^{112} + {}_{-1}e^0$$

D.
$$_{20}Co^{43}+lpha
ightarrow _{21}Si^{46}+{}_{1}H^{1}$$

Answer: C

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55. Which one of the following particles is used to bombard ${}_{13}Al^{27}$ to give ${}_{15}P^{30}$ and a neutron?

A. $_1H^2$

 $\mathrm{B.}\,\gamma$

 $\mathsf{C}.\, \alpha$

D. β

Answer: C



56. Which is the missing particle in the following nuclear reaction ? ${}_{3}Li^{7} + {}_{1}H^{2} \rightarrow {}_{3}Li^{8} + ?$

A. Proton

B. Deutron

C. positron

D. alpha- particle

Answer: A



57. Which of the following nuclear reaction occurs in
nature for the formation of tritium? a)
$$\cdot_{3} Li^{6} + \cdot_{0} n^{1} \rightarrow \cdot_{2} He^{4} + \cdot_{1} H^{3}$$
 b)
 $\cdot_{5} B^{10} + \cdot_{0} n^{1} \rightarrow 2 \cdot_{2} He^{4} + \cdot_{1} H^{3}$ c)
 $\cdot_{7} N^{14} + \cdot_{0} n^{1} \rightarrow \cdot_{6} C^{12} + \cdot_{1} H^{3}$ d)
 $\cdot_{4} Be^{9} + \cdot_{1} D^{2} \rightarrow 2 \cdot_{2} He^{4} + \cdot_{1} H^{3}$
B. $_{5} B^{10} + _{0} n^{1} \rightarrow 2 He^{4} + _{1} H^{3}$
B. $_{5} B^{10} + _{0} n^{1} \rightarrow 2 2 He^{4} + _{1} H^{3}$
C. $5B^{11} + _{2} He^{4} \rightarrow _{6} C^{12} + _{1} H^{3}$
D. $_{4} Be^{9} + _{1} D^{2} \rightarrow 2 _{2} He^{4} + _{1} H^{3}$

Answer: A

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58. On bombarding $_7N^{14}$ with α -particles, the nuclei of the product formed after the release of a proton will be

A. ${}_{9}F^{17}$ B. ${}_{8}O^{17}$ C. ${}_{9}F^{18}$ D. ${}_{8}N^{18}$

Answer: B

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59. Which one of the following nuclear transformation is (n,p) type ?

$$\begin{array}{l} \mathsf{A.} \ _{3}Li^{7}+_{1}H^{1}\rightarrow _{4}Be^{7}+_{0}n^{1}\\\\ \mathsf{B.} \ _{33}As^{75}+_{1}H^{1}\rightarrow _{34}Be^{7}+_{0}n^{1}\\\\ \mathsf{C.} \ _{83}Bi^{209}+_{1}H^{2}\rightarrow _{80}Po^{210}+_{0}n^{1}\\\\ \mathsf{D.} \ _{21}Sc^{45}+_{0}n^{1}\rightarrow _{20}Ca^{45}+_{1}H^{1}\end{array}$$

Answer: D



60. Which of the following transformations is not

correct ?

$$\begin{array}{l} \mathsf{A.}_{33}As^{75}+{_2He^4} \rightarrow {_{35}Br^{78}}+{_0n^1} \\\\ \mathsf{B.}_{3}Li^7+{_2He^4} \rightarrow {_5B^{10}}+{_0n^1} \\\\ \mathsf{C.}_{88}Bi^{209}+{_0n^1} \rightarrow {_{20}Ca^{40}}+{_1H^1} \\\\ \mathsf{D.}_{21}Sc^{45}+{_0n^1} \rightarrow {_{20}Ca^{45}}+{_1H^1} \end{array}$$

Answer: C



61. For the nuclear reaction, $._0 n^1
ightarrow ._1 H^1 + ?$, the missing nuclide is

A.
$$_{33}As^{75}+_{2}He^{4}
ightarrow _{35}Br^{78}+_{0}n^{1}$$

 ${\sf B.}\,_{3}Li^7+_2He^4\rightarrow {}_{35}Br^{78}+_0n^1$

C.
$$_{88}Bi^{209} +_0 n^1
ightarrow {}_{20}Ca^{40} +_1 H^1$$

D.
$$_{21}Sc^{45}+_{0}n^{1}
ightarrow _{20}Ca^{45}+_{1}H^{1}$$

Answer: B

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62. The nuclide ${}^{247}_{99}Es$ can be obtained by bombarding ${}^{239}_{92}U$ in a reaction that emits 5 neutrons . The bombarding particle is

A. 4_2He

 $\mathsf{B}.\,{}_1^3H$

C. $^{13}_{7}N$

D. $^0_{-1}e$

Answer: C



63. Which of the following nuclear reactions is incorrect ?

- A. ${}^{63}_{29}Cuig(p,{}^2_1Hig){}^{62}_{29}Cu$
- $\mathsf{B}.\,{}^9_4Be\bigl(\alpha,{}^1_0n\bigr){}^{12}_6C$
- C. ${}^{10}_5Beig(lpha, {}^1_0nig){}^{12}_6N$

D. ${}^{59}_{227}Coig(n,{}^2_1Hig){}^{56}_{25}Mn$

Answer: D Watch Video Solution

64. For the nuclear reaction

 $^{24}_{12}Mg+d
ightarrow lpha+$? The missing nuclide is

A. $^{22}_{11}Na$

 $\mathsf{B}.\,{}^{27}_{12}Mg$

C. $^{26}_{12}Mg$

D. $^{23}_{11}Na$

Answer: A



65. The nuclear reaction which is not accompanied with the emission of neutrons is

A.
$${}^{75}_{33}As + {}^4_2He o {}^{78}_{35}Br$$

B. ${}^{27}_{13}Al + {}^4_2He o {}^{30}_{15}p$
C. ${}^{241}_{95}Am + {}^4_2He o {}^{244}_{97}Bk$
D. ${}^{12}_6C + {}^1_1H o {}^{13}_7N$

Answer: D

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66. When $._{17} Cl^{35}$ undergoes (n, p) reaction, the radioisotope formed is a). $_{15} P^{32}$ b). $_{16} S^{35}$ c). $_{16} S^{34}$ d) $._{15} P^{34}$

A. $_{15}P^{32}$

 $\mathsf{B.}_{16}S^{35}$

 $\mathsf{C.}_{16}S^{34}$

D. $_{15}P^{34}$

Answer: B



67. The number of α -particles emitted by

 $^{218}_{84}Ra
ightarrow ^{206}_{82}Pb$ is

A. 3

B. 4

C. 6

D. 2

Answer: A



68. How many α and β -particles are emitted in the transformation $^{238}_{92}U o ^{234}_{92}U$

A. 1,1

B. 1,0

C. 1,2

D. 2,1

Answer: C



69. Which of the following particles is emitted in the nuclear reaction: $._{13} Al^{27} + ._2 He^4 \rightarrow ._{14} P^{30+} \dots$? a). $_0 n^1$ b). $_{-1} e^0$ c). $_1 H^1$ d). $_1 H^2$

A. $_0n^1$

B. $_{-1}e^0$

 $\mathsf{C}.\,1H^1$

D. $1H^2$

Answer: C



70. How many α -particles are emitted in the nuclear transformation: $._{84} Po^{215} \rightarrow ._{82} Pb^{211} + ?._2 He^4$

A. 0

B. 1

C. 2

D. 3

Answer: B



71. The isotope ${}_{y}A^{x}$ undergoes a series of $m\alpha$ and $n\beta$ disintegrations to form a stable isotope ${}_{y-10}B^{x-32}$. The values of m and n are

A. 6 and 8

B. 8 and 10

C. 8 and 6

D. 5 and 8

Answer: C



72. Which of the following is a fusion reaction ?

A.
$${}^{235}_{98}U + {}^{1}_{0}n \rightarrow {}^{141}_{56}Ba + {}^{96}_{36}Kr + 3{}^{1}_{6}n$$

B. ${}^{239}_{92}Fe + {}^{1}_{0}n \rightarrow {}^{239}_{92}U + \gamma$
C. ${}^{55}_{26}Fe + {}^{1}_{1}e^{0} \rightarrow {}^{55}_{25}Mn$
D. ${}^{1}_{1}H + {}^{1}_{1}H + {}^{1}_{0}n \rightarrow {}^{4}_{2}He$ + Energy

Answer: D

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73. Which of the following is a thermonuclear reaction

A.
$${}^{238}_{93}U + {}^1_0n o {}^{239}_{98}Np + {}^0_{-1}e$$

B. ${}^1_1H o {}^4_2He + {}^0_{+1}2e$
C. ${}^{238}_{92}U + {}^{12}_6C o {}^{246}_{98}Cf + {}^1_0n$

D. $^{27}_{13}Al+^4_2He
ightarrow ^{30}_{15}P+^1_0n$

Answer: B



74. The fulture inexhaustible source of energy will be

A. hydrogen

B. Uranium

C. coal

D. natural gas

Answer: A

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75. The nuclear reaction $._{1}^{2} \, H + ._{1}^{2} \, H o ._{2}^{4} \, He$ is called

A. fission reaction

B. fusion reaction

C. chain reaction

D. thermal reaction

Answer: B





76. To start a nuclear fusion reaction, the temperature required is of the order of

A. $10^3 \ \mathrm{K}$

 $\mathrm{B.}\,10^2~\mathrm{K}$

 $\mathrm{C.}~10^5~\mathrm{K}$

D. More than $10^6~{\rm K}$

Answer: D

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77. Average life period is equal to

A.
$$rac{1}{t_{0\cdot 5}}$$

B. $rac{1}{\lambda}$
C. $(t_{0\cdot 5})^2$

D.
$$0\cdot 75t_{0\cdot 5}$$

Answer: B

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78. The half life period of four isotopes

(i) 6.7 yr (ii) $8 imes 10^3 yr$

(iii)5760 yr (iv) $2\cdot 35 imes 10^5$ yr,

The most stable isotope is

A. (i)

B. (ii)

C. (iii)

D. (iv)

Answer: D

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79. A radioisotope has half life of 10 years. What percentage of the original amount of it would you

expect to remain after 20 years? a)0 b)12.5 c)25 d)8

A. 0

 $\mathsf{B.}\,12\cdot5$

C. 25

D. 8

Answer: C



80. The amount of substance that give $3.7 imes10^7$ dps is

A. one becquerel
B. one curie

C. one millicurie

D. one rutherford

Answer: C



81. The mass of 1 curie of U-234

 $ig(t_{1\,/\,2}=2\cdot 35 imes 10^5 {
m years}ig)$ is

A. $1\cdot 548 imes 10^3~{
m g}$

 $\mathsf{B.}\,15\cdot48g$

 $\mathrm{C.}\,1\cdot548\times10^{-3}~\mathrm{g}$

D.
$$1\cdot 548 imes 10^2$$
 g

Answer: D

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82. The $t_{0.5}$ of a radioactive substance is 100 days. After

400 days , one gram of element will be reduced to

A. $0\cdot 5\,\mathrm{g}$

 $\mathrm{B.}~0\cdot 25~\mathrm{g}$

 $\mathrm{C.}~0\cdot125~\mathrm{g}$

 $\mathrm{D.}~0\cdot 625~\mathrm{g}$

Answer: D



83. A certain nuclide has a half life of 30 minutes. If the sample containing 26×10^{10} atoms us allowed ti decay for 90 minutes, how many atoms will remain ?

A. $2 imes 10^{10}$ atoms

B. $4.5 imes 10^9$ atoms

C. $7.5 imes 10^9$ atoms

D. $1.5 imes 10^9$ atoms

Answer: C



84. If the half of an isotope X is 10 years , its decay contant is

A. $6.932 yr^{-1}$

B. $0.6932 yr^{-1}$

C. $0.06932 yr^{-1}$

D. $0.006932 yr^{-1}$

Answer: C

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85. The $t_{0.5}$ of a radioactive isotope is 1.5 hours. How long will it take for its activity to be reduced to 1/16 of its original value ?

A. 3.0 h

B. 360 min

C. 4.5 h

D. 600 min



86. The $t_{1/2}$ of radioactive K-40 is 5.274 years $(\lambda=2.5 imes10^{-7}{
m min}^{-1}).$ The decay activity of 2.0 g of the sample is about

A. $5 imes 10^5~{
m dpm}$

B. $5 imes 10^{10} \ {
m dpm}$

C. $7.5 imes 10^{15} \ {
m dpm}$

D. $7.5 imes 10^{20}~{
m dpm}$

Answer: C



87.8 grams of a radioactive substance is reduced to 0.5

g after 1 hour . The $t_{1\,/\,2}$ of the radioactive substance is

A. 15 min

B. 30 min

C. 45 min

D. 10 min

Answer: A



88. The activity of a sample of Ti(Z=22) decreased by 90% over a period of 10 years . The half life of the sample is

A.1 year

B. 2 years

C. 3 years

D. 5 years

Answer: C



89. The rate of disintegration of a radioactivity element changes from initial value of 10,000 dpm to 2,500 dpm in 50 days . The decay constant is

A.
$$rac{2500}{10000} d^{-1}$$

B. $1.386 imes 10^{-2} d^{-1}$
C. $rac{0.693}{2.303} imes 50 s^{-1}$
D. $2.772 imes 10^{-2} d^{-1}$

Answer: D



90. Mark the incorrect relation

A.
$$N_0=Ne^{\lambda t}$$

B. $au=1.44t_{1/2}$
C. $N=N_0igg(rac{1}{2}igg)^n$
D. $t_{0.5}=\lambda/\ln 2.$

Answer: D



91. A radioactive isotope having $t_{1/2}$ =3 days was read after 12 days . If 3 g of the isotope is now left in the

container, the initial weight of isotope was

A. 12 g

B. 24 g

C. 36 g

D. 48 g

Answer: D



92. If N_0 is the number of radioactive nuclei initially present , then the number of nuclei remaining undecayed at the end of nth half life is

A. $2^{-n}N_0$ B. $2^{-n}N_0$ C. $2^{-n}N_0$

D. $2^{-n}N_0$

Answer: A



93. A radioactive isotope has initial activity of 28 dpm Its activity is reduced to 14 dpm after half an hour. The initial number of nuclide in sample was: B. 400

C. 600

D. 1200

Answer: D



94. The wt. in g of 1 curie of a radioactive element ^{200}X

having $t_{1/2}$ of 69.3 min is

A. $3.7 imes10^{-8}$ g

B. 200 g

C. $7.4 imes10^{-8}g$

D.
$$3.0 imes10^{-8}g$$

Answer: C

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95. Calculate the no. of disintegrations which 1 g of radioactive element X-200 undergoes per sec. $t_{1/2}$ of X =1000 years.

