Arjuna NEET 2026

Physical Chemistry

Structure of Atom

DPP: 1

Q1 Among the following the lightest subatomic particle is:
(A) Electron (B) Neutron
(C) Proton (D) Deutron

Q2 Select the correct statements from the following:
A. Atoms of all elements are composed of two fundamental particles.
B. The mass of the electron is 9.01039×10^{-31} kg.
C. All the isotopes of a given element show same chemical properties.
D. Protons and electrons are collectively known as nucleons.
E. Dalton's atomic theory, regarded the atom as an ultimate particle of matter.
Choose the correct answer from the otpions given below:
(A) B, C and E only
(B) A, B and C only
(C) C, D and E only
(D) A and E only

Q3 The charge to mass ratio of electron was found to be:
(A) $1.6022 \times 10^{-19}\,\mathrm{Ckg}^{-1}$
(B) $1.925 \times 10^{12}\,\mathrm{Ckg}^{-1}$
(C) $1.758 \times 10^{11}\,\mathrm{Ckg}^{-1}$
(D) $1.869 \times 10^{13}\,\mathrm{Ckg}^{-1}$

Q4 Cathode rays have:
(A) mass only
(B) charge only
(C) neither mass nor charge
(D) mass and charge both

Q5 Which of the following statement is not correct about the characteristics of cathode rays?
(A) They start from the cathode and move towards the anode.
(B) They travel in straight line in the absence of an external electrical or magnetic field.
(C) Characteristics of cathode rays do not depend upon the material of electrodes in cathode ray tube.
(D) Characteristics of cathode rays depend upon the nature of gas present in the cathode ray tube.

Q6 Which of the following statements about the electron is incorrect ?
(A) It is a negatively charged particle.
(B) The mass of electron is equal to the mass of neutron.
(C) It is a basic constituent of all atoms.
(D) It is a constituent of cathode rays.

Q7 Which of the following is not true for cathode rays?
(A) Cathode rays consist of negatively charged particles.
(B) Cathode rays were discovered by J.J Thomson.
(C) Nature of cathode rays depend upon the nature of the gas in discharge tube.
(D) Cathode rays are produced inside the discharge tube.

Q8 The canal rays led to the discovery of which subatomic particle?
(A) Beta rays (B) Protons
(C) Neutrons (D) Electrons

Q9 The e/m for positive rays in comparison to cathode rays is:
(A) very low (B) high
(C) same (D) none

Q10 Positive rays or canal rays are:
(A) electromagnetic waves
(B) a steam of positively charged gaseous ions
(C) a stream of electrons
(D) neutrons

Q11 What are the essential conditions for the production of anode rays?
(A) High voltage and low pressure
(B) High voltage and high pressure
(C) Low voltage and high pressure
(D) Low voltage and low pressure

Q12 What is the other name for anode rays?
(A) Proton rays (B) Cation rays
(C) Thomson rays (D) Canal rays

Q13 Mass of neutron is.....times the mass of electron.
(A) 1840 (B) 1480
(C) 2000 (D) None of these

Q14 The lightest particle in the following is:
(A) α-particle
(B) Positron
(C) Proton
(D) Neutron

Q15 Which of the following properties of atom could be explained correctly by Thomson model of atom?
(A) Overall neutrality of atom
(B) Spectra of hydrogen atom
(C) Position of electrons, protons and neutrons in an atom.
(D) Stability of atom

Answer Key

Q1	(A)
Q2	(A)
Q3	(C)
Q4	(D)
Q5	(D)
Q6	(B)
Q7	(C)
Q8	(B)
Q9	(A)
Q10	(B)
Q11	(A)
Q12	(D)
Q13	(A)
Q14	(B)
Q15	(A)

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Physical Chemistry

Structure of Atom

DPP: 2

Q1 Which is true?
(A) $\mathrm{e/m}$ values of cathode rays generated by discharge of different gases are different
(B) $(\mathrm{e/m})$ value of anode rays generated by discharge of different gases is same
(C) $\left(\frac{\mathrm{e}}{\mathrm{m}}\right)_{\text{proton}} > \left(\frac{\mathrm{e}}{\mathrm{m}}\right)_{\text{electron}}$
(D) $\left(\frac{\mathrm{e}}{\mathrm{m}}\right)_{\text{proton}} > \left(\frac{\mathrm{e}}{\mathrm{m}}\right)_{\alpha-\text{ particle}}$

