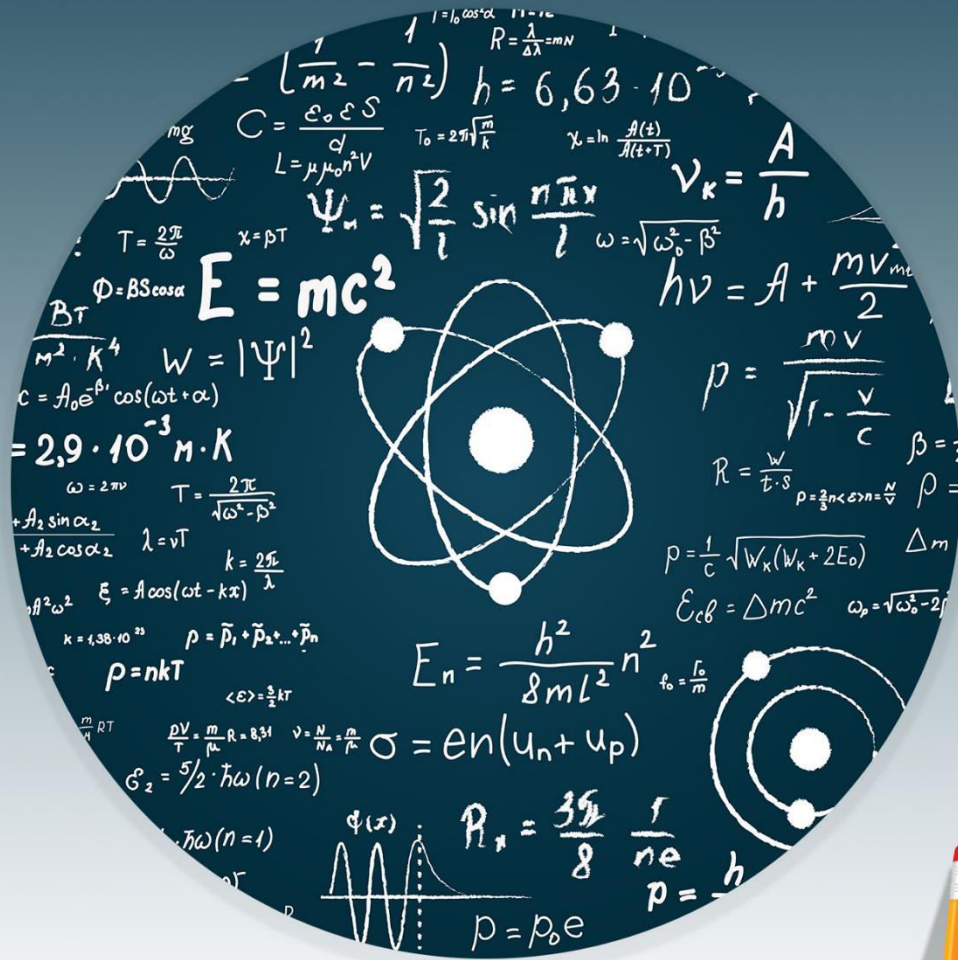


PHYSICS



WORKSHEET-9



ST≡P

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Worksheet-9

Topics:- Atomic Nucleus, Radio Activity, Nuclear Transmutation, Mass-Defect & Binding Energy

Q.1 Isotopes have same:

- A) Chemical properties C) Both of these
B) Physical properties D) None of these

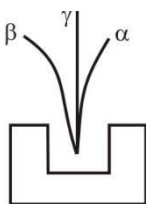
Q.2 Which of following element has maximum number of isotopes?

- A) Xenon C) Nitrogen
B) Cesium D) Both A & B

Q.3 The neutron to proton ratio for $^{16}_8O$ is:

- A) 2:1 C) 1:1
B) 1:2 D) 8:16

Q.4 In a radioactive phenomenon observation shown in figure where α deviates lesser than β in some electric or magnetic field (not shown in the figure). What is the reason of less deviation of α ?



- A) α is charged particle C) α is neutral particle
B) α is heavier particle D) α is lighter particle

Q.5 What is the charge number of an α -particle emitted during the phenomena of radioactivity?

- A) $-e$ C) $-2e$
B) $+2e$ D) $+2$

Q.6 Which one is a container for storing radioactive substance?

- A) Lead C) Cadmium
B) Iron D) Copper

Q.7 Which of the following is true for γ -rays?

	Charge	Rest mass
A)	Positive	$m_0 c^2$
B)	Negative	Zero
C)	Neutral	$m_0 c^2$
D)	Neutral	Zero

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Q.8 γ -radiation are emitted due to:

- A) De-excitation of atom C) De-excitation of nucleus
B) Excitation of atom D) Excitation of nucleus

Q.9 The phenomenon of radioactivity is associated with:

- A) Decay of nucleus
B) Fusion of nuclei
C) Transmission of radio waves
D) Nuclear reactions caused by cosmic rays

Q.10 After α -emission from ${}_{88}^{226}\text{Ra}$, the daughter nucleus will be:

- A) ${}_{86}^{226}\text{Ra}$ C) ${}_{86}^{226}\text{Rn}$
B) ${}_{86}^{224}\text{Ra}$ D) ${}_{86}^{222}\text{Rn}$

Q.11 After β -emission from neutron, which particle is found?