- A. $3.66 imes 10^{10}$ dps
- $\text{B.}\,6.6\times10^{10}~\text{dps}$
- $\mathrm{C.}\,10^{11}~\mathrm{dps}$
- D. $1.0 \times 10^{10}~\text{dps}$

Answer: B



96. Which one of the following is an exact example of artificial radioactivity?

$$\begin{array}{l} \mathsf{A.}_{0}n^{1} + {}_{11}Na^{23} \rightarrow {}_{11}Na^{24} + \gamma \\ \\ {}_{11}Na^{24} + {}_{7}H^{14} \rightarrow {}_{12}Mg^{24} + {}_{0}n^{1} \\ \\ \mathsf{B.}_{2}^{11}He^{4} + {}_{7}N^{14} \rightarrow {}_{12}Mg^{24} + {}_{0}n^{1} \\ \\ \\ {}_{8}O^{17} + {}_{0}n^{1} \rightarrow {}_{7}O^{18} + \gamma \\ \\ \\ \mathsf{C.}_{2}He^{4} + {}_{13}Al^{27} \rightarrow {}_{15}P^{30} + {}_{0}n^{1} \\ \\ \\ \\ {}_{15}P^{30} \rightarrow {}_{14}Si^{30} + {}_{1}e^{0} \end{array}$$

D.
$$_{89}Ac^{228}
ightarrow {}_{90}Th^{228}+eta$$

$$_{90}Th^{228}
ightarrow _{88}Ra^{224}+lpha$$

Answer: C



97. The first positron emitter discovered was

- A. $^{30}_{15}P$
- $\mathsf{B.}\,{}^{30}_{14}Si$
- $\mathsf{C}.\,{}^{15}_4P$
- D. $^{24}_{11}Na$





99. 20 mg of C-14 has half-life of 5760 yr. 100 mg of sample containing C-14 is reduced to 25 mg in

A. 11520 yr

B. 5760 yr

C. 18270 yr

D. 17280 yr

Answer: A



100. The activity of an old piece of wood is just 1/4 of the fresh piece of wood. If $t_{1/2}$ of C-14 is 6000 years, the age of the piece of wood is

A. 6000 years

B. 3000 years

C. 9000 years

D. 12000 years

Answer: D



101. An old piece of wood has 25.6 times as much C^{14} as ordinary wood today has. Find the age of the wood. Half-life period of C^{14} is 5760 years.

A. 5760 years

B. 11520 years

C. 2880 years

D. 1440 years



102. The analysis of a rock shows that relative no. of ^{206}Pb and ^{238}U atoms is Pb/U =0.25. If $t_{0.5}{}^{238}U o {}^{206}Pb$ is $4 imes 10^9$ years, the age of the rock is

$$\begin{array}{l} \mathsf{A.} \ \displaystyle \frac{2.303}{0.693} \times \left(4 \times 10^9 \right) \mathrm{log1.25} \\ \mathsf{B.} \ \displaystyle \frac{2.303}{0.693} \times \left(4 \times 10^9 \right) \mathrm{log0.25} \\ \mathsf{C.} \ \displaystyle \frac{2.303}{0.693} \times \left(4 \times 10^9 \right) \mathrm{log4} \\ \mathsf{D.} \ \displaystyle \frac{2.303}{4 \times 10^9} \times 0.693 \times \mathrm{log4} \end{array}$$

Answer: A



103. A method which uses radioactivity for determining

the age of a prehistoric fossil is called

A. carbon dating

B. deutrerium dating

C. radium dating

D. uranium dating

Answer: A



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

A. Pu

B. Bi

C. Cm

D. Am



105. Which of the following is considered as a synthetic

element?

A. Thorium

B. Lead

C. Plutonium

D. Uranium

Answer: C



106. Which one of the following is not a transuranic

element ?

A. Californium

B. Thorium

C. Curium

D. Lawrencium



107. Which one of the following is not a synthetic element ?

A. Technetium

B. Neptunium

C. Astatine

D. Uranium

Answer: D



108. For treatment of canerous tumors, the radio isotope used was

A. Co-60

B. U-235

C. Pu-239

D. Th-231

Answer: A



109. Atom bomb is based on

A. nuclear fusion

B. nuclear fission

C. induced radioactivity

D. disintegration

Answer: B



110. The source of enomous energy of sum is

A. fissionof uranium

B. fusion of hydrogen to form helium

C. fusion of deuterium and tritium

D. fusion of tritium to form helium

Answer: B

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111. Nuclear reactors are based on

A. natural radioactivity

B. nuclear fission

C. Nuclear fusion

D. spontaneous chemical reaction





112. Hydroden bombs are based on

A. natural radioactivity

B. nuclear fission

C. Nuclear fusion

D. spontaneous chemical reaction

Answer: C

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113. The source of energy of the sun is

A. natural radioactivity

B. artifical radioactivity

C. nuclear fission

D. Nuclear fusion

Answer: D



114. The triad of nuclei is isotonic in

A. ${}^{14}_6C, {}^{15}_7N, {}^{17}_9F$

 ${\sf B}.\,{}^{12}_6C,\,{}^{14}_7N,\,{}^{18}_9F$

 $\mathsf{C}.\,{}^{14}_6C,{}^{17}_7N,{}^{17}_9F$

D.
$${}^{14}_6C, {}^{14}_7N, {}^{19}_9F$$

Answer: A

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115. The energy equivalent to 1 amu is?

A. 280 MeV

B. 932.65 MeV

C. 8.314 J

D. 4.183 MeV







117. The most ratioactive element is

A. uranium

B. Thorium

C. radium

D. Plutonium

Answer: C

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118. Which of the following has the maximum penetrating power? a) α -particle b)Proton c) γ -particle

d)Positron

A. α -particle

B. proton

C. γ -radiation

D. positron

Answer: C

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119. The energy released in an atom bomb explosion is

mainly due to

A. release of electrons

B. release of neutrons

C. lower mass of products than initial material

D. greater mass of products tha initial material

Answer: C



120. During the fission of U-235, 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. $1.73 imes 10^7$ KJ
B. $1.08 imes 10^{23}$ KJ

 ${\sf C}.\,1.73 imes10^{16}~{\sf KJ}$

D. $1.08 imes 10^7$ KJ

Answer: A



121. If the mass defect of 9_4X is 0.09 a.m.u. then the

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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122. Which of the following statements about radioactivity are correct? a)It is a nuclear property b)It does not involve any rearragement of electrons. c)It is not affected by the presence of other elements. d)Its rate is affected by the change in temperature and/or pressure.

A. It is a nuclear property

B. It does not involve any rearrangement of

electrons

C. it is not affected by the presence of other

elements

D. Its rate is effected by change in temperature

and/or pressure

Answer: D

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123. Radioactive disintegration differs from a chemical

change inbeing a)An exothermic change b)A

spontaneous process c)A nuclear process d)A

unimolecular first-order reaction

A. and exothermic change

B. a sponthaneous process

C. a nuclear process

D. a unimolecular firs order reaction

Answer: C

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124. Neutrons are more effective projectiles than protons because they

A. are attracted by the nuclei

B. are not repelled by the nuclei

C. travel with high speed

D. None of the above

Answer: B



125. β -rays

A. have greater ionising power than lpha-rays

B. possess greater penetrating power than γ -rays

C. are ejected when light falls on active metals

D. carry charge opposite in sign but equal in

magnitude to that on proton.

Answer: D

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126. The half life of radium is 1600 years. After how much time will 1 g radium be reduced to 125 mg ?

A. 800 years

B. 1600 years

C. 3200 years

D. 4800 years



127. The half life period of a radioactive material is 15 minutes. What percent will remain after 45 minutes ?

A. 10~%

B. 12.5~%

C. 15 %

D. 17.5~%

Answer: B



128. A radioactive isotope having a half life of 3 days was received after 12 days. It was found that there were 3 gm of the isotopes in the container. The initial weight of the isotope when packed was a)12 gm b)24gm c)36 gm d)48 gm

A. 12 g B. 24 g C. 36 g

D. 48 g

Answer: D

129. The half life of the radioactive element is 35 years. If there are $4 imes10^6$ nuclei at the start then after how many years $0.5 imes10^6$ of them would be left ?

A. 35

B. 70

C. 105

D. 140

Answer: C



130. The weight of 1 curie $._{82} P b^{214} (t_{1/2} = 26.8 \min)$ in grams is

A.
$$3.1 imes 10^{-8}$$
 g
B. $1.55 imes 10^{-8}$ g
C. $6.2 imes 10^{-8}$ g
D. $3.1 imes 10^{-10}$ g

Answer: A



131. The activity of a sample of ${}^{36}_{16}S$ falls to 25% of its initial value after 174.2 days. The half life period of ${}^{36}_{16}S$

A. 174.2 days

B. 87.08 days

C. 17.42 days

D. 10 days

Answer: B



132. Radium has atomic weight 226 and a half-life of 1600 Yr. The number of disintegrations produced per second from one gram are

A. $4.8 imes10^{10}$

 ${\sf B}.\,9.2 imes10^6$

 ${\sf C}.\,3.7 imes10^{10}$

D. zero

Answer: C

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133. The number of lpha- particle emitted per second by 1 g of Ra-226 is $3.7 imes10^{10}$. Find the decay constant

A. $1.39 imes 10^{-11} \mathrm{sec}^{-1}$

B. $13.9 imes 10^{-11} {
m sec}^{-1}$

C.
$$3.7 imes10^{-11}
m sec^{-1}$$

D. $2.78 imes 10^{-11} {
m sec}^{-1}$

Answer: A

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134. The amount of C-14 in a piece of wood is found to be 1/6 of the amount present in a fresh piece of wood. What is the age of the wood ? $(t_{1/2}$ for C-14 =5770 years)

A. 14935 years

B. 11540 years

C. 5770 years

D. 17310 years

Answer: A

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135. A 12 mL sample of an aqueous solution containing 2×10^6 counts per sec of tritium is injected into the blood stream of an animal. After complete circulatory mixing , a 1 mL sample was drawn and found to have an activity of 1.5×10^4 counts . Calculate blood volume of the animal.

A. $1.33 imes10^2$ mL

B. $2 imes 10^6$ mL

 $\text{C.}~1.5\times10^{4}~\text{mL}$

D. $2.66 imes10^2$ mL

Answer: A



136. If a hospital buys 4 g of pure Co-60 for therapeutic

use, then after 20 years of use the sample of Co-60 will

be $(t_{1/2}$ for Co-60 =5 years)

A. 0.25 g

B. 0.50 g

C. 0.33 g

D. 0.66 g

Answer: A

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137. A radioactive isotope decays to such a rate that after 96 min only 1/8th of the original amount remains. The value $t_{1/2}$ of this nuclide is

A. 12.0 min

B. 32.0 min

C. 24.0 min

D. 48.0 min

Answer: B



138. Radioactivity of a radioactive element remains 1/10 of the original radioactivity after 2.303 seconds. The half life period is

A. 2.303 seconds

B. 23.03 seconds

C. 0.693 seconds

D. 0.0693 seconds

Answer: C



139. A radioactive disintegration of ${}_{90}Th^{232}$ yields ${}_{82}Pb^{208}$ in the end . The number of α and β -particle emitted will be

A. 6α and 6β

B. 5α and 5β

C. 6α and 4β

D. 4α and 6β

Answer: C



140. The half life of a radioactive isotope 25 days . After

what time it will disintegrate 75%

A. 50 days

B. 48 days

C. 24 days

D. 125 days

Answer: A

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141. Chlorine has two isotope ${}_{17}Cl^{35}Cl^{35}$. The atomic weight of chlorine is 35.5. In what ratio Cl^{35} and Cl^{37} are present in chlorine ?

A. 1:3

B. 3:1

C.1:5

D. 5:1

Answer: B



142. After a period of 100 days the radioactive of an isotope remains 1/4th of the original activity . The half life of the isotope is

A. 25 days

B. 50 days

C. 75 days

D. 100 days

Answer: B



143. An archeological sample of wood has half C^{14} activity as compared to that found in fresh wood of the same plant. The half life of C^{14} is 5770 years. The age of archiological sample of wood will be

A. 5770 years

B. 2885 years

C. 11,540 years

D. 1445 years

Answer: A

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144. The half life of a radioactive isotope is 3 days. When it was weighted after 12 days its weight was found to be 3 g. The original weight of the substance is

A. 36 g

B. 24 g

C. 48 g

D. 12 g

Answer: C



145. 1 mg of a radioactive substance starts decaying . How much substance will be left after 24 hours ? Half life is 8 hours.

A.
$$\frac{1}{2}$$
 mg
B. $\frac{1}{4}$ mg
C. $\frac{1}{8}$ mg
D. $\frac{1}{16}$ mg

Answer: C

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146. Half life of a radioactive substance is 15 seconds. After 15 seconds what percentage of activity will be left ?

A. 15~%

B. 18~%

C. 12.5 %

D. 10~%

Answer: C



147. The half life of a radioisotope is 1.5 hours is (the

initial mass of isotope is 32 g)

A. 32 g

B. 16 g

C. 30 g

D. 2 g

Answer: C



148. A radioisotope having a half life of 3 days was received after 12 days. It was found there were 3 g of the isotope in the container. The initial weight of the isotope when packed was

A. 12 g

B. 24 g

C. 36 g

D. 2 g

Answer: D



149. If 25/26 quantity of a ratioactive element disintegrates in two hours, its half life would be

A. 1 hour

B. 45 minutes

C. 30 minutes

D. 15 minutes

Answer: C

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150. Two radioactive nuclides A and B have half life of t

and 2t respectively . If we start an experiment with one

mole of each of them, what will be the mole ratio after a time interval of 6 t ?

A. 1:2

B.1:8

C. 1:6

D.1:1

Answer: B

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151. A freshly prepared radioactive source of half life period of 2 hour emits radiations of intensity which is

64 times the permissible safe level. Minimum time after which it would be possible to work with the source is

A. 6 hr

B. 12 hr

C. 24 hr

D. 48 hr

Answer: B

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152. The radium and uranium atoms in a sample of uranium mineral are in the ratio of $12.8 imes 10^6$. If half

life period of radium is 1620 years , the half life period

of uranium will be

A. $45.3 imes 10^9$ years

B. $4.53 imes 10^{10}$ years

C. $4.53 imes 10^9$ years

D. $4.53 imes 10^{10}$ years

Answer: C

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153. The activity of carbon-14 in a piece of ancient wood

is only 12.5 % . If the half life period of carbon-14 is 5760

years, the age of the piece of wood will be

A. $17.281 imes 10^2$ years

B. $172.81 imes 10^2$ years

C. $1.7281 imes 10^2$ years

D. $1728.1 imes 10^2$ years

Answer: B



154. The activity of a radioactive nucleide (X^{100}) is 6.023 curie. If its disintegration constant is $3.7 imes 10^{10} {
m sec}^{-1}$, the mass of X is A. 10^{-3} g B. 10^{-15} g C. 10^{-6} g D. 10^{-14} g

Answer: B

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155. A radioactive sample has initial activity of 28 dpm 30 minutes later its activity 14 dpm . How many atoms of nuclide were present initially?