Q2 The increasing order for the values of $\mathrm{e/m}$ (charge/mass) is:
(A) e, p, n, α
(B) $\mathrm{n, p, e, \alpha}$
(C) $\mathrm{n, p, \alpha, e}$
(D) $\mathrm{n, \alpha, p, e}$

Q3 The radius of nucleus is approximately _____ times smaller than the radius of atom :
(A) 1,00,000 (B) 5,000
(C) 10,000 (D) 200

Q4 When α-rays strike a thin gold foil then:
(A) Most of the α-rays do not pass through the gold foil.
(B) Most of the α-rays get deflected back.
(C) Most of the α-rays get deflected through small angles.
(D) Most of the α-rays pass through without any deviation.

Q5 Metal of which foil was used in Rutherford experiment?
(A) Silver (B) Gold
(C) Platinum (D) Iron

Q6 When a gold sheet is bombarded by a beam of $\alpha-$ particles, only a few of them get deflected whereas most go straight, undeflected. This is because
(A) The force of attraction exerted on the $\alpha-$ particles by the oppositely charged electrons is not sufficient.
(B) A nucleus has a much smaller volume than that of an atom.
(C) The force of repulsion acting on the fast moving α-particles is very small.
(D) The neutrons in the nucleus do not have any effect on the α-particles.

Q7 Discovery of the nucleus of an atom was due to the experiment carried out by
(A) Bohr (B) Mosley
(C) Rutherford (D) Thomson

Q8 Rutherford's scattering experiment is related to the size of the
(A) Nucleus (B) Atom
(C) Electron (D) Neutron

Q9 In the Rutherford atomic model, the alpha particles were stroked on
(A) aluminum (B) gold
(C) silver (D) titanium

Q10 The particles which were deflected backward in Rutherfords experiment were hit upon by:
(A) nucleus (B) empty space
(C) electrons (D) protons

Q11 According to the Rutherford atomic model, the whole atom is:
(A) positively charged
(B) negatively charged
(C) neutral
(D) None of these

Q12 What did Rutherford conclude from his gold foil experiment?
(A) Alpha particles are much smaller than gold atoms.
(B) Alpha-particles are doubly-charged helium ions.
(C) Radius of the nucleus is about 10^5 times less than the radius of the atom
(D) No Alpha-particles passed through the gold foil.

Q13 Which of the following is not a part of the observations made by Rutherford in his experiment?
(A) Very few alpha particles deflected at small angles.
(B) A large number of alpha particles bounced back completely.
(C) Only a few alpha particles were scattered at large angles
(D) Most alpha particles passed straight through gold foil.

Q14 Most of the alpha particles passed through the gold foil without deflection because:
(A) Atoms are stable.
(B) Most of the space inside the atom is empty.
(C) Atoms are unstable.
(D) All the space in the atom is covered by nucleus.

Q15 Which one of the following statements is true according to Rutherford's nuclear model of an atom?
(A) Atoms move in circular orbits around a central charge
(B) All the mass of an atom resides in the electron.
(C) The electrons revolve around the nucleus in well-defined orbits.
(D) There is a negatively charged centre in an atom called the nucleus.

Q16 Which of the following conclusions could not be derived from Rutherford's α-particle scattering experiment?
(A) Most of the space in the atom is empty
(B) The radius of the atom is about 10^{-10} m while that of nucleus is 10^{-15} m
(C) Electrons move in a circular path of fixed energy called orbits
(D) Electrons and the nucleus are held together by electrostatic forces of attraction

Q17 The nuclear radius is of the order of 10^{-13} cm while atomic radius is of the order 10^{-8} cm. Assuming the nucleus and the atom to be spherical, the fraction of the atomic volume occupied by the nucleus is
(A) 10^{-15} (B) 10^{-10}
(C) 10^{-14} (D) 10^{-13}

Q18 The ratio of mass of an electron to that of the mass of hydrogen atom is:
(A) $1:3871$ (B) $1:1837$
(C) $1:1296$ (D) 1 : 3781