- A) Proton C) Neutron
B) Electron D) Proton and electron

Q.12 An α -emission is always accompanied by:

- A) β -emission C) Both "A" and "B"
B) γ -emission D) Neutron emission

Q.13 The equation ${}_Z\text{X}^A \longrightarrow {}_{z+1}\text{Y}^A + {}_{-1}\text{e}^0 + \bar{\nu}$ represents:

- A) β -decay C) γ -decay
B) α -decay D) Proton decay

Q.14 In an α -decay:

- A) The parent and daughter nuclei have same number of protons
B) The daughter nucleus has one proton more than parent nucleus
C) The daughter nucleus has two protons less than parent nucleus
D) The daughter nucleus has two neutrons more than parent nucleus

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- Q.15** When a radioactive nucleus emits an α -particle, the N/Z ratio?
- A) Increases
B) Decreases
C) Remains same
D) Any of these
- Q.16** When a radioactive nucleus emits a β -particle, the mass number of the atom?
- A) Increases by one
B) Decreases by one
C) Remains the same
D) Decreases by four
- Q.17** The decay constant λ of a radioactive sample:
- A) Decreases as the age of atoms increases
B) Increases as the age of atoms increases
C) Is independent of the age
D) Depends on the nature of activity
- Q.18** Half life of a radioactive substance depends upon:
- A) Temperature
B) Pressure
C) Nature of substance
D) Electric & magnetic field
- Q.19** The half life of radium is about 1600 years. If 100 g radium existing now, 25 g will remain un-decayed after:
- A) 4800 years
B) 6400 years
C) 6400 years
D) 3200 years
- Q.20** Half-life of radium is 1600 years. In how many years shall the earth lose all its radium due to radioactive decay?
- A) 1590×10^6 years
B) 1590×10^{12} years
C) 1590×10^{24} years
D) Never
- Q.21** The half-life of a certain element is 7 days at S.T.P .If the temperature is doubled and pressure is reduced to half then half-life of the same element will be:
- A) 1.75 days
B) 7 days
C) 3.5 days
D) 14 days
- Q.22** Which of the following rays are more energetic?
- A) α - rays
B) γ - rays
C) β - rays
D) All of these

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- Q.23** Due to emission of β^+ -rays:
- A) Mass of the Nucleus Increases
 - B) Mass of the Nucleus Decreases
 - C) Charge on the Nucleus Increases
 - D) Charge on the Nucleus Decreases
- Q.24** The Uranium Nucleus ${}_{92}^{238}\text{U}$ undergoes successive decays, emitting respectively α -particle, β -particle and γ -ray. What is the atomic number and atomic mass of the resulting nucleus?
- A) 90, 238
 - B) 92, 236
 - C) 91, 234
 - D) 92, 238
- Q.25** A nucleus ${}_{81}^{210}\text{X}$ decays to another nucleus ${}_{82}^{\text{A}}\text{Y}$ in four successive radioactive decays. Each decay involves, the emission of either an α -decay or β -decay. What is the value of A?
- A) 210
 - B) 206
 - C) 208
 - D) 204
- Q.26** A Radioactive Isotope ${}_{92}^{238}\text{U}$ decays to ${}_{92}^{234}\text{U}$ the particles emitted are:
- A) One α and one β
 - B) One α and two β
 - C) Two α and one β
 - D) Two α and two β
- Q.27** Which one of the following radiation possesses maximum penetrating power?
- A) α -rays
 - B) γ -rays
 - C) β -rays
 - D) All have equal penetrating power
- Q.28** After α -decay, the parent and daughter nuclei are called:
- A) Isomers
 - B) Isotones
 - C) Isobars
 - D) Isodiapheres
- Q.29** The emission of β -particle results in:
- A) Isomers
 - B) Isotones
 - C) Isobars
 - D) Isodiapheres

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Q.30 Which one is not true about radioactivity?

- A) Radioactivity is a stochastic process
- B) Half-life only depends on nature of element
- C) Decay rate decreases exponentially with time
- D) None of these

Q.31 The number of atoms decayed in four half-lives are:

- A) $\frac{N_0}{16}$
- B) $\frac{7N_0}{8}$
- C) $\frac{N_0}{8}$
- D) $\frac{15N_0}{16}$

Q.32 If the half-life of an element is 10 second, the mean life will be:

- A) 14.4 sec
- B) 10 sec
- C) 9.93 sec
- D) Can't be predicted

Q.33 The mass defect per nucleon _____ as the atomic number increases till iron, for iron the mass defect per nucleon _____ and after iron the mass defect per nucleon _____ as atomic number increases further.