B. 400

C. 600

D. 800

Answer: A



156. 1 Mole of an α -emitting nuclide with $t_{1/2} = 10$ hous, is placed in a sealed container. The time in which 4.52×10^{23} molecules of He will accumulate is

A. 4.52 hr

B. 9.40 hr

C. 10.10 hr

D. 20.00 hr

Answer: D

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157. half life of radium is 1580 years. Its average life will

be

A.
$$8.25 imes 10^2$$
 years

B. $1.8 imes 10^3$ years

C. $2.5 imes 10^3$ years

D. $2.279 imes 10^3$ years

Answer: D Watch Video Solution

158. The weight in grams of 1 curie of radioactive element X-200 having a $t_{1/2}$ of 69.3 min is

- A. $3.0\times10^{-8}~{\rm g}$
- $\text{B.}\,3.7\times10^{-8}~\text{g}$
- $\text{C.}~7.4\times10^{-8}~\text{g}$

D. 100 g

Answer: C

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159. Ra^{226} has half life of 1600 years. The number of disintegration per second per gram is

A. $4.8 imes 10^{10}$

B. $9.2 imes10^5$

C. $3.7 imes10^{10}$

D. None of these

Answer: C



160. What is the packing fraction of ${}^{56}_{26}Fe$?

A. + 14.167

B. - 14.167

 $\mathsf{C.}+73.90$

D. - 73.90

Answer: B

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

A. +5.25B. -5.25C. +12.5

D. - 12.5

Answer: A

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Revision Questions from Competitive Exams

1. From the reaction given below, deduce the group of polonium in the periodic table (Pb belongs to group

14)

 $._{84}~Po^{210}
ightarrow ._{82}~Pb^{206} + ._{2}~He^{4}$

A. 2

B. 14

C. 6

D. 16

Answer: D

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2. Which of the following does not contain material particle

A. α -rays

B. β -rays

C. anode rays

D. γ -rays

Answer: D



3. Radioactive is due to

A. stable electrons configuration

B. stable nucleus

C. unstable nucleus

D. unstable electronic configuration.

Answer: C



4. C^{14} has a half – life of 5760 years. 100mg of the sample containing $.^{14}C$ is reduced to 25mg in a)11520years b)2880years c)1440years d)17128years

A. 11.520yrs

B. 2880 yrs

C. 1440 yrs

D. 17280 yrs

Answer: A



5. The reaction

 $._1\,D^2 + ._1\,T^3
ightarrow ._2\,He^4 + ._0\,n^1$

is an example of a)Nuclear fission b)Nuclear fusion c)Artifical radioactivity d)Radioactive disintegration

A. nuclear fission

B. nuclear fusion

C. artifical radioactivity

D. radioactive disintegration

Answer: B



6. A radioactive isotope decays at such a rate that after 96 min, only 1/8th of the original amount remains. The value of $t_{1/2}$ of this nuclide is

a. 12 min b. 32 min c. 24 min d. 48 min

A. 12.0 min

B. 32.0 min

C. 24.0 min

D. 48.0 min



7. Which of the following is used as neutron absorber

in the nuclear reactor?

A. water

B. Deuterium

C. Some compound to uranium

D. Cadmium

Answer: D

8. Insert the missing figure in the following $._{25} \, Mn^{55}(n,\gamma)
ightarrow$ a. . $_{25}~Mn^{56}$ b. . $_{24}~Cr^{56}$ c. . $_{24}~Mn^{56}$ d. . $_{24}~Cr^{56}$ A. ${}^{55}_{25}Mn$ B. ${}^{55}_{24}Cr$ C. ${}^{55}_{25}Mn$ D. ${}^{56}_{24}Cr$

Answer: A

9. The half life of a radioactive element is 30 min. One sixteenth of the original quantity of element will be left after

a. 1 hr b. 16 hr c. 4 hr d. 2 hr

A.1hrs

B. 16 hrs

C. 4 hrs

D. 2 hrs

Answer: D

10. If the amount of radioactive substance is increased three times, the number of atoms disintegrated per ubit time would :

A. doubled

B. tripled

C. one third

D. unchanged

Answer: B



11. A radioactive sample has half life of 1500 years. A sealed tube containing 1 g of sample will be containing of the sample after 3000 years. The missing figure is

A. 1 g

B. 0.5 g

C. 0.25 g

D. 0 g

Answer: C



12.	In	nuclear	reaction
$4 Be^9 + .$	$_2~He^4 ightarrow$.	$_{5}C^{12}+X,X$ will be	
A. 4			
B. 8			
C. 6			
D. 9			
Answer: D			



13. In a radioactive decay, an emitted electron comes from

A. nucleus of the atom

B. the orbital with principal quantum number 1

C. inner orbital of atoms

D. the outermost shell of atom

Answer: A



14. Which of the following statements is wrong ?

- A. P^{33} is used in the treatment of Leukemia
- B. I^{131} is used in the treatment of Thyroid Gland Cancer
- C. Co^{59} can't be used for treatment of Cancer
- D. Excessive use of radioactive elements is

responsible for cancerous growth.

Answer: A



15. Half life of radioactive element is 100 yrs. The time in

which it disintegrate 50% of its mass will be

A. 50 yrs

B. 200 yrs

C. 100 yrs

D. 25 yrs

Answer: C

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16. Energy released in the nuclear fusion reaction is :

$$^2_1H+^3_1H
ightarrow ^4_2He+^1_0n$$

Atomic

mass

of

 ${}^2_1H=2.014, {}^3_1H=3.016{}^4_2He=4.303, {}^1_0n=1.009$ (all

in a.m.u.)

A. 16.60 MeC

B. 500 J

 ${\sf C.4} imes 10^{67}$ Kcal

D. 8.30 eV

Answer: A

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17. Positron has mass equal to

A. electron

B. α -particle

C. protons

D. deutron

Answer: A

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18. Which of the following is (n,) type rection ?

A.
$${}_5C^{13} + {}_1H^1 o {}_6C^{14}$$

B. ${}_7N^{14} + {}_1H^1 o {}_8O^{15}$
C. ${}_{13}Al^{27} + {}_0n^1 o {}_{12}Mg^{27} + {}_1H^1$
D. ${}_{92}U^{235} + {}_0n^1 o {}_{54}Xe^{140} + {}_{88}Sr^{94}$

Answer: C





19. Half life of a radioactive substance is 60 min. After 3 hours, the fraction of total number of atoms that have decayed would be

A. 12.5~%

B. 87.5 %

 $\mathsf{C.}\,8.5\,\%$

D. 25~%

Answer: B



20. In radioactive transformation ${}_{92}U^{235}
ightarrow {}_{82}Pb^{206}$,

the number of lpha and eta particles emitted are

A. $10\alpha, 6\beta$

B. 4 protons, 8 neutrons

C. 6 electrons, 8 protons

D. 6β , 8α

Answer: D



21. Which of the following statements is false ?

A. In chlorine gas, the ratio of ${}^{35}Cl$ and ${}^{37}Cl$ is 1:3`

B. Hydrogen bomb is based on the principle of

nuclear fusion

C. The atom bomb is based on the principle of

nuclear fission

D. The penetrating power of proton is less than that

of electron

Answer: A



22. The composition of tritium is

A. 1 electron , 1 proton , 1 neutron

B. 1 electron, 2 protons, 1 neutron

C. 1 electron, 1 proton, 2 neutrons

D. 1 electron, 1 proton, 3 neutrons.

Answer: C



23. Isotopes of elements were discovered by

A. Soddy

B. Curie

C. Chadwick

D. Thomson

Answer: A



24. The number of electrons in the nucleus of C^{12} is

A. 6

B. 12

C. 17

D. 0

Answer: D





25. In the reaction ltBrgt $_7N^{14}+_2He^4
ightarrow _aX^b+_1H^1$

the nucleus X is

A. N-16

B. N-17

C. O-16

D. O-17

Answer: D

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

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

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

C. ${}_{34}Z^{38}$

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

Answer: D



27. After emission of one α particle followed by one β particle from ${}^{238}_{92}X$, the number of neutrons in the atom will be

A. 142

B. 146

C. 144

D. 143

Answer: D



28. Heavy water is used as moderator in a nuclear reactor. The function of the moderator is

A. to slow down the speed of neutron

B. to increase the speed on neutron

C. to produce more neutrons

D. to stop the nuclear reaction

Answer: A



29. By removing , one β -particle from a radio active

nucleus, the atomic number

A. increases by one

B. decreases by one

C. no change

D. increases by two

Answer: A



30. Which of the following is used as control rod?

A. Cadmium rod

B. Graphite rod

C. Boron

D. Both (A) and (C)

Answer: D

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31. Which is used as moderator in nuclear reactor?

A. D_2O

B. Alum

 $\mathsf{C}.\,H_2O$

D. None of these

Answer: A



32. 1.0g of a radioactive isotope left 125mg after 24 hr.

The half-life period of the isotope is

a. 8 hr b. 24 hr c. 6 hr d. 4 hr

A. 8 hours

B. 24 hours

C. 6 hours

D. 4 hours



33. A radioactive substance has a half life of 60 minutes. After 3 hours, the fraction of atom that have decayed would be.

A. 17.5~%

B. 12.5 %

C. 25~%

D. 50~%

Answer: B



Answer: D



35. A radioactive element X emits 3lpha , one beta and one

gamma-particles and forms $_{76}Y^{225}$ Element X is

A. ${}^{238}_{81}X$ B. ${}^{2237}_{80}X$ C. ${}^{237}_{80}X$

D. $^{236}_{80}X$

Answer: A



36. Which is correct statement ?

A. Isotopes are always radioactive

B. α rays are always negatively charged

C. β -rays are always negatively charged

D. γ -rays can be deflected in a magnetic field

Answer: C

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37. Which is not emitted by radioactive substance ?

A. α -rays

B. β -rays

C. positron

D. Proton

Answer: D

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38. Positron is -

- A. Electron with + ve charge
- B. a helium nucleus
- C. a nucleus with two protons
- D. a nucleus with one neutron and one proton.

Answer: A


39. $U^{235} + n^1 \rightarrow \,$ fission product + neutron + 3.2 $imes \, 10^{-11} j$. The energy released , when 1g of u^{235} finally undergoes fission , is

A. $12.75 imes10^88$ KJ

B. $18.60 imes 10^9 KJ$

 $\mathsf{C.8.21}\times 10^7 KJ$

D. $6.55 imes 10^6$ KJ



40. Which element is the end product of every natural

radioactive series?

A. Pb

B. Sn

C. C

D. Bi

Answer: A



41. In radioactive decay, which one of the following moves the fastest ?

A. α -particle

B. β -particle

C. γ -rays

D. positron



42. Which one of the following notations shows the product incorrectly?

A.
$$_{96}Cm^{242}(lpha,2n)_{97}BK^{24}$$

B. $_{5}B^{10}(lpha,n)_{7}N^{13}$

C.
$$_7N^{14}(n,p)_6C^{14}$$

D.
$${}_{14}Si^{28}(d,n)_{15}P^{29}$$

Answer: A



43. In terms of energy 1 a.m.u. is equal to

A. 100 J

B. 932.1 MeV

C. 931.1 k cal

 $\mathrm{D.}\,10^7~\mathrm{ergs}$

Answer: B

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44. The end product of (4n+2) disintegration series is

A. $^{204}_{82}Pb$

 $\mathsf{B}.\,{}^{208}_{82}Pb$

C. $^{209}_{82}Pb$

D. $^{206}_{82}Pb$

Answer: D

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45. If ${}_{90}Th^{238}$ disintegrates to ${}_{83}Bi^{212}$, then the number α and β particles emitted is

A. 4lpha and 7eta

B. 4α and 1β

C. 4α only

D. 7β only

Answer: B



46. What is X in the nuclear reaction

 $._7 \, N^{14} + ._1 \, H^1
ightarrow ._8 \, O^{15} + X$

A. $_0n^1$

B. $_{-1}e^{0}$

C. $_{+1}e^{0}$

D. γ



47. The radioactive isotope used to estimate the age of ancient geological formations is

A. O^{16}

 $\mathsf{B.}\,Pb^{212}$

 $\mathsf{C.}\,Fe^{59}$

 $\mathsf{D.}\, C^{14}$



48. The half life period of a radioctive element is 140 days. Afte 560 days, one gram of the element will reduced to : a) $\frac{1}{2}g$ b) $\frac{1}{4}g$ c) $\frac{1}{8}g$ d) $\frac{1}{16}g$

A. 1/2

B. 1/4

C.1/8

D. 1/16



49. Number of neutrons i8n a parent nucleus X, which gives $._7^{14} N$ after two sucessive β – emission would be:

A. 6

B. 7

C. 8

D. 9



50. The activity of radionuclide $\binom{100}{X}$ is 6.023 curie. If the disintegration constatnt is a) $3.7 \times 10^4 \text{sec}^{-1}$,the mass of radionuclide is b) 10^{-6} g c) 10^{-15} g d) 10^{-3} g

- A. $10^{-14}g$
- $\mathrm{B.}\,10^{-6}~\mathrm{g}$
- $C. 10^{-15} g$
- $\mathsf{D}.\,10^{-3}~\mathsf{g}$



51. The symbol x in the following equation is

 $_{11}Na^{23}+_1H^1
ightarrow _{12}Mg^{23}+x$

A. A neutron

B. A deutron

C. A positron

D. An α -particle

Answer: A



52. The half - life of $._{92} U^{238}$ against $\alpha - decay$ is 4.5×10^9 years. How many disintegrations per second occur in 1 g of $._{92} U^{238}$?

A. $9.0 \times 10^9 \text{ years}$

B. $13.5 imes 10^9$ years

C. $4.5 imes 10^9$ years

D. $4.5 imes 10^{4.5}$ years



53. Sulphur 35(34,96903 amu) emits a β – particles but no γ -rays. The product is c hlorine -35 (34, 96885 amu),. The maximum energy carried by β – particle is:

A. 16.758 MeV

B. 1.6758 MeV

C. 0.16758 MeV

D. 0.016758 MeV



54. In the following radioactive decay, $_{92}U^{238}
ightarrow (89)Y^{220}$, how many lpha and eta particles are ejected from X to form Y ?

A. 3lpha and 3eta

B. 4α and 3β

C. 3α and 5β

D. 5α and 5β

Answer: A



55. The half-life of a radioactive isotope is 3 h. if the initial mass of the isotope was 300 g, the mass which remained undercayed in 18 h would be

A. 2.34 g

B. 1.17 g

C. 9.36 g

D. 4.68 g



56. β -particles are

A. Charge particles emitted from nucleus

- B. neutral particle orbiting nucleus
- C. a particle produced by splitting of σ into H and

 n_0^1

D. high energy positively charged particles emitted

from nucleus

Answer: A



57. What will be half life period of a nucleus if at the

end of 4.2 days, N $= 0.798 N_0$?

A. 15 days

B. 10 days

C. 12.83 days

D. 20 days



58. If 2.0 g of a radioactive substance has $t_{1/2}$ of 7 days

, the half life of 1 g sample is

A. 7 days

B. 14 days

C. 28 days

D. 35 days

Answer: A



59. Neutron was discovered by

A. Chadwick

B. Rutherford

C. Yukank

D. Dalton

Answer: A

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60. Isobar of a nucleide is formed whentakes place ?