Q19 The general representation of the symbol of elements ' X ' is ($Z=$ Atomic number, $A=$ Mass number)
(A) ${}_{\mathrm{x}}^{\mathrm{A}}\mathrm{Z}$
(B) ${}_{Z}^{A}\mathrm{X}$
(C) ${}_{\mathrm{A+1}}\mathrm{X}^{\mathrm{z+1}}$
(D) ${}_{x}A^{Z}$

Q20 Isotopes have
(A) Same number of protons
(B) Same number of neutrons
(C) Different number of electrons
(D) Different atomic numbers

Q21 Identify the correct match:

	Column I		Column II
a.	$_{32}Ge^{76}$, $_{33}As^{77}$	(i)	Isotopes
b.	$_{26}Fe^{57}$, $_{26}Fe^{58}$	(ii)	Isodiaphers
c.	$_{92}U^{235}$, $_{90}Th^{231}$	(iii)	Isobars
d.	$_{1}H^{3}$, $_{2}He^{3}$	(iv)	Isotones

(A) a(iv); b(i); c(ii); d(iii)
(B) a(ii); b(i); c(iv); d(iii)
(C) a(iv); b(iii); c(ii); d(i)
(D) a(ii); b(iii); c(iv); d(i)

Q22 Which of the following are pairs of isodiaphers?
(A) $^{15}N_7, ^{17}O_8$
(B) $^{15}N_7, ^{16}O_8$
(C) $^{14}N_7, ^{17}O_8$
(D) All of these

Q23 Molecules which are both isoelectronic and isostere ?
(A) N_2 and CO
(B) N_2 and CS
(C) O_2 and CO
(D) O_2 and CS

Q24 Species which is isoelectronic with CN^- is
(A) CO
(B) O_2^+
(C) F_2^-
(D) O_2

Q25 What will happen to atomic number when an neutral atom loses its electron
(A) Increase (B) Decreased
(C) Remain same (D) None of these

Q26 What is the charge on the species with 17 protons, 18 neutrons and 18 electrons is:
(A) +1 (B) -1
(C) -2 (D) +2

Q27 Wave number is
(A) λ
(B) $1/\lambda$
(C) c/λ
(D) $\lambda \times v$

Q28 Calculate the wavelength of a light whose time period is 4×10^{-8} s.
(A) 10 m (B) 14 m
(C) 12 m (D) 8 m

Q29 Which of the following have maximum wavelength?
(A) Cosmic rays
(B) γ-rays
(C) Micro waves
(D) Radio waves

Q30 Which of the following have maximum frequency?
(A) Cosmic rays
(B) γ-rays
(C) Micro waves
(D) Radio waves

Q31 Unit of wavelength is:
(A) m
(B) nm
(C) Å
(D) All of these

Q32 The correct order of increasing frequency of electromagnetic radiations is:
(A) Microwave $<$ UV $<$ IR $<$ γ-rays
(B) Microwave $<$ Radiowave $<$ Visible $<$ X-rays
(C) UV $<$ Radiowave $<$ X-rays $<$ γ-rays

(D) Radiowave $<$ IR $<$ Visible $<$ X-rays

Q33 The velocity of light is $3.0 \times 10^8\ \text{ms}^{-1}$. Which value is closest to the wavelength in nanometres of quantum of light with frequency of $8 \times 10^{15}\ \text{s}^{-1}$
(A) 3×10^7
(B) 2×10^{-25}
(C) 5×10^{-18}
(D) 37.5

Q34 The frequency of a wave of light is $12 \times 10^{14}\ \text{s}^{-1}$. The wave number associated with this light is:
(A) $5 \times 10^{-7}\ \text{m}^{-1}$
(B) $4 \times 10^{-8}\ \text{cm}^{-1}$
(C) $2 \times 10^{-7}\ \text{m}^{-1}$
(D) $4 \times 10^{4}\ \text{cm}^{-1}$

Q35 Rank the following types of radiations from the highest energy to the lowest. Ultraviolet/ visible/X- ray/microwave/infrared
(A) X-ray, ultraviolet, microwave, infrared, isible
(B) ultraviolet, X-ray, visible, infrared, microwave
(C) infrared, microwave, ultraviolet, visible, X ray
(D) X-ray, ultraviolet, visible, infrared, microwave