- A) Decreases, minimum, increases
- B) Decreases, maximum, decreases
- C) Increases, maximum, decreases
- D) None of these

Q.34 Among the following which nucleus has maximum mass defect and binding energy:

- A) Fe
- B) Kr
- C) He
- D) U

Q.35 Mass defect of ^{10}u is equal to:

- A) 1.66×10^{-27} kg
- B) 1.66×10^{-26} kg
- C) 166×10^{-28} kg
- D) Both B and C

ANSWER KEY (Worksheet-09)

1	A	11	A	21	B	31	D
2	D	12	B	22	A	32	A
3	C	13	A	23	D	33	C
4	B	14	C	24	C	34	D
5	D	15	A	25	B	35	D
6	A	16	C	26	B		
7	D	17	C	27	B		
8	C	18	C	28	D		
9	A	19	D	29	C		
10	D	20	D	30	D		

SOLUTIONS**Unit – 11 (WS-09)**

Q.1 Answer is “A”

Solution:- Isotopes have same chemical properties while their physical properties are different.

Q.2 Answer is “D”

Solution:- Both Xenon and Cesium have maximum number of isotopes (Both have 36 isotopes).

Q.3 Answer is “C”

Solution:- For ${}^{16}_8\text{O}$; Z=8, N=8

Q.4 Answer is “B”

Solution:- Heavier particles deflect lesser.

Q.5 Answer is “D”

Solution:- Charge no. for α particle is “+2”, but charge is “+2e”.

Q.6 Answer is “A”

Solution:- Lead absorbs radiations without becoming unstable.

Q.7 Answer is “D”

Solution:- Gamma rays are photons, so their rest mass and charge both are zero.

Q.8 Answer is “C”

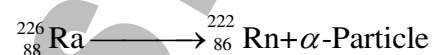
Solution:- γ -rays are emitted due to de-excitation of nucleus.

Q.9 Answer is “A”

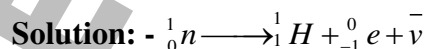
Solution:- Radioactivity is purely a nuclear phenomenon.

Q.10 Answer is “D”

Solution:-



Q.11 Answer is “A”



Q.12 Answer is “B”

Solution: - α and β emissions are always accompanied by γ -emission.

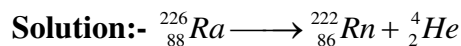
Q.13 Answer is “A”

Solution: - The given equation represents a negative beta decay.

Q.14 Answer is “C”

Solution: - In α -decay, the daughter nucleus has 2 protons less than parent nucleus.

Q.15 Answer is “A”



Check $\frac{N}{Z}$ ratio for parent and daughter nucleus.

Q.16 Answer is “C”

Solution:- The mass number remains same whether β^+ is emitted or β^- is emitted.

Q.17 Answer is “C”

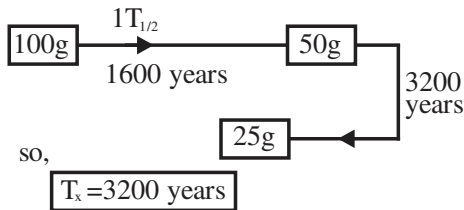
Solution:- “ λ ” only depend on nature of element.

Q.18 Answer is “C”

Solution:- Half-life only depend on Nature of substance.

Q.19 Answer is “D”

Solution:-



Q.20 Answer is “D”

Solution:- Complete life of any radioactive element is always infinite.

Q.21 Answer is “B”

Solution:- Half-life only depends on nature of element.

Q.22 Answer is “A”

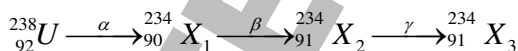
Solution:- Usually α -radiations are most energetic and γ -rays are least energetic.

Q.23 Answer is “D”

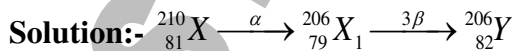
Solution:- During β^+ decay the charge number of daughter nucleus is one less than parent nucleus.

Q.24 Answer is “C”

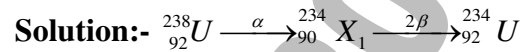
Solution:-



Q.25 Answer is “B”



Q.26 Answer is “B”



Q.27 Answer is “B”

Solution:- Penetration power of γ -rays is maximum and it is minimum for α -particles.

Q.28 Answer is “D”

Solution:- Isodiapheres are nuclei which have same neutron excess.

Q.29 Answer is “C”

Solution:- α -Particle emission results in isodiapheres, β -particle emission results in isobars and γ -rays emission result in isomers.

Q.30 Answer is “D”

Solution:- All given options A, B & C are true.

Q.31 Answer is “D”

Solution:-

No. of decayed atoms = $N_0 - \left(\frac{1}{2}\right)^n N_0$

Q.32 Answer is “A”

Solution:- $T_{mean} = 1.44T_{\frac{1}{2}}$

Q.33 Answer is “C”

Solution:- See graph from book

Q.34 Answer is “D”

Solution:- (Mass defect of nucleus)

= $A \times$ (Mass defect per nucleon)

So, total mass defect of uranium nucleus will be greater than other options.

Q.35 Answer is “D”

Solution:- $1 \text{ u} = 1.66 \times 10^{-27} \text{ kg}$

STOP

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