A. 1lpha -emission

B. 1β -emission

C. 1α and 1β emission

D. 2α and 1β -emission

Answer: B



61. After 2 hr the radioactive substance becomes 1/16 th

of original amount. The $t_{1/2}$ in minutes is

A. 60 min

B. 120 min

C. 30 minutes

D. 15 minutes

Answer: C



62. The reaction
$$_7N^{14} + _0n^1
ightarrow _6C^{14} + X$$

requires emission of

A. 4_2He

- $\mathsf{B}.\,{}^1_1H$
- $\mathsf{C}.\,{}^1_0n$

D.
$$_{-1}e^{0}$$



63. Positron was so named by

A. Rutherford

B. Fermi

C. Valrava

D. Anderson



64. The number of lpha and eta particles emitted in nuclear reaction ${}_{90}Th^{228} o {}_0Th^{228}$ are respectively

A. 4,1

B. 3,7

C. 8,1

D. 4,7

Answer: A



65. Wooden article and freshly cut tree show activity 7.6 and 15.2 min $^{-1}g^{-1}$ of carbon ($t_{1/2} = 5760$ year) respectively. The age of the article is a)5760 year b) $5760 \times \frac{15.2}{7.6}year$ c) $5760 \times \frac{7.6}{15.2}year$ d) $5760 \times 15.2 - 7.6year$

A. 5760 yrs

$$\mathsf{B.}\,5760\!\left(\frac{15.6}{7.8}\right)\,\mathsf{yrs}$$

C. $5760 imes 7.8 \,/\, 15.6$ yrs

D.
$$5760 imes(15.6-7.8)$$
 yrs

Answer: A

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66. A radioactive isotope having $t_{\frac{1}{2}} = 2.3$ days was received after 9.2 days . It was found that 300 mg of the isotope was left in the container. The initial amount of the isotope was

A. 4800 mg

B. 2400 mg

C. 1200 mg

D. 3600 mg

Answer: A

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67. A sample of radioactive substance with a $t_{1/2} = 3$ days was found to contain 3 g of it, when received exactly after 12 days. The amount of radioactive substance when it was sealed was

A. 6 g

B. 12 g

C. 24 g

D. 48 g



68. A human body required the 0.01 M activity of radioactive substance after 24 h. Half life of radioactive substance is 6h. Then injection of maximum activity of radioactie substance that can be injected will be

A. 0.08

B. 0.04

C. 0.16

D. 0.32



69. If $_aX^b$ emits firstly a positron, then two α and two β and in the last α is emitted and finally it converts to $_d^cY$. The correct relation is

A.
$$a=C+12, d=b-5$$

B.
$$a=c+8, d=b-1$$

C.
$$a=c+6, d=b-2$$

D.
$$a=c+4, d=b-2$$

Answer: A



70. In the case of a radioisotope , the value of $t_{1/2}$ and

 λ are identical in magnitude. The value is

A. 1/0.693

B. $(0.693)^{1/2}$

C. 0.693

D. $(0.693)^{1/2}$



71. Half life of a radioactive substance which disintegrates by 75% in 60 min be

A. 120 min

B. 30 min

C. 45 min

D. 20 min



72. The half life period of a radioactive element is 90 minutes. What percentage of radioactive element will be present after 6 hours of decomposition ?

A. 25~%

 $\mathsf{B.}\,6.25\,\%$

C. 50 %

D. 12.5~%



73. A sample of eood decayed to 1/16 of its original value. What is the number of $t_{1/2}$?

A. 3

B.4

C. 8

D. 16



74. ^{226}Ra disintegrates at such a rate that after 3160 years, only one fourth of its original amount remains . The half life of ^{226}Ra will be

A. 790 years

B. 3160 years

C. 1580 years

D. 6230 years



75. $_{Z}X^{M} + {_{2}He^{4}} \rightarrow {_{15}P^{20}} + {_{0}n^{1}}$

A. Z=12, M=17

B. Z=13, M=28

C. Z=12 ,M27

D. Z=13, M=27

Answer: D

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76. $_{92}U^{235}$ nucleus absorbs a neutron and disintegrates into $_{54}Xe^{139}$. $_{38}Sr^{94}$ and X. What will be the product X A. 3 neutrons

B. 2 neutrons

C. α -particles

D. β -particles.

Answer: A



77.
$$_{92}U^{238} \xrightarrow{\alpha} A \xrightarrow{\beta} _{x}^{y}B$$

What are x and y?

A. 90, 234
B. 91,234

C. 92,234

D. 93,234

Answer: B



78. Fill in the blank

 $_{92}U^{235}+_{0}n^{1}
ightarrow\,?\,+\,_{36}^{92}Kr+3_{0}^{1}n$

A. $^{141}_{56}Ba$

 $\mathsf{B.}\,{}^{139}_{56}Ba$

 $\mathsf{C}.\,{}^{139}_{56}Ba$

D. $^{141}_{54}Ba$

Answer: A



79. Half life of a radioactive particle is 1 second. The initial amount of A is 1000 . Then after 3 seconds, A will be

A. 500

B. 250

C. 125

D. 333

Answer: C



80. The age of most ancient geological formations is estimated by a)C-14 dating method b)K-Ag method c)U-Pb method d)Ra-Rn method

A. Potassium argon method

B. Carbon-14 dating method

C. Radium and silicon method

D. Uranium lead method.

Answer: D



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81. A radioisotope will not emit

A. alpha and beta rays simultaneously

B. beta and gamma rays simultaneously

C. gamma and alpha rays simultaneously

D. gamma rays only

Answer: D

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82. C^{14} is

A. an artifical radioactive isotope

B. a natural radioactive isotope

C. a natural non-radioactive isotope

D. an artifical non-radioactive isotope

Answer: B



83. Which one of the following radioisotopes is used in

the treatment of blood cancer?

A. P^{32}

 $\mathsf{B.}\, Co^{62}$

 $C. 1^{131}$

D. Na^{24}

Answer: A

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84. The proper rays for radio carbon dating are

A. UV rays

B. IR rays

C. Cosmic rays

D. X-rays

Answer: C

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85. The nuclear reaction

 ${}^{63}_{29}Cu + {}^{4}_{2}He
ightarrow {}^{37}_{17}Cl + {}^{1}_{1}H + 16{}^{1}_{0}n$

is referred to as

A. Spallation reaction

B. Fusion reaction

C. Fission reaction

D. Chain reaction

Answer: A	
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86. Unstable substance exhibity higher radioactivity due to

A. low P/N ratio

B. high P/N ratio

C. P/N =1

D. Both (A) and (B)

Answer: D



87. The reactor used to convert stable form to fissile form is

A. Chemical reactor

B. Nuclear reactor

C. Breeder reactor

D. Atomic reactor

Answer: C



88. Which of the following are easily stopped by air?

A. X-rays

B. UV -rays

C. γ -rays

D. α -rays

Answer: D

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89. β - particle in radioactivity is emitted by:

A. conversion of proton to neutron

B. from outermost orbit

C. conversion of neutron to proton

D. beta-particle is not emitted

Answer: C



90. The phenomenon of radioactivity is associated with a)Decay of nucleus b)Fussion of nucleus c)Emission of electrons or protons d)Rearragement in the in the extra nuclear electron

A. binary fission

B. nuclear fission

C. nuclear fusion

D. decay fo unstable nuclei

Answer: D

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91. The first artifical disintegration of an atomic nucleus

was achieved by

A. Geiger

B. Wilson

C. Madame curie

D. Rutherford

Answer: D

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92. The radioisotope , tritium $\binom{3}{1}H$ has a half-life 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. 8 mg

B.1mg

C. 2 mg

D. 4 mg

Answer: C



93. The radioactive nuclide $._{90}^{234} Th$ shows two successive β – decay followed by one α – decay. The atomic number and mass number respectively of the resulting atom is:

A. 92 and 234

B. 94 and 230

C. 90 and 230

D. 92 and 230

Answer: C



94. The half life of radioactive isotope is 3 hour. If the initial mass of isotope were 256 g, the mass of it remaining undecayed after 18 hr is a)12 g b)16 g c)4 g d)8 g

A. 4.0 g

B. 8.0 g

C. 12.0 g

D. 16.0 g

Answer: A



95. How may α – and β – particles will be emitted when $._{90} Th^{232}$ changes into $._{82} Pb^{208}$?

A. 8,6

B. 6,4

C.,4,2

D. 2,2

Answer: B



96. $A \xrightarrow{-2\beta} \xrightarrow{-\alpha} C$. Relation between A and C is

A. isotope

B. isotone

C. isodiapheres

D. isobar

Answer: A



97. It $t_{1/2}$ of A is 1000 yrs, then 'A' left after t=2000 years

A. 0.5

B. 0.25

C. 0.125

D. 0.06725

Answer: B



98. If N_0 =1 gm then after how many half lives N t will be 0.25 gm ?

A. 2

B. 3

C. 1

D. 4

Answer: A



99. $^{235}_{92}U+X ightarrow Ba+Kr+3^0_1n$ X is

A. 1_0n

 $\mathsf{B}.\,{}^1_1H$

C. $_{-1}e^0$

D. $_{+1}e^{0}$

Answer: A

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100. Alpha particles are

A. protons

B. charged helium atoms

C. positron

D. electrons.

Answer: B

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101. Most radioactive is

A. U-238

B. Plutonium

C. Thorium

D. None

Answer: A





102. Which of the following isotopes of uranium is most radioactive ?

A. U-226

B. U-248

C. U-238

D. U-235

Answer: D

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103. In the nuclear reaction

 ${}_{13}Al^{27} + {}_{2}He^4
ightarrow {}_{14}X^{30} + {}_{1}H^1, X$ is

A. Si

B. Al

C. Mg

D. P

Answer: A



104. The product obtained after positron emission from ${}_{31}Ga^{68}$ is

A. $_{30}Ga^{68}$

 $\mathrm{B.}_{\,30}Zn^{68}$

C. $_{31}Zn^{69}$

D. $_{31}Ga^{69}$

Answer: B



105. One gm of an element decays by β -emission to 0.125 gm in 200 years . The half life period of the reaction is

A. 0.014 years

B. 6.66 years

C. 66.6 years

D. 666 years

Answer: C



106. Isotopes are

A. atoms of different elements having same mass

number

B. atoms of same element having same mass

number

C. atoms of same element having different mass

numbers

D. atoms of different element having same number

of neutrons.

Answer: C



107. The noble gas used in atomic reactors is

A. krypton

B. oxygen

C. neon

D. helium

Answer: D



108. The atomic number (A) and mass number (M) of the nuclide formed when three alpha (α) and 2 beta (β) particles are emitted from $^{238}_{92}U$ is

A. A=87, M=233

B. A=86, M=226

C. A=88,M=235

D. A=88,M=226

Answer: D



109. The process, $_1H^2+_1H^3
ightarrow _2He^4+_0n^1$

represents the types of reaction known as

A. fusion

B. chemical

C. autocatalytic

D. fission

Answer: A



110. Given that radioactive species decays according to the exponential law $N = N_0 e^{-\lambda t}$. The half life of the species is

A. λ

B. N_0

C. $\lambda/\ln/2$

D. $\ln 2/\lambda$

Answer: D



111. Fusion bomb involves

A. Combinations of lighter nuclei into bigger

B. Destruction of heavy nucleus into smaller nuclei

C. Combustion of oxygen

D. Explosion of TNT

Answer: A



112. The element usef fro dating the ancient remains is

A. Ni

B. C-14

C. C-12

D. Rd.

Answer: B

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113. If the mass defect of ${}^9_4 X$ is 0.099 a.m.u. , then binding energy per nucelon is (1 a.m.u, 931.5 MeV)

A. 10.25 MeV

B. 931.5 MeV

C. 83.0 MeV

D. 8.38 MeV

Answer: A

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114. $_{27}Co^{60}$ is radioactive because

A. its atomic number is high

B. it has high p/n ratio

C. it has high n/p ratio

D. None of these



115. A heavy element has atomic number X and mass number Y . Correct relation between X and Y

- $\operatorname{A.} X > Y$
- $\operatorname{B.} X < Y$
- $\mathsf{C}.\, X=Y$
- D. X = Z(1 Y)

Answer: B



116. Decay of $_{92}U^{235}$ isorder reaction.

A. Zero

B. Ist

C. 2nd

D. 3 rd

Answer: B



117. Order of radioactive disintegration reaction is

A. Zero

B. Ist

C. 2nd

D. 3 rd

Answer: B

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118. In which radiation mass number and atomic number will not change ?

A. α

 $\mathsf{B.}\,\beta$
$\mathsf{C}.\,\gamma$

D. α and 2β

Answer: C

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

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

 $\mathsf{B.}\,{}^{59}_{28}Ni$

 $\mathsf{C.}\,{}^{59}_{28}Co$

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

Answer: D



120. A radioactive isotope decays at such a rate that after 192 minutes only 1/16 of the original amount remains. The half life of the radioactive isotope is

A. 32 min

B. 48 min

C. 12 min

D. 24 min



121. An artifical radioactive isotope gave ${}^{14}_7N$ after two successive β -particle emissions. The number of neutrons in the parent nucleus must be

A. 9

B. 14

C. 5

D. 7

Answer: A



122. If radium and chlorine combine to form radium chloride the compound is

A. no longer radioactive

B. twice as radioactive as radium

C. half as radioactive as radium

D. as radioactive as radium

Answer: D

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123. Consider the following nuclear reactions:

 $_{92}{}^{238}M
ightarrow$. $_{y}{}^{x}N+2$. $_{2}{}^{4}He$, $_{x}{}^{y}N
ightarrow$ $_{B}{}^{A}L+2eta^{+}$

The number of neutrons in the element L is

A. 142

B. 146

C. 140

D. 144

Answer: C



124. The half life of a radio isotope is four hours. If the initial mass of the isotope was 200 g the mass remaining after 24 hours undecayed is

A. 1.042 g

B. 4.167 g

C. 3.125 g

D. 2.084 g

Answer: C



125. A radioactive isotope has half life of 8 days . If today 125 mg is left over, what was its original weight 32 days earlier?

A. 6 g

B. 5 g

C. 4 g

D. 2 g

Answer: D



126. Hydrogen bomb is based on the principle of

A. nuclear fusion

B. artifical radioactivity

C. nuclear fusion

D. natural radioactivtiy

Answer: A



127. A nuclide of an alkaine earth metal undergoes radioactive deacy by emission of the α – particles in

sucession. The group of the periodic tablle to which the resulting daughter element would belong to:

A. Gr 4

B. Gr 6

C. Gr 16

D. Gr 14

Answer: D

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128. $_{.92} U^{238}$ emits 8α – particles and 6β – particles. The n/p ratio in the product nucleus is a) $\frac{62}{41}$ b) $\frac{60}{41}$ c) $\frac{61}{42}$ d) $\frac{62}{42}$

A. 60/41

B. 61/40

C.62/41

D. 1/32

Answer: C



129. If a substance with hlaf life 3 days is taken at other

place in 12 days. What amount of substance is laft now

A. 1/4

B. 1/8

C.1/16

D. 1/32

Answer: C



130. The half lives of two radioactive nuclides A and B are 1 and 2 min. respectively . Equal weights of A and B are taken separately and allowed to disintegrate for 4 min. What will be the ratio of weigths of A and B disintegrated ? A. 1:1

B. 5:4

C. 1: 2

D. 1:3

Answer: B

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131. Calculate the energy released in the following:

$$._1\,H^2 + ._1\,H^3
ightarrow ._2\,He^4 + ._0\,n^1$$

(Given

masses

:

 $H^2=2.014, H^3=3.016, He=4.003, n=1.009m_uig)$

A. 16.76

B. 26.38

C. 13.26

D. 23.275

Answer: D

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132. In successive emission of β and α -particles, how many α and β -particles should be emitted for the natural (4n+1 series) conversion of $^{241}_{94}Pu$ to $^{233}_{92}U$ are

 $\mathsf{B.}\,\alpha,2\beta$

 $C. 2\alpha, 3\beta$

D. 2α , 2β

Answer: D

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133. What will be the binding energy of ${}^{16}O$, if the mass defect is 0.210 amu ?