Q36 The frequency of a green light is $6 \times 10^{14}\ \text{Hz}$. Its wavelength is:
(A) $500\ \text{nm}$
(B) $5\ \text{nm}$
(C) $50,000\ \text{nm}$
(D) None of these

Q37 A particular station of All India Radio, New Delhi, broadcasts on a frequency of 1,368 kHz (kilohertz). The wavelength of the electromagnetic radiation emitted by the transmitter is:
[speed of light, c = 3.0 $\times 10^8$ ms^{-1}]
(A) 219.7 m (B) 2192 m
(C) 21.92 cm (D) 219.3 m

Q38 All types of electromagnetic radiations possess same:
(A) energy (B) velocity
(C) frequency (D) wavelength

Q39 A certain radio station broadcasts on a frequency of 980kHz (kilohertz). What is the wavelength of electromagnetic radiation broadcast by the radio station?
(A) $306\ \text{m}$
(B) $30.6\ \text{m}$
(C) $3.06\ \text{m}$
(D) $3060\ \text{m}$

Q40 The MRI (magnetic resonance imaging) body scanners used in hospitals operate with 400 MHz radio frequency. The wavelength corresponding to this radio frequency is;
(A) $0.75\ \text{m}$
(B) $1.5\ \text{m}$
(C) $0.75\ \text{cm}$
(D) $2\ \text{cm}$

Q41 The frequency of a wave light is 1.0 × 10^6 sec^{-1}. The wave length for this wave is:
(A) 3 × 10^4 cm
(B) 3 × 10^{-4} cm
(C) 6 × 10^4 cm
(D) 6× 10^6 cm

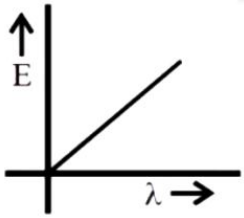
Q42 The number of photons of light of wavelength $7000A^o$ equivalent to $1\ \text{J}$ are
(A) 3.52×10^{-18}
(B) 3.52×10^{18}
(C) 50,000
(D) 10,0000

Q43 A 100 watt bulb emits monochromatic light of wavelength $400\ \text{nm}$. Calculate the number of

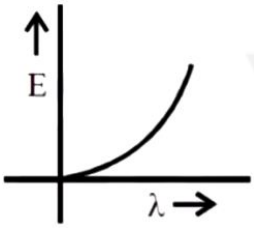
photons emitted per second by the bulb.
(A) 2.022×10^{23}
(B) 2.012×10^{20}
(C) 20.21×10^{21}
(D) 22.06×10^{20}

Q44 A dye absorbs a photon of wavelength λ and re-emits the same energy into two photons of wavelength λ_1 and λ_2 respectively. The wavelength λ is related with λ_1 and λ_2 as:
(A) $\lambda = \frac{\lambda_1+\lambda_2}{\lambda_1\lambda_2}$
(B) $\lambda = \frac{\lambda_1\lambda_2}{\lambda_1+\lambda_2}$
(C) $\lambda = \frac{\lambda_1^2\lambda_2^2}{\lambda_1+\lambda_2}$
(D) $\lambda = \frac{\lambda_1\lambda_2}{(\lambda_1+\lambda_2)^2}$

Q45 Which graph shows how the energy E of a photon of light is related to its wavelengths (λ) ?
(A)



(B)



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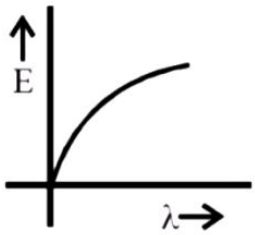

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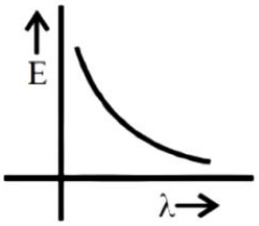

Q46 Which wave property is directly proportional to energy of electromagnetic radiation:
(A) velocity
(B) frequency
(C) wave number
(D) all of these

Q47 The number of photons of light of $\bar{\nu} = 2.5 \times 10^6\ \mathrm{m}^{-1}$ necessary to provide $1\ \mathrm{J}$ of energy are
(A) 2×10^{18}
(B) 2×10^{17}
(C) 2×10^{20}
(D) 2×10^{19}

Q48 The number of photons emitted in 10 hours by a 60w sodium lamp (λ of photon = $6000A^\circ$)
(A) 6.50×10^{24}
(B) 6.40×10^{23}
(C) 8.40×10^{23}
(D) 3.40×10^{23}

Q49 Minimum number of photons of light of wavelength 4000 angstrom which provide $1\ \mathrm{J}$ energy:
(A) 2×10^{18}
(B) 2×10^{9}
(C) 2×10^{20}
(D) 2×10^{10}

Q50 The energy $\Delta\mathrm{E}$ corresponding to intense yellow line of λ sodium of $589\ \mathrm{nm}$ is:
(A) $2.10\ \mathrm{eV}$
(B) $43.37\ \mathrm{eV}$

(C) $47.12\ \text{eV}$
(D) $2.11\ \text{kcal}$

Q51 The relation between energy of a radiation and its frequency was given by:
(A) de Broglie (B) Einstein
(C) Planck (D) Bohr

Q52 Which is not characteristic of Planck's quantum theory of radiation?
(A) Radiation is associated with energy.
(B) Energy is not absorbed or emitted in whole number or multiples of quantum.
(C) The magnitude of energy associated with a quantum is proportional to the frequency.
(D) Radiation energy is neither emitted nor absorbed continuously but in small packets called quanta.

Q53 Which of the following is not a characteristic of Plancks quantum theory of radiation?
(A) Energy is not absorbed or emitted in whole number integral multiples of quantum.
(B) Radiation is associated with energy.
(C) Radiation is associated with energy emitted or absorbed continuously but in the form of small packets called quanta
(D) The magnitude of energy associated with quantum is proportional to frequency.

Q54 The energy absorbed by each molecule (A_2) of a substance is $4.4 \times 10^{-19}\ \text{J}$ and bond energy per molecule is $4.0 \times 10^{-19}\ \text{J}$. The kinetic energy of the molecule per atom will be:
(A) $2.2 \times 10^{-19}\ \text{J}$
(B) $2.0 \times 10^{-19}\ \text{J}$
(C) $4.0 \times 10^{-20}\ \text{J}$
(D) $2.0 \times 10^{-20}\ \text{J}$

Q1	(D)
Q2	(D)
Q3	(A)
Q4	(D)
Q5	(B)
Q6	(B)
Q7	(C)
Q8	(A)
Q9	(B)
Q10	(A)
Q11	(C)
Q12	(C)
Q13	(B)
Q14	(B)
Q15	(C)
Q16	(C)
Q17	(A)
Q18	(B)
Q19	(B)
Q20	(A)
Q21	(A)
Q22	(A)
Q23	(A)
Q24	(A)
Q25	(C)
Q26	(B)
Q27	(B)
Q28	(C)
Q29	(D)
Q30	(A)
Q31	(D)
Q32	(D)
Q33	(D)
Q34	(D)
Q35	(D)
Q36	(A)
Q37	(D)
Q38	(B)
Q39	(A)
Q40	(A)
Q41	(A)
Q42	(B)
Q43	(B)
Q44	(B)
Q45	(D)
Q46	(D)
Q47	(A)
Q48	(A)
Q49	(A)
Q50	(A)
Q51	(C)
Q52	(B)
Q53	(A)
Q54	(D)

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Physical Chemistry

Structure of Atom

DPP: 3

Q1 A gas absorbs photon of $355\ \text{nm}$ and emits at two wavelengths. If one of the emission is at $680\ \text{nm}$, the other is at

(A) $1035\ \text{nm}$

(B) $325\ \text{nm}$

(C) $743\ \text{nm}$

(D) $518\ \text{nm}$

Q2 A 100 watt bulb emits monochromatic light of wavelength 400 nm. Calculate the number of photons emitted per second by the bulb.

(A) 20.12×10^{20}

(B) 2.012×10^{20}

(C) 4.969×10^{-19}

(D) 49.69×10^{-19}

Q3 Light of wavelength λ strikes on a metal surface with intensity X and metal emits Y electrons per second of average energy Z. What will happen to Y and Z if X is doubled?