A. $1.89 imes 10^{10} J ext{ mol}^{-1}$

B. $1.89 \times 10^{15} J \ mol^{-1}$

 $\textrm{C.}~1.89\times10^{14}J~mol^{-1}$

D. 1.89 \times $10^{13} J$ mol $^{-1}$

Answer: D



134. The compound used for the preparation of UF_6 in

the enrichment of . $_{92}\,U^{235}$ is

A. AlF_3

B. CaF_2

C. HF

D. CIF_3



135. How many alpha and beta particles are emitted when uranium $._{92}^{238} U$ decays to lead $._{82}^{206} Pb$?

A. 6lpha and 6eta

B. 6α and 8β

C. 8β and 8α

D. 6β and 8α

Answer: D



136. Which emits β -particles ?

A. $_1H^3$

 $\mathsf{B.}_6C^{14}$

C. $_{19}K^{40}$

D. All

Answer: B



137. The neutron to proton ratio of the daughter element after a nucleides ${}_{92}U^{238}$ loses an α -particle and a beta particle successively is

A. 144/90

B. 143/91

C. 144/91

D. 132/91

Answer: B



138. The nuclei $._6 C^{13} \&._7 N^{14}$ can be described as

A. isotopes

B. isotone

C. isobars

D. isosteres

Answer: B

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Selected Straight Objected Type MCQs

1. Control rods used in nuclear reactor are made of

A. Iron

B. Graphite

C. Cadmium

D. Boron

Answer: C::D

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2. The moderator used in nuclear reactor is

 $\mathsf{B.}\, D_2 O$

C. Graphite

D. Boron

Answer: B::C



3. In a nuclear reactor, heavy water is used to a)Increase the speed of neutorns b)Decreases the speed of neutrons c)Transfer the heat from the reactor d)None of above

A. transfer the that from the reactor

B. provide high speed neutrons for the fission

reactor

C. reduce the speed of moving neutrons

D. increase the speed of neutrons

Answer: A::C

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4. The fissionable material commonly used in atomic bomb is (are)

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

 $\mathrm{B.}_{92}Th^{238}$

 ${\sf C}_{.\,94}U^{239}$

D. $_{90}Th^{232}$

Answer: A::C



5. Nuclear fusion is the source of energy in

A. atomic bomb

B. hydrogen bomb

C. the sun

D. the moon

Answer: B::C



6. The nuclear reactions accompanied with emission of neutron (s) are

A.
$${}_{13}Al^{27} + {}_{2}H^4 \rightarrow {}_{15}P^{30}$$

B. ${}_{6}C^{12} + {}_{1}H^1 \rightarrow {}_{7}N^{13}$
C. ${}_{15}P^{30} \rightarrow {}_{14}Si^{30} \rightarrow {}_{14}Si^{30} + {}_{1}e^0$
D. ${}_{96}Cm^{241} + {}_{2}He^4 \rightarrow {}_{97}BK^{244} + {}_{1}e^0$

Answer: A::C

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7. Decrease in atomic number is observed during a) α emission b) β -emission c)positron emission d)electron capture

A. α -emission

B. β -emission

C. positron emission

D. electron capture

Answer: A::C::D

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8. Radium has atomic weight 226 and a half-life of 1600

Yr. The number of disintegrations produced per second

from one gram are

A. $4.28 imes 10^{11}$

B. $9.27 imes10^5$

C. positron emission

D. $6.02 imes10^{23}$

Answer: D



9. The activity of radionuclide $\binom{100}{X}$ is 6.023 curie. If the disintegration constatnt is a) $3.7 \times 10^4 \text{sec}^{-1}$,the mass of radionuclide is b) 10^{-6} g c) 10^{-15} g d) 10^{-3} g

- A. 10^{-3} g
- $\mathrm{B.}\,10^{-6}~\mathrm{g}$
- C. 10^{-14} 14 g
- $\mathsf{D.}\,10^{-15}~\mathsf{g}$

Answer: D



10. The half life of a radioactive substance is 24 hours. Time required for 12.5% of the original radioactive substance W remain is

A.1 day

B. 2 days

C. 3 days

D. 4 days

Answer: C



11. $_{91}Pa^{234}$ an element of group 3 emits β -particles, the

daughter nuclide belongs to

A. group 2

B. group 4

C. group 1

D. group 3

Answer: D



12. The mass of an atom of ${}_{2}He^{4}$ is 4.0026 amu . The mass of a neutron and a proton are 1.0087 amu and 1.0078 amu respectively. The nuclear binding energy per nucleon is nearly

A.7 MeV

B. 5 MeV

C. 10 MeV

D. 14 MeV

Answer: A

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13. $(92)^{233}U$ is assumed to decay by emitting lpha- and eta-

particles, the possible produce of decay is

A. ${}^{207}_{82}Pb$ B. ${}^{205}_{82}Pb$

C. $^{206}_{82}Pb$

D. $^{208}_{82}Pb$

Answer: C

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14. $^{238}_{92}U$ emits an lpha-particle, the product has the atomic and mass numbers as

A. 92,236

B. 90,234

C. 90,238

D. 96,236

Answer: B



15. The radiation from naturally occuring radioactive substance as seen after deflection by a magnetic field in one direction are :

A. Definitely alpha rays

- B. Definitely beta rays
- C. Both alpha and beta rays
- D. Either α -or β rays

Answer: D



16. An isotone of $.^{76}_{32} Ge$ is-

- (a) $.^{77}_{32} Ge$
- (b). $^{77}_{33} As$
- (c). $^{77}_{34}\,Se$

(d). $^{78}_{34} Se$

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

 $\mathsf{B}.\,{}^{77}_{32}As$

 $\mathsf{C.}\,{}^{77}_{34}Se$

D. $^{78}_{36}Sc$

Answer: B

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17. The half — life periof of a radioactive element is 140 days. After 560 days, one gram of the element will reduce to

B. 1/4 g

C. 1/8 g

D. 1/16 g

Answer: D

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18. The triad of nuclei that is isotonic is

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

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

Answer: A Watch Video Solution

19. .7 N^{13} changes to . $_6 C^{13}$ by the emission of

A. Electron

B. Neutron

C. Positron

D. Proton

Answer: C


20. The nucleus resulting from ${}_{92}U^{238}$ after successive emission of two lpha and four eta -particles is

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

B. $_{94}Pu^{230}$

C. $_{88}Ra^{230}$

D. $_{92}U^{230}$

Answer: D



21. 1g atom of an α -emitting $._z X^4$ (half life = 10 hr) was placed in sealed containers, 4.52×10^{25} . Helium atoms will accumulate in the container after a)4.52 hr b)10.00 hr c)9.40 hr d)20.00 hr

A. 4.52 hrs

B. 9.40 hrs

C. 10.00 hrs

D. 20.00 hrs

Answer: D

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22. An element X loses one α – and two β – particles in three successive stages. The resulting element will be

A. an isobar of X

B. an isotope of X

C. X itself

D. an isotone of X

Answer: B



23. ${}_{13}Al^{27}$ is a stable isotope. ${}_{13}Al^{29}$ is expected to disintegrate by

A. α -emission

B. β -emission

C. positron emission

D. Proton emission

Answer: B



24. Loss of β -particles is equivalent to

A. Increase of one proton only

B. Decrease of one neutron only

C. Both (a) and(b)

D. None of these

Answer: C



25. The number of neutrons accompanying the formation of $._{54} X e^{139}$ and $._{38} S r^{94}$ from the absorption of a slow neutron by $._{92} U^{235}$, followed by nuclear fission is

A. 0

B. 2

C. 1

D. 3

Answer: D

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26. $.^{23}$ Na is the 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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Linked Comprehension Type MCQs

1. The half life can serve as the molecular clock to determine the age of different products i.e., mineral, rocks and matter of vegetable origin such as wood, charcoal etc. because the half-life of a particlar nucleide

is constant. C-14 being radio-isotope , it is also used to determine the age of different products. which is known as radio-carbon dating.

C-14 is a neutron rich nucleide that decays by β emission with a half-life of 5730 years as under :

 ${}^{14}_6C
ightarrow {}^{14}_7N+{}^0_{-1}e$

Just after World War II . WIllcard F. Libby proposed a way to use this rection to determine the age of the carbon containing substances. The C-14 dating technique for which Libby received nobel is based upon the following assumption .

(i) C-14 is produced in atmosphere at a more or less constant rate which is also equal to its rate of decay. As a result, there is a constant concentration of C-14 in the atmosphere and all living things. (ii) After death, organisms no longer pick C-14

(iii) By comparing activity of a sample with acitivity of living tissue we can estimate the age of organisms . One of the Libby's assumptions is questionable, the amount of C-14 has not been constant with time. It has varied as much as ± 5 % .

The activity of the C-14 in given tissue is 15.3 dpm per gram of carbon. The limit for the reliable determination of C-14 is 0.1 dpm per gram of carbon. The maximum age of the sample, that can be dated accurately, is

A. 41600 years

B. 42700 years

C. 21600 years

D. 20500 years

Answer: A



2. The half life can serve as the molecular clock to determine the age of different products i.e., mineral, rocks and matter of vegetable origin such as wood, charcoal etc. because the half-life of a particlar nucleide is constant. C-14 being radio-isotope, it is also used to determine the age of different products. which is known as radio-carbon dating.

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It activity of C-14 in living matter is 15.3 dpm, then what will be the age of the object which has activity of 4 d.p.m. ?

A. 11100 years

B. 22200 years

C. $5.1 imes 10^5$ years

D. $2.1 imes 10^6$ years

Answer: A

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3. The half life can serve as the molecular clock to determine the age of different products i.e., mineral, rocks and matter of vegetable origin such as wood, charcoal etc. because the half-life of a particlar nucleide is constant. C-14 being radio-isotope, it is also used to determine the age of different products. which is known as radio-carbon dating.

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(iii) By comparing activity of a sample with acitivity of living tissue we can estimate the age of organisms . One of the Libby's assumptions is questionable, the amount of C-14 has not been constant with time. It has varied as much as ± 5 % .

Charcoal sample emits 62.3% of disintegrations per gram of carbon per minute for living tissue. Then, what will be the age of charcoal ?

A. 4910 years

B. 3910 years

C. 6000 years

D. 5050 years

Answer: B



4. The half life can serve as the molecular clock to determine the age of different products i.e., mineral, rocks and matter of vegetable origin such as wood, charcoal etc. because the half-life of a particlar nucleide is constant. C-14 being radio-isotope, it is also used to determine the age of different products. which is

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living tissue we can estimate the age of organisms . One of the Libby's assumptions is questionable, the amount of C-14 has not been constant with time. It has varied as much as $\pm 5~\%$.

What will be the weight ratio of living tissue to dead tissue for the age of 22920 years , if it is dated by radiocarbon technique ?

A. 16:1

B. 8:1

C. 10:3

D. 5:7

Answer: A

5. The phenomenon of spontaneous nuclear disintegration of radioactive elemets. Isotopes by emitting α , β or γ -rays in order to give stable nucleus is known as radioactivity. It is totally a nuclear phenomenon i.e., only depends upon the nucleons . It is alos known as activity and is given by

 $A = \lambda N$

where λ =decay constant

N=no. of atoms at time t

Activity per gram of the sample is known as specific activity . The cause of radioactivtiy of a nucleide can be attributed to a certain degree to its neutron to proton ratio i.e., n/p ratio. Lighter nucleides with n/p =1 or slightly greater than one, are non-radioactive or stable nucleides. Nucleides with Z>20 , requires large number of neutrons than protons to moderate the effect of the increasing protonic repulsions. Nucleides with Z > 83, the protonic repulsions are too large to overcome by proton -neutron interactions . The stable nuclei lie within zone of stability, all the nuclei which fall outside of this zone are invariably radioactive and unstable in nature. Nuclei which are above the stability zone have excess protons. These nuclei attain stability by making adjustments in n/p ratio for moderate value. Which of the following statement is correct?

A. The radioactivity of $RaCl_2$ and Ra will be same

B. The radioactivity of $RaCl_2$ and Ra will not be

samw

C. The radioactivity depends on the chemical

reaction

D. All

Answer: A



6. The phenomenon of spontaneous nuclear disintegration of radioactive elemets. Isotopes by emitting α , β or γ -rays in order to give stable nucleus

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overcome by proton -neutron interactions . The stable nuclei lie within zone of stability , all the nuclei which fall outside of this zone are invariably radioactive and unstable in nature. Nuclei which are above the stability zone have excess protons. These nuclei attain stability by making adjustments in n/p ratio for moderate value. Which of the following statement(s) is (are) correct ?

A. Radioactivity only depends upon the nucleons

B. Radioactivity is independent of pressure and

temperature

C. Radioactivity is directly proportional to the no. of atoms of the radioactive element, and reciprocal to the half-life of the radioactive elements

D. All of these

Answer: D



7. The phenomenon of spontaneous nuclear disintegration of radioactive elemets. Isotopes by emitting α , β or γ -rays in order to give stable nucleus is known as radioactivity. It is totally a nuclear phenomenon i.e., only depends upon the nucleons. It is alos known as activity and is given by

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Choose the correct statement(s)

A. The activity of the same radioactive element for 5

cc and 10 cc volume will be same

B. Specific activity of same radioactive element for

10 g and 1000 g sample will be same

C. Specific activity of same radioactive element for

10 g and 100 g sample will not be same

D. Specific activity for 10 g of each fo different

nucleides will be same.

Answer: B

8. The phenomenon of spontaneous nuclear disintegration of radioactive elemets. Isotopes by emitting α , β or γ -rays in order to give stable nucleus is known as radioactivity. It is totally a nuclear phenomenon i.e., only depends upon the nucleons . It is alos known as activity and is given by

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A. β -emission

- B. K-electron capture
- C. positron emission
- D. α -emission

Answer: A



9. The phenomenon of spontaneous nuclear disintegration of radioactive elemets. Isotopes by emitting α , β or γ -rays in order to give stable nucleus is known as radioactivity. It is totally a nuclear phenomenon i.e., only depends upon the nucleons. It is alos known as activity and is given by

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unstable in nature. Nuclei which are above the stability zone have excess protons. These nuclei attain stability by making adjustments in n/p ratio for moderate value. Nucleide with low n/p ratio, which are below the zone of stability , the stability cannot be achieved by

A. β -emission

B. K-electron capture

C. positron emission

D. emission of α -particles.

Answer: A

View Text Solution

1. Assertion : To separate U-235 from the more abundant U-238 isotope, all the uranium is converted into UF_6

Reason : UF_6 is one of the new compounds that exists in gaseous state under ordinary conditions

A. Both A and R are true and R is the correct

explanation of A

B. Both A and R are true but R is not a correct

explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: A



2. Assertion : Activity of 10^8 undecayed radioactive nucei of half life 50 days is equal to that of 10×10^8 number of undecayed nuclei of some other material with half life 60 days.

Reason : Activity is proportional to half life

A. Both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is not a correct

explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: A



3. Assertion (A): In radioactive disintegrations, $_2 He^4$ nuclei can come out of the nucleus but lighter $_2 H^3$ cannot.

Reason (R): The binding energy of $._2 H^3$ is more than that of $._2 H^4$. A. Both A and R are true and R is the correct

explanation of A

B. Both A and R are true but R is not a correct

explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: B



4. Assertion : In a fission reaction a heavy nucleus is broken into three fragement of nearly equal mass .

Reason: The binding energy per nucleon for a heavy nuclei is less than the binding energy per nucleon of the fragments.

A. Both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is not a correct

explanation of A

C. A is true but R is false

D. Both A and R are false

Answer: D

View Text Solution

5. Assertion : Neutrons are better projectiles.

Reason : Neutrons move faster than protons or alpha particles.

A. Both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is not a correct

explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: C


6. Assertion : Heavy water acts as a moderator in nuclear reactors.

Reason : Heavy water absorbs fast moving electrons.

A. Both A and R are true and R is the correct

explanation of A

B. Both A and R are true but R is not a correct

explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: C



7. Assertion $(A): \gamma$ – rays have very high penetrating power.

Reason $(R): \gamma$ - rays are high - energy electromagnetic radiations. a) If both (A) and (R) are correct, and (R) is the correct explanation of (A) b) If both (A) and (R) are correct, but (R) is not the correct explanation of (A) c) If (A) is correct, but (R) is incorrect. d) If (A) is incorrect, but (R) is correct.

A. Both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is not a correct

explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: A



8. Assertion : Neutrons are better prohectiles than protons or α -particles.

Reason : The neutrons being neutral does not experience repulsions form positively charged nucleus.