(A) Z will remain constant and Y will increase

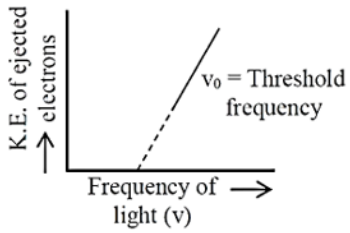
(B) Both Z and Y will remain constant

(C) Z will decrease and Y will increase

(D) Both Z and Y will increase

Q4 Find out the **correct** graph.

(A)



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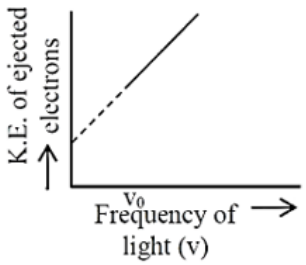

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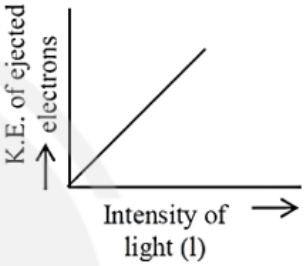

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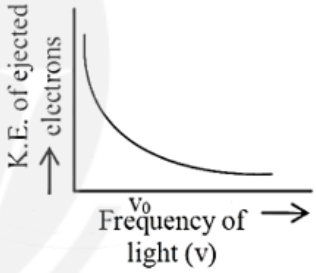
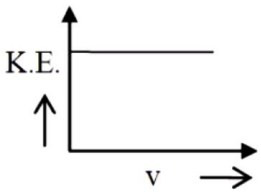
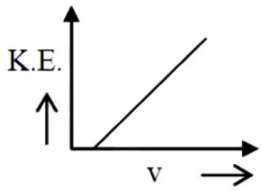


Q5 Which is the correct graphical representation based on photoelectric effect?

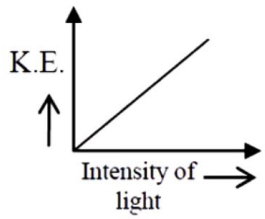
(I)



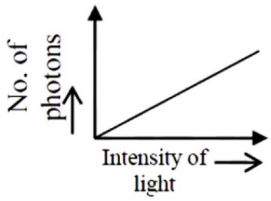
(II)



(III)



(IV)



(A) I and II (B) II and III
(C) III and IV (D) II and IV

Q6 If threshold wavelength (λ°) for ejection of electron from metal is $330\ \text{nm}$, then work function for the photoelectric emission is:
(A) $6 \times 10^{-10}\ \text{J}$
(B) $1.2 \times 10^{-18}\ \text{J}$
(C) $3 \times 10^{-19}\ \text{J}$
(D) $6 \times 10^{-19}\ \text{J}$

Q7 A certain metal when irradiated with light $(\text{v} = 3.2 \times 10^{16}\ \text{Hz})$ emits photo electrons with twice kinetic energy as did photoelectrons when the same metal is irradiated by light $(\text{v} = 2.0 \times 10^{16}\ \text{Hz})$. Calculate v_0 of electron?
(A) $1.2 \times 10^{14}\ \text{Hz}$
(B) $8 \times 10^{15}\ \text{Hz}$
(C) $1.2 \times 10^{16}\ \text{Hz}$
(D) $4 \times 10^{12}\ \text{Hz}$

Q8 In the emission of photoelectrons, the number of photoelectrons emitted per unit time depends upon
(A) energy of the incident radiation
(B) intensity of the incident radiation
(C) frequency of the incident radiation
(D) wavelength of the incident radiation

Q9 What is the work function (w_0) of the metal whose threshold frequency (v_0) is $5.2 \times 10^{14}\ \text{s}^{-1}$?
(A) $3.44 \times 10^{-19}\ \text{J}$
(B) $34.4 \times 10^{-19}\ \text{J}$
(C) $0.344 \times 10^{-15}\ \text{J}$
(D) $3.03 \times 10^{-19}\ \text{J}$

Q10 Einstein's theory of photoelectric effect is based on:
(A) Newtons corpuscular theory of light
(B) Huygen's wave theory of light
(C) Maxwell's electromagnetic theory of light
(D) Planck's quantum theory of light

Q11 In photoelectric effect the number of photo-electrons