A. Both A and R are true and R is the correct

explanation of A

B. Both A and R are true but R is not a correct

explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: A



9. Assertion (A): Nucleus of the atom does not contain electrons, yet it emits β – particles in the form

of electrons.

Reason (R): In the nucleus , protons and neutrons exchange mesons frequently. a)If both (A) and (R) are correct , and (R) is the correct explanation of (A) b)If both (A) and (R) are correct, but (R) is not the correct explanation of (A) c)If (A) is correct, but (R) is incorrect. d)If (A) is incorrect, but (R) is correct.

A. Both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is not a correct

explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: B



10. Assertion : Thorium, uranium and actinium series are designated as 4n, 4n+2 and 4n+3 series respectively.

Reason : The mass number of all elements in the thorium series are divided by 4 gives a remainder of 2 while those of actinium series gives a remainder of 3 when the mass number is divided by 4.

A. Both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is not a correct

explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: A



11. Assertion : The fourth series (4n+1) starts with plutonium -241 and ends with bismuth -209 is known as Neptunium series.

Reason : Neptunium is a naturally occuring element

A. Both A and R are true and R is the correct

explanation of A

B. Both A and R are true but R is not a correct

explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: C

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12. Assertion : 4n+1 series is designated as Neptunium

series.

Reason : The fourth series is not naturally occuring and Neptunium -237 is the longest -lived member of the series.

A. Both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is not a correct

explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: A

View Text Solution

13. Assertion : β -particles are very effective projectile for transformation.

Reason : β -particles are negatively charged particles having very small mass and hence very small momentum

A. Both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is not a correct

explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: D



14. Assertion : α -particles are generally used as projectiles for transformation

Reason : α -particles always experience repulsion from the positively charged nucleus.

A. Both A and R are true and R is the correct

explanation of A

B. Both A and R are true but R is not a correct

explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: D



15. Assertion : At least one radioactive isotope of every element has been prepared in the laboratory.
Reason : The bombardment of various atomic nuclei with common light weight projectile lead to artificial radioactivity.

A. Both A and R are true and R is the correct

explanation of A

B. Both A and R are true but R is not a correct

explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: A



16. Assertion : The elements with atomic numbers greater than 92 (transuranic elements) are known as

synthetic elements.

Reason : Transuranic elements are rarely formed in the earth's crust but have been produced in the laboratory.

A. Both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is not a correct

explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: A

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17. Assertion : Plutonium among the transuranic elements is the longest lived element.

Reason : Plutonium is not radioactive.

A. Both A and R are true and R is the correct explanation of A

B. Both A and R are true but R is not a correct

explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: C



1. $^{238}_{92}U$ under lpha -decay . The daughter nuclide belongs to group

A. 5

B. 1

C. 3

D. 2

Answer: D



2. $^{237}_{92}U$ undergoes eta-decay . The daughter nuclide belong to group

A. 3

B. 4

C. 2

D. None of these

Answer: A



3. Consider the following disintegration reactions

 ${}_{91}Pa^{234} \xrightarrow{-eta} {}_{92}U^{234} \xrightarrow{-lpha} {}_{90}Th^{230} \xrightarrow{-lpha} {}_{88}Ra^{236}$ Ra

belongs to Groups 2 of the long form of the periodic

table. To which group nuclide Pa-91 belongs ?

A. 5

B. 4

C. 3

D. 2

Answer: C



4. Packing fraction for which of the following nuclide is

zero?

A. $_1H^1$

 $\mathsf{B.}\,_1H^2$

 $\mathsf{C.}_{26}H^{56}$

D. $_{6}H^{12}$

Answer: D

View Text Solution

5. Radioactive Equilibrium

A. the rate of fission becomes equal to rate of

fusion at equilibrium

B. the concentrations of various nuclide involved

becomes constant at equilibrium

C. both A and B

D. None

Answer: D

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6. An unstable nuclide with N/P ratio more than that required for stability can attain stability by

A. α -decay

B. β^- decay

C. K-electron capture

D. Both A and C

Answer: B

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7. An unstable nuclide (Z < 70) with N/P ratio less than that required for stability can attain stability by

A. α -decay

B. β^- decay

- C. K-electron capture
- D. Both A and C

Answer: A

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8. An unstable nuclide (Z < 70) with N/P ratio less than that required for stability can attain stability by

A. α -decay

- B. β^- decay
- C. K-electron capture
- D. All the three



radioactivity?

A.1g of Ra

B. 1 g of $RaCl_2$

C. 1 g of $Ra_3(PO_4)_2$

D. 1 g of $RaNO_3$

Answer: A



10. Maximum number of stable nuclides are when

A. P is even and N is odd

B. P is even and N is even

C. P is odd and N is even

D. P is odd and N is odd

Answer: B



11. Pick out the odd one out

A. Cyclotron

- B. Wilson cloud chamber
- C. Spinthariscope
- D. Geiger -Muller counter

Answer: A



12. Pick out the odd one out

A. Cyclotron

B. Linear particle accelerator

C. Cathode ray oscilloscope (CRO)

D. Synchroton

Answer: C

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13. Pick out the incorrect statement

A. Energy released per gram is more is case of

fusion than in fission

B. Energy released per mole is more in case of

fusion than in fission

C. Energy released per gram is more in case of

fission than in fusion

D. Energy released per mole is less in case of fission

than in fusion.

Answer: A

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Brain Teasers-7

1. How many electrons flow when a current of 5 amperes is passed through a conductor for 200 seconds?

A. $6.02 imes10^{23}$

 $\text{B.}\,6.24\times10^{21}$

 $\text{C.}~6.024\times10^{21}$

D. $6.2 imes 10^{22}$

Answer: B



2. Which of the following can act as an oxidising and reducing agent in neutral and alkaline solution ?

A. $K_2 Cr_2 O_7$

B. $KMnO_4$

 $\mathsf{C}. Cl_2$

D. CrO_3

Answer: B

View Text Solution	

3. Which of the following reactions involves neither oxidation nor reduction ?

A. $CrO_4^{2\,-}
ightarrow Cr_2O_7^{2\,-}$

- B. $Cr
 ightarrow CrCl_3$
- C. $Na
 ightarrow Na^+$

D. $2S_2O_3^{2\,-} o S_4O_6^{2\,-}$



4. What would happen when a small quantity of H_2O_2 is added to a solution of $FeSO_4$?

A. Colour disappears

B. H_2 is evolved

C. An electron is added to Fe^{2+}

D. An electron is lost by Fe^{2+}

Answer: D

5. The buring of hydrogen is called as

A. Hydrogenation

B. Hydration

C. Oxidation

D. Reduction

Answer: C



6. The elements with even atomic numbers are

A. less stable

B. more stable

C. may or may not be stable

D. none

Answer: B

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7. The numbers 2,8,20,28,50,82,126 are called as

A. even Numbers

B. integers

C. bohr Numbers

D. magic Number

Answer: D

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8. How may α – and β – particles will be emitted when $._{90} Th^{232}$ changes into $._{82} Pb^{208}$?

A. 2,2

B. 4,2

C. 6,4

D. 8,6



9. Successive emission of an α -particle and two β particles by an atom of an element result in the formation of its

A. isobar

B. isotone

C. isotope

D. isotherm

Answer: C



10. The largest stable nucleus is

A. U-238

B. U-235

C. Pb-206

D. Bi-209

Answer: C

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11. When a radioactive substances is subjected to a vacuum, the rate of disintergration per second

A. increase considerably

B. increases only if the products are gaseous

C. is not affected

D. suffer a slight decrease

Answer: C


12. The radioactivity due to C - 14 isotope (half-life = 6000 years) of a sample of wood form an ancient tomb was found to be nearly half that of fresh wood. The bomb is there for about how many years old? a)3000 b)6000 c)9000 d)12000

A. 3000 years old

B. 6000 years old

C. 9000 years old

D. 12000 years old

Answer: B

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13. Tritium undergose radioactive decay giving

A. α -particle

B. β -particle

C. neutrons

D. None of these

Answer: B



14. How many hour are required for a current of 3.0

ampere to decompose 18g water?

A. 6 h

B. 12 h

C. 18 h

D. 24 h

Answer: B

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15. The nuclear reaction given below is of type

 $^{27}_{13}Al+^4_2He
ightarrow ^{30}_{14}Si+^1_1H$

A. fusion

B. fission

C. transmutation

D. chemical

Answer: C

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16. A sample of radioactive element with $t_{0.5}$ of 11.2yr weigh 2.0 g . After 33.6 yrs how much is left ?

A. 0.25 g

B. 0.5 g

C. 0.75 g

D. 1.0 g



17. The $t_{0.5}$ of a radioactive element is related to its average life by the expression

A. $1.44/t_{0.5}$

B. $0.693t_{0.5}$

C. $t_{0.5}/1.44$

D. $1.44t_{0.5}$

Answer: D

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18. Which one is an example of miceller system?

A. Soap + water

B. Protein + water

C. Rubber + benzene

D. None

Answer: A



19. Which of the following is the best protective colloid?

A. Gelatin (gold no.=0.005)

B. Gum arabic (gold no. =0.15)`

C. Egg albumin (gold no. = 0.08)

D. None

Answer: A



20. The coagulation of 100ml of colloidal solution of gold is completely prevented by addition of 0.25g of a substance "X" to it before addition of 1 ml of 10% NaCl solution. The gold number of "X" is :

A. 0.25

B. 25

C. 250

D. 2.5

Answer: B



21. A isoelectric point

A. Colloidal particles become uncharged

B. Colloidal sol becomes highly stable

C. Peptization can be carried out

D. None

Answer: A

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22. Gold number was given by :

A. Ostwald

B. Zsigmondy

C. Williams ad Chang

D. None

Answer: B

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23. The accumulation of gases on surface of solids is

called as

A. Absorbtion

B. Adsorption

C. Occlusion

D. None

Answer: C

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24. In the Leclanche dry cell, anode is

A. Graphite rod

B. Carbon

C. Zinc container

D. MnO+ carbon

Answer: C





25. If the specific conductance and conductance of a solution are same, then its cell constant is equal to:

A. 1

B. 0

C. 1000

D. 10

Answer: A

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26. Which of the following solutions will have the

highest specific conductance?

A. 0.001 N

B. 0.0001 N

C. 0.1 N

D. 1.0 N

Answer: D



27. The term quinhydrone means

A. a quinone

B. a hydroquinone

C. a mixture of quinone and hydroquinone

D. none of above

Answer: C



28. The standard electrode potential of the electrode

Ag(s), AgCl| KCl (1 M) is

A. +0.2225V

 $\mathrm{B.}+0.2245V$

 $\mathrm{C.}+0.2255V$

 $\mathsf{D}.\,0.2265V$

Answer: A

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29. The calomel electrode is reversible with repect to :

A. mercury

 $\mathsf{B.}\,H^{\,+}$

 $\mathsf{C.}\,Hg^{2\,+}$

D. Cl^{-}



30. In potentiometric titrations, the end point of a titration is determined

A. with the help of an indicator

B. by measuring potential of an electrode

C. by measuring conductance

D. by measuring density

Answer: B



31. In a concentration cell the

A. two electrodes are of different elements

B. two electrolytic solutions of the same electrolyte

but having different concentrations are used

C. electrolyte of one strength but elecrtrodes of

two different concentrations are used

D. Both (B) and (C)

Answer: D

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32. The electrode potential of a glass electrode depends upon

A. concentration of chlorine ions

B. concentration of hydrogen ions

C. concentration of KCl solution

D. None of these

Answer: B



33. Lithium is generally used as an electrode in high energy density batteries . This is because

A. lithium is the hightest element

B. lithium has quite high negative reduction potential

C. lithium is quite reactive

D. lithium does not corrode easily

Answer: B



34. How long will it take for a current of 3 amperes to

decompose 36g of water? (Eq. wt. of hydrogen is 1 and

that of oxygen is 8)

A. 36 hours approx.

B. 18 hours approx

C. 9 hours approx.

D. 4.5 hours approx.

Answer: A

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35.
$$\wedge = \wedge^0 - b\sqrt{c}$$
 is called as

A. Faraday's Equation

B. Debye-Huckel-Onsagar's Equation

C. Henderson's Equation

D. None

Answer: B

View Text Solution

36. Calculate equivalent conductivity of $1MH_2SO^4$ whose conductivity is 26×10^{-2} ohm $^{-1}cm^{-1}$

A. 260

B. 130

C. 65

D. 200

Answer: B



37. At $18^{\circ}C$, the conductivities at infinite dilution of NH_4Cl , NaOH and NaCl are 129.8, 217.4 and 108.9 mho respectively. If the equivalent conductivity of N/100 solution of NH_4OH is 9.93 mho, calculate the degree of dissociation of NH_4OH at this dilution.

A. 0.392

B. 39.2

C. 3.92

D. 0.039



38. KCl cannot be used as a salt bridge for cell Cu(s)| $CuSO_4(aq) \mid |AgNO_3(aq)|Ag(s)$ because

A. $CuCl_2$ gets precipited

B. Cl_2 gas is evolved

C. AgCl gest precipitated

D. None of the above

Answer: A



Brain Teasers-8

1. Oxidation number of carbon in carbon suboxide (C_3O_2) is :

A.
$$\frac{+2}{3}$$

B. $\frac{+4}{3}$
C. +4

D.
$$\frac{-4}{3}$$

Answer: B



2. Which of the following change represents a disproportionation reaction (s) :

A. $Cl_2 + 2OH^-
ightarrow ClO^- + Cl^- + H_2O$

B. $Cu_2O+2H^+
ightarrow Cu+Cu^{+2}+H_2O$

C.

 $2HCuCl_2 \xrightarrow[water]{ ext{dilution with}} Cu + Cu^{+2} + 4Cl^- + 2H^+$

D. All the above

Answer: D



3. The number of electrons per second which pass through a cross section of a copper wire carrying 10^{-16} A is

A. $1.6 imes 10^{-3}$ e/s

B. 60 e/s

C. 625 e/s

D. $16 imes 10^{-2}$ e/s

Answer: C



4. Blocks of magnesium metal are often strapped to the steel hulls of ocean going ships in order to:

A. provide catholic protection

B. prevent oxidation of the steel

C. Both A and B are correct

D. None of the A and B are correct

Answer: C



5. To what stable isotope ${}^{257}_{103}Lw$ decay after having been produced by artificial means ?

A. ${}^{209}_{83}Bi$ B. ${}^{208}_{82}Pb$ C. ${}^{206}_{82}Pb$

D. $^{207}_{82}Pb$

Answer: A



6. Sedimentation potential is reverse of :

- A. Electro-osmosis
- B. Electrophoresis
- C. Electro kinetic potential
- D. Dorn potential

Answer: B



7. Electro-osmosis was discovered by

A. Dorn

B. Reuss and Porret

C. Freundlich

D. Langmuir

Answer: B



8. 50ml of 1M oxalic acid is shaken with 0.5g of wood charcoal. The final concentration of the solution after adsorption is 0.5M. Amount of oxalic acid absorbed per gm of charcoal is

A. 3.15 g

B. 3.45 g

C. 6.30 g

D. None

Answer: A

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9. Silver iodide is used for producing artifical rain because AgI

A. is easy to spray at high altitude

B. is easy to synthesize

C. has crystal structure similar to ice

D. is insoluble in water

Answer: C

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10. Isoelectric point is the pH at which colloidal particles

A. coagulate

B. become electrically neutral

C. can move towards either electrode

D. All of these

Answer: D

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11. The nucler reacion,

 $.^{63}_{29} Cu + .^{4}_{2} He \rightarrow .^{37}_{17} Cl + 14.^{1}_{1} H + 16.^{1}_{0} n$

represents:

A. Artificial radioactivity

B. Induced radioactivity

C. Nuclear reaction

D. Spallation reaction

Answer: D



12. The mass Co-59 is 58.9332 . What is the value of its

packing fraction ?

A. - 11.322

B. $11.322 imes 10^4$

 $\mathsf{C.}\,1.132\times10^4$

 $\mathsf{D.}-1.132 imes10^3$

Answer: A

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13. If the nuclear radius of $.^{27}A1$ is 3.6 Fermi, the approximate nuclear radius of 64Cu in Fermi is :

A. 1 Fermi

B. 5.6 Fermi

C. 6.5 Fermi

D. 3.8 Fermi

Answer: B



14. A cyclotron cannot accelerate

A. protons

B. deutrons

C. neutrons

D. α -particles

Answer: C



15. Nuclear power reactors are operated at low temperature and consequently will lower efficiency because

A. nuclear heat is carried by ordinary steam

B. uranium is difficult to heat

C. the walls of nuclear reactors cannot with stand

high temperature
D. All the above

Answer: C

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16. The source of energy of Red giant Stars, which are

cooler than sun is

A. Fission

B. Fusion

C. Burning of coal

D. Burning of gases.

Answer: B



17. If 200 MeV energy is released in the fission of a single nucleus of $\frac{235}{92}U$ how many fissions must occur per second to produce a power of 1k W

A. $22222sec^{-1}$

- B. 3.2 \times $10^{-11} \rm sec^{-1}$
- C. $31.25 imes 10^{13} \mathrm{sec}^{-1}$
- D. $31.25 imes10^{12} \mathrm{sec}^{-1}$

Answer: D



18. All colloidal solutions show :

A. very high osmotic pressure

B. high osmotic pressure

C. low osmotic pressure

D. no osmotic pressure

Answer: C

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19. An atom of radium combines with two atoms of chlorine to form $RaCl_2$ molecules . The radioactivity of $RaCl_2$ will be

A. as much as that of same quantity of Ra

B. one third of the same qunatity of Ra

C. one half of the same quantity of Ra

D. zero

Answer: A



20. All cell do not contain

A. an anode

B. a cathode

C. ions

D. a Porous parition

Answer: D



21. which of the following can be used in an electrode ?

A. a nail

B. A glass rod

C. A wooden rod

D. None

Answer: A



22. Given standard electrode potentials:

 $Fe^{3+}+3e^- o Fe,\,E^\circ\,=\,-\,0.036$ volt $Fe^{2+}+2e^- o Fe,\,E^\circ\,=\,-\,0.040$ volt The standard electrode potential E° for $Fe^{3+}+e^- o Fe^2$ is:- A. 0.772 V

 $\mathrm{B.}-0.404\,\mathrm{V}$

 ${\rm C.}+0.404V$

 $\mathrm{D.}-0.772V$

Answer: A

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23. The differnce between a decinormal solutions of hydrochloric acid and a decinormal solution of acetic acid is that

A. one of them is corrosive and the other is not

B. one of them conducts electricity and the other

does not

C. one of them decomposes sodium carbonate and

the other does not

D. one of them contains undisociated molecules of

the acid and the other does not

Answer: D

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24. Ostwald's dilution law is not obeyed by

A. CH_3COOH

 $\mathsf{B.}\, NH_4OH$

C. HCN

D. KCl

Answer: D

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25. In the salt bridge KCI is used because

A. it is an electrolyte

B. it is an ionic compound

C. it is a good conductor of electricity



26. Nuclide having the same number of protons and also neutrons nut differ in radioactivity are called as

A. isotones

B. isobars

C. nuclear Isomers

D. isodiaphers

Answer: C



27. Neutrions was predicted to:

A. conserve mass of the reaction

B. conserve charge of the reaction

C. conserve spin of the reaction

D. All the above

Answer: C



28. Colloidion is a colloidal solution of

A. source in water

B. cellulose in water

C. cellulose nitrate in water

D. cellulose nitrate in ethyl alcohol

Answer: D



29. A catalyst in the finely divided state is more efficient

because in this state

- A. it has larger activation energy
- B. it can react with one of the reactant more

efficiently

- C. it has large surface area
- D. All the above

Answer: C



30. Conductivity water is

A. the water whose own conductance is very very

small

B. highly purified water containing no suspended

impurity

C. the water whose conductance is quite high

D. the water which has been sterilised.

Answer: A



31. Which of the following reactions leads the formation of colloidal solution ?

A.
$$Cu + HgCl_2
ightarrow CuCl_2 + Hg$$

 $\texttt{B.}\ 2HNO_3+3H_2S\rightarrow 3S+H_2O+2NO$

 $\text{C.}\, 2Mg + CO_2 \rightarrow 2MgO + C$

D. $Cu = CuCl_2
ightarrow Cu_2Cl_2$

Answer: B

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32. The phenomenon of Synersis is

A. separation of the dispersed phase form the gel

B. formation of a sol from a gel

C. migration of colloid in an electric field

D. process of converting gel into a true solution.

Answer: A

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33. Ferric chloride is applied to stop bleeding cut because

A. Fe^+ ions coagulate blood which is a negatively

charged solution

B. Fe^{3+} ion coagulate blood which is a positively

charged solution

C. Cl^- ions coagulate blood which is a positively

charged solution

D. Cl^- ions coagulate blood which is a negatively

charged solution.

Answer: A

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34. ZSM - 5 is used to conver :

A. Alcohol to Petrol

B. Benzene to Toluence

C. Toluence to Benzene

D. Heptance to Toluence



35. which of the following does not contain a hydrophobic structures.

A. Linseed oil

B. lanolin

C. Glycogen

D. Rubber

Answer: D



36. Colloidal sulphur is used as

A. a disinfectant

B. a germ killer

C. a treating eye diseases

D. a to raise vitality of human system

Answer: B



37. Colloidal gold is given by injection

A. to act as a disinfectant

B. to act as a germ killer

C. for treating eye diseases

D. to raise vitality of human system

Answer: D



38. Lysione is used as

A. disinfectant

B. germ

C. treating eye diseases

D. to raise vitality of human system

Answer: A

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39. Example of intrinsic colloid is

A. Egg -albumin

B. Sulphur

C. Arsenic sulphide

D. Ferric hydroxide

Answer: A





40. Term catalyst was given by

A. Rutherford

B. Berzelius

C. Wohler

D. Kolbe

Answer: B



Unit Test 4

1. In the reaction

 $3Br_2 + 6CO_3^{2-} + 3H_2O
ightarrow 5Br^- + 2BrO_3^- + 6HCO_3^-$

A. Bromine is oxidized and carbonate is reduced

B. Bromine is reduced and water is oxidized

C. Bronine is neither oxidized nor reduced

D. Bromine is both reduced nad oxidized

Answer: D



2. Which of the following is a redox reaction ?

A. H_2SO_4 with NaOH

B. In atmosphere , O_3 from O_2 by lightning

C. Nigrogen oxides form nitrogen and oxygen by

lightning

D. Evaporation of H_2O

Answer: C



3. For the redox reaction

 $MnO_4^- + C_2O_4^{2-} + H^+ o Mn^{2+} + CO_2 + H_2O$

The correct coefficients of the reactants for the balanced reaction are

Answer: A

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4. The chemical that undergoes self oxidation and self

reduction in the same reaction is

A. benzyl alcohol

B. acetone

C. formaldehyde

D. acetic acid

Answer: C



5. In which of the following pairs, there is greatest difference in the oxidation number of the underlined elements ?

A. $\underline{N}O_2$ and \underline{N}_2O_4

- B. \underline{P}_2O_5 and \underline{P}_4O_{10}
- C. $\underline{N}_2 O$ and $\underline{N} O$
- D. $\underline{S}O_2$ and $\underline{S}O_3$

Answer: D



6. One of the following has both positive and negative

oxidation states

A. Fe

B. Cl

C. He

D. Na

Answer: B



7. In which of the following compounds , the oxidation

number of iodine is fractional ?

A. IF_7

 $\mathsf{B.}\,I_3^{\,-}$

C. IF_5

D. IF_3

Answer: B	
O Watch Video Solution	

8. In which of the following , elements has least oxidation number ?

A. $Ni(CN)_4$

 $\operatorname{B.}Ni(CO)_4$

 $\mathsf{C.}\,Fe_2O_3$

D. SF_6

Answer: B



9. A,B and C are three elements forming a compound in which their oxidation state are +2,+5, and -2 respectively. Which could not be the formula of compound?

- A. $A_2(BC)_2$
- B. $A_2(BC_4)_3$
- C. $A_3(BC_4)_2$
- D. ABC

Answer: C



10. When $KMnO_4$ acts as an oxidising agnet and ultimetely from MnO_4^{2-} , MnO_2 , Mn_2O_3 , and Mn^{2+} , then the number of electrons transferred in each case, respectively, are

A. 4,3,1,5

B. 1,5,3,7

C. 1,3,4,5

D. 3,5,7,1

Answer: C



11. Which of the following reactions involves neither

oxidation nor reduction ?

A.
$$CrO_4^{2\,-}
ightarrow Cr_2 CrO_7^{2\,-}$$

 $\mathsf{B}. Cr
ightarrow CrCl_3$

C.
$$Na
ightarrow Na^+$$

D. $2S_2O_3^{2-} o S_4O_6^{2-}$

Answer: A



12. In the following reaction,

 $4P+3KOH+3H_2O
ightarrow 3KH_2PO_2+PH_3$

A. only phosphorus is oxidized

B. only phosphorus is reduced

C. phosphorus is both oxidized and reduced

D. phosphorus is neither oxidized nor reduced

Answer: C

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13. The most powerful oxidizing agent in the following

is

A. H_3Bo_3

B. HPO_3

 $\mathsf{C}.\,H_3PO_4$

 $\mathsf{D.}\,H_2SO_4$

Answer: D



14. A current of 2.0A passed for 5 hours through a molten metal salt deposits 22.2 g of metal (At. Wt. =177). The oxidation state of the metal in the metal salt is

 $\mathsf{A.}+1$

C. + 3

D.+4

Answer: C



15. on passing a current of 1.0 ampre for 16 min and 5 sec through one litre solution of $CuCl_2$ all the copper of the solution was solution was peposited at cathode. The strength of $CuCl_2$ solution was (Molar mass of Cu=63.5 faraday constant =96500 $Cmol^{-1}$)

A. 0.07 M

B. 0.2 N

C. 0.005 N

D. 0.02 N

Answer: C



16. In a solution of $CuSO_4$ how much time will be required to preciitate 2 g copper by 0.5 ampere current?

A. 12157.48 sec

B. 102 sec
C. 510 sec

D. 642 sec

Answer: A

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17. Conductivity (S m) is directly proportional to area of the plates and the concentration of solution (mol m^{-3}) in it and is inversely proportional to the distance between plates then the unit of constant of proportionality is

A. $Smmol^{-1}$

B. Sm^2 mol⁻¹

C. $S^{-2}m^2$ mol

D. S^2m^2 mol $^{-2}$

Answer: A



18. The cell constant of a given cell is 0.47 cm^{-1} . The resistance of a solution placed in this cell is measured to be 3.16 ohm . The conductivity of the solution (in Acm^{-1} where S has usual meaning) is

A. 0.15

B. 1.5

C. 0.015

D. 150

Answer: C



19. The resistance of 1N solution of acetic acid is 250ohm, when measured in a cell of cell constant $1.15cm^{-1}$. The equivalent conductance (in $ohm^{-1}cm^2eq^{-1}$) of 1N acetic acid is

A. 4.6

B. 9.2

C. 18.4

D. 0.023

Answer: A



20. The conductivity of saturated solution of $BaSO_4$ is $3.06 \times 10^{-6} ohm^{-1} cm^{-1}$ and its equivalent conductance is 1.53 $ohm^{-1} cm^2$ equiv⁻¹. The K_{sp} for $BaSO_4$ will be:

A. $4 imes 10^{-12}$

B. $2.5 imes10^{-9}$

C. $2.5 imes 10^{-13}$

D. $4 imes 10^{-6}$

Answer: D



21. What will be the emf for the given cell?

 $Pt|H_{2}(g,P_{1})|H^{+}(aq)|H_{2}(g,P_{2})|Pt|$

A.
$$\frac{RT}{F} \operatorname{In} \frac{P_1}{P_2}$$

B.
$$\frac{RT}{2F} \operatorname{In} \frac{P_1}{P_2}$$

C.
$$\frac{RT}{F} \operatorname{In} \frac{P_2}{P_1}$$

D. None of these

Answer: B



22. On the basis of information available from the reaction

 $rac{4}{3}Al+O_2
ightarrow rac{2}{3}Al_2O_3, \Delta G=-827kJmol^{-1}$ of O_2 , the minimum emf required to carry out of the electrolysis of Al_2O_3 is $ig(F=96,500Cmol^{-1}ig)$

A. 4.28 V

B. 6.42 V

C. 8.50 V

D. 2.14 V

Answer: D

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23. In the electrochemical reaction

 $2Fe^{3+} + Zn \rightarrow Zn^{2+} + 2Fe^{2+}$

Increasing the concentration of Fe^{2+}

A. increases cell emf

B. increases the current flow

C. decreases the cell emf

D. alters the pH of the solution.

Answer: C



24. If salt bridge is removed from two half cells, the voltage

A. drops to zero

B. does not changes

C. increase gradually

D. increases rapidly

Answer: A

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25. The standard hydrogen electrode potential is zero, because

A. there is no potential differnce between the

electrode and the solution

B. hydrogen ions acquire electrons from a platinum

electrode

C. it has been measured accurately

D. it has been defined that way.

Answer: D

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26. The standard reduction potential for Fe^{2+}/Fe and Sn^{2+}/Sn electrodes are -0.44 and -0.14 volt respectively. For the given cell reaction $Fe^{2+} + Sn \rightarrow Fe + Sn^{2+}$, the standard EMF is. A. +0.30V

 $\mathrm{B.}-0.58\,\mathrm{V}$

 $\mathrm{C.} + 0.58\,\mathrm{V}$

 ${\sf D.}-0.30V$

Answer: D



27. Standard potential $(E^{\,\circ\,})$ for some half reactions are given below (i) $Sn^{4\,+} + 2e^-
ightarrow Sn^{2\,+}, E^{\,\circ} = 0.15V$ $(ii) 2 H g^{2\,+} + 2 e^{-}
ightarrow H g_2^{2\,+}, E^{\,\circ} = 0.92 V$ (iii) $PbO_2 + 4H^+ + 2e^- \rightarrow Pb^{2+} + 2H_2O, E^\circ = +1.45V$ based on the above, which one of the following statements is correct?

A. Sn^{4+} is a stronger oxidising agent than Pb^{4+}

B. Sn^{2+} is a stronger reducing agent than Hg_2^{2+}

C. Pb^{2+} is a stronger oxidizing agent than Pb^{4+}

D. Pb^{2+} is a stronger reducing agent than Sn^{2+}

Answer: B



28. A smuggler could not carry gold by depositing iron

chemically on the gold surface since

A. gold is denser

B. iron rusts

C. gold has higher reduction potential than iron

D. gold has lower reduction potential than iron

Answer: C



29. The emf of a Daniell cell at 298K is E_1 $Zn|ZnSO_4(0.01M)||CuSO_4(1.0M)|Cu$ When the concentration of $ZNSO_4$ is 1.0M and that of $CuSO_4$ is 0.01M, the emf changed to E_2 . What is the relationship between E_1 and E(2) ?

A. $E_1 < E_2$

 $\mathsf{B}.\, E_1 = E_2$

C. $E_2=0
eq E_1$

D. $E_1 > E_2$

Answer: D

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30. Mark the false statement.

A. A salt bridge is used to eliminate liquid junction

potential

B. The Gibb's free energy , ΔG is related with

electromotive force as $\Delta G=~-nFE$

C. Nernest equation for single electrode potential is

$$E=E^{\,\circ}\,-rac{RT}{nF}{
m log}_eig[M^{n\,+}ig]$$

D. The efficiency of a hydrogen-oxygen fuel cell is

zero.

Answer: C



31. Cloud or fog is a colloidal in which the dispered phase and the dospersion medium are

A. gas, liquid

B. liquid, gas

C. liquid, liquid

D. solid, liquid

Answer: B

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32. Which of the following constitutes irreversible colloidal system in water as dispersion medium?

A. Clay

B. Platinum

 $\operatorname{C.} Fe(OH)_3$

D. All

Answer: D

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33. surface tension of lyophilic sols is

A. lower than that of H_2O

B. more than that of H_2O

C. equal to that of H_2O

D. none of the above

Answer: A

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34. Colloid of which one of the following can prepared by electrical dispersion method as well as reduction method ?

A. Sulphur

B. Ferric hydroxide

C. Arrhenius sulphide

D. Gold

Answer: D



35. The formation of a colloidal from suspension is

A. Peptisation

B. Condensation

C. Sedimenatation

D. Fragmentation

Answer: A

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36. the stability of lyophilic colloids is due to

A. Change in their particles

B. Large size of their particle

C. small size of their particle

D. A layer of dispersion medium

Answer: D

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37. At CMC, the surfactant molecules :

A. decompose

B. become completely soluble

C. associate

D. dissociate



38. Which one of the following is an incorrect statement for physiosorption ?

A. It is reversible process

B. It requires less heat of adsorption

C. It requires activation energy

D. It takes place at low temperature

Answer: C



39. The half life of ${}^{24}Na$ is 15.0 hours. What percentage of it remains after 60 hours ?

A. 0

B. 0.0331

C. 0.0625

D. 12.5~%

Answer: C

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40. At equilibrium , number of atoms disintegrating at two different stages are in the ratio of 1: 10 . It half life of first stages is 15 minutes , half life of second stage would be

A. 150 min

B. 15 min

C. 1.5 min

D. 30 min

Answer: A

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1. One among the following set of quantum numbers defines the highest energy electron in scandium (I)ion

Answer: C



2. If threshold wavelength (λ_0) for ejection of electron from metal is 330 nm, then work function for the photoelectron emission is

A. $1.2 imes 10^{-18}J$

B. $6.0 imes10^{-19}J$

C. $1.2 imes 10^{-20}J$

D. $6.0 imes10^{-12}J$

Answer: B::D



3. All elements in the third period have

A. three complete shells

B. three complete subshells

C. three valence electrons

D. three electrons less than octet.

Answer: B

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4. One among the following species is planar

A. PCl_3

 $\operatorname{B.} CO_3^{2\,-}$

 $\mathsf{C}.NH_3$

D. $SO_4^{2\,-}$

Answer: B



5. From amongst the following triatomic molecules the

least bond angle is in

A. O_3

 $\mathsf{B}.\,I_3^{\,-}$

 $\mathsf{C.}\,NO_2^{\,-}$

D. H_2S

Answer: D

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6. The atoms/ion listed in correct order of increasing

size are

A. Na, Si, H

 $\mathsf{B}.\,Be^{2\,+},\,Mg^{2\,+},\,Na^{\,+}$

C. Al, Na, S

D. Na^+, Cl^-, K^+

Answer: B



7. The solution of Schrodinger equation for hydrogen leads to three quantum numbers n, l , m_1

(i) n can have any integral value

(ii) When n=3, l can have value of 0,1,2

(iii) When n=5, l=2, m_1 can have values ranging between

+2 to -2 through

(iv) when n=2, l=1, three equivalent orbitals with a nodal

plane containing nucleus of the H atom are possible.

Out of these the correct one is /are

A. (i), (ii) ,(iii)

B. only (ii)

C. (ii) & (iv)

D. (i), (ii) , (iii) & (iv)

Answer: A



8. In which of the following are all the electrons paired

?

A. An atom with atomic no. 17

B. Fe^{3+}

C. An element with configuration $1s^22s^22p^63s^23p^2$

D. N^{3-}

Answer: D

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9. The diamagnetic molecules from among mole cules of second period elements are

A. $B_2,\,C_2,\,N_2$

B. Li_2, N_2, F_2

 $\mathsf{C}.\,C_2,\,N_2,\,F_2$

D. $B_2, O_2^{2\,-}, N_2$

Answer: C Watch Video Solution **10.** Which of the following statements is correct? A. A small cation minimises polarisation. B. The second ionisation erergy of C, N and O follows the order C < N < OC. The magnitude of lattice energy of a solid increases if ions are of equal size D. Energy of $\sigma_{2s} > \sigma_{1s}^{*}$ because σ_{2s} is bonding and

 σ_{1s}^* is antibonding molecular orbital

Answer: B View Text Solution

11. Amongst phosphorus halides the correct increasing order of bond angle is

- A. $PF_3 < PCl_3 < PBr_3$
- $\mathsf{B.}\, PBr_3 < PCl_3 < PF_3$
- $\mathsf{C}.\,PCl_3 < PF_3 < PBr_3$
- D. $PBr_3 < PF_3 < PCl_3$

Answer: A

12. The State of hybridisation of phosphorus (Z=15) in phosphate ion (PO_4^{3-}) is the same as

A. I in ICI_4^-

B. S in SO_3

C. N in NO_3^-

D. S in SO_3^{2-}

Answer: D

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13. The strength of σ bond formed by s-s, s-p & p-p overlaps are in the order

A. s-s>s-p>p-p

 $\mathsf{B}.\,p-p>s-s-\ >s-p$

C. p-p>s-p>s-s

 $\mathsf{D}.\, s-s > p-p > s-p$

Answer: B



14. In a crystalline solid, W atoms are at corners, O atoms at edge centres and Na at cube centre, The formula of solid is

A. Na_4WO_3

B. $NaWO_3$

 $\mathsf{C.}\,NaW_8O_3$

D. $NaWO_4$

Answer: B


15. A binary solid, A^+B^- (formula mass= 60) has a CsCl structure. The no. of unit cells present in 6 g ideal crystals of solid are

A. $6.02 imes 10^{22}$

 $\texttt{B.}~6.02\times10^{23}$

C. $3.01 imes 10^{23}$

D. $3.01 imes10^{22}$



16. The molecular orbital shown below is described as





17. Which among the following molecules has the largest dipole moment ?

A. CH_3CH_2Cl

B. $CHCl_3$

 $\mathsf{C}.NF_3$

D. XeF_4



18. The difference between ΔH and ΔE at constant voluem is equal to

A. $P\delta V$

B. R

C.
$$V\Delta P$$

D.
$$\frac{3}{2}R$$

Answer: C



19. If the critical frequency (v_0) for emission of photoelectrons from a metal is $9.62 \times 10^{14} s^{-1}$, then light that can emit photoelectons should have a wavelength equal to

A. 6000Å

B. 5000Å

C. 4500Å

D. 3000Å

Answer: D

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20. The expected wavelength at which the first line of P

fund series shall be obtained is

A. 2.63μ

B. 7.45μ

 $\mathsf{C.}\,3.90\mu$

D. 4.05μ

Answer: B

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21. The correct order of electron affinity among

(i) Na (ii) Mg (iii) F (iv) I is

$$\begin{array}{l} \mathsf{A}.\,(iv)>(iii)>(i)>(ii)\\\\ \mathsf{B}.\,(ii)>(iii)>(iv)>(iv)>(i)\\\\ \mathsf{C}.\,(iii)>(iv)>(i)>(i)>(ii)\\\\ \mathsf{D}.\,(i)>(ii)>(ii)>(iii)>(iv) \end{array}$$

Answer: C



22. From the following enthalpies of combution, deduce which of the quoted expressions gives the heat of formation at a fixed temp.

 $C(s)+O_2(g)
ightarrow CO_3(g), \Delta H=c$

 $egin{aligned} H_2(g) + 1/2O_2(g) & o H_2O(l), \Delta = h \ CH_4(g) + 2O_2(g)CO_2(g) + 2H_2O(l), \Delta H = m \end{aligned}$

A. c+h-m

B. c-h+m

C. c+2h-m

D. -1/2c-h+1/2 m

Answer: C

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23. The combustion of benzoic acid occurs according to

expression

$$C_6H_5COOH(s)+7rac{1}{2}O_2(g)\Leftrightarrow 7CO_2+3H_2O(l)$$
 in a bomb calorimeter at 25° C . If it liberates $Q_v{
m mol}^{-1}$,

then ΔH for reaction is

$$egin{aligned} \mathsf{A}. & -Q_v + (RT)^{1/2} \ & \mathsf{B}. -Q_v + (RT)^{-1/2} \ & \mathsf{C}. -Q_v + rac{1}{2}RT \ & \mathsf{D}. -Q_v - rac{1}{2}RT \end{aligned}$$

Answer: D



24. During the solid-liquid transition at the melting point

A. $\Delta H=0$

 $\mathrm{B.}\,\Delta G=0$

 $\mathsf{C.}\,\Delta S=0$

D. $\Delta E=0$

Answer: B



25. From amogst $Al^{3+}, Cl^-, K^+, N^{3-}$, the correct order of radii is

A.
$$A l^{3\,+}\, < N_{3\,-}\, < K^{\,+}\, < C l_{\,-}$$

B.
$$N^{3-} < A l^{3+} < C l^- < K^+$$

C. $Al^{3+} < K^+ < Cl^- < N^{3-}$

D.
$$K^{\,+}\, < Cl^{\,-}\, < Al^{3\,+}\, < N^{3\,-}$$



26. The enthaply change, ΔH , in a simple one step reaction is > 0, so, the E_a (activation energy) of reaction is , therefore

A. equal to ΔH

B. never greater than ΔH

C. never less than ΔH

D. equal to zero.

Answer: C



27. The half life of a first order reaction is 60 sec . The

percentage of reactant left after 3 minutes is

A. 7.5

B. 15

C. 25

D. 12.5

Answer: D



28. If the reaction , $A + B \rightarrow C + D$, is thermodynamically feasible, the time taken for half of reaction to occur will depend most precisely on

A. ΔS

 $\mathrm{B.}\,\Delta H$

 $\mathrm{C.}\,\Delta G$

D. E_a

Answer: D



29. For a hypothetical reaction, the following kinetic data suggested that the overall order of this reaction is $[A] \qquad [B] \qquad [C]$

[]		[_]			
mol	dm^{-3}	mol	dm^{-3}	mol	$dm^{-3}s^{-1}$
2.0		1.0		1.0	
2.0		4.0		2.0	
1.0		4.0		1.0	

A. 3

B. 1.5

C. 1

D. 0.5

Answer: B



30. A reaction rate contant doubles between 300 and 310 k. By which of the following factors does the rate constant increases between 400-410 K.

A. 3.39

B. 2

C. 1.48

D. 1.1

Answer: C

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31. If $t_{0.5}$ of a first order reaction, $PCl_5 \rightarrow PCl_3 + Cl_2$ is 10 minutes then the time in which the concentration of PCl_5 reduces to 10% of the original is

A. 26 min

B. 33 min

C. 71 min

D. 90 min

Answer: B



32. The d-orbital involved in sp^3d hybridisation is

A. d_{xy}

B. d_{x2-y2}

 $\mathsf{C}.\,d_{xz}$

D. d_z^2

Answer: D



33. A molecules ML_5 contains 5 s bonding pairs of electrons and one non-bonding pair in V-shell of M. The shape of electron pair distribution is

A. octahedral

B. square planer

C. trigonal bipyramidal

D. sqaure pyramidal

Answer: D



34. If heat of formation of HI in the given reactions

(i) $H_2(g)+I_2
ightarrow I_2(s)
ightarrow 2HI$

(ii) $H_2(g)+I_2(g)
ightarrow 2HI(g)$

are 26 KJ and -4.5 $m mol^{-1}$ + respectively , then the heat of sublimation of iodine is

A. 30.5 KJ

B. 61.0 KJ

C. 21.5 KJ

 $\mathrm{D.}-30.5KJ$

Answer: B



35. The entropy change produced in universe when 3.6 kg of water of 47° C loses 12 J heat into surrounding at 27° C is

A. $12JK^{-1}$

B. $0.12 J K^{-1}$

C. $0.0025 JK^{-1}$

D. unpredictable

Answer: C



36. A sample of radioactive element undergoes 90% decomposition in 336 minutes. Its $t_{0.5}$ in minutes is

A. (In 2/I In 10) $\, imes \, 366$

B. 1/366

C. (In 2/1 ln 90) $\, imes \, 366$

D. 183

Answer: A

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37. The vant Hoff factor (i) for a dilute solution of potassium aluminium sulphate is

A. 4

B. 5

C. 3

D. unpredictable



38. A 0.01 M solution of glucose in water freezes at $-0.0186^{\circ}C$ A 0.01 M solution of KNO_3 in water will freeze at

A. $-0.0093^{\,\circ}\,C$

 $\mathrm{B.}-0.0372^{\,\circ}\,C$

 $\mathrm{C.}-0.0186^{\,\circ}\,C$

D. $-0.093^{\,\circ}\,C$

Answer: B



39. 20 mL of HCl having a certain normality neutralises exactly 1.0 g $CaCO_3$. The normality of acid is

A. 0.5 N

B. 0.12 N

C. 0.01 N

D. 1.0 N

Answer: D

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40. The potential of an electrode is represented as Pt. (0.25 atm) $/H^+[0.5]$

A. 0

B. 0.018 V

C. 0.059 V

D. 0.118 V

Answer: A

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41. For the cell reaction , $|Cu|Cu^{2+}(aq)\mid Ag^+|Ag$ is $E^{\,\circ}Cu^2\mid Cu=\,+\,0.34V$ adb $nE^{\,\circ}Ag^+|Ag=0.80V$

and $\left[Cu^{+2}
ight]=0.01$ and $\left[Ag^{+}
ight]=1.0 {
m mol} ~{
m dm}^{-3}$ the emf of the cell is

A. 0.34 V

B. 0.46 V

C. 0.52 V

D. 1.14 V

Answer: C

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42. Which of the following is not possible ?

A. dsp^3

 $\mathsf{B.}\, sp^3d$

 $\mathsf{C.}\, sp^2d$

D. dsp^2

Answer: C



43. For a reaction,

 $SO_2(g) + 1/2O_2(g)
ightarrow SO_3(g)$ if $K_p = 1.7 imes 10^{12}$ at

 $20\,^\circ C$ and 1 atm pressure , then value of K_c is

A. $1.7 imes 10^{12}$

 $\texttt{B.}~0.7\times10^{12}$

 $\text{C.}~8.33\times10^{12}$

D. $1.2 imes 10^{12}$

Answer: C

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44. A radioactive isotope having $t_{1/2}$ =3 days was read after 12 days . If 3 g of the isotope is now left in the container, the initial weight of isotope was

A. 12 g

B. 24 g

C. 36 g

D. 48 g

Answer: D



45. The number of α and β -particle emitted in the

transformation

 ${}^{238}_{92}U \rightarrow {}^{234}_{92}U$

A. 1,1

B. 1,0

C. 1,2

D. 2,1

Answer: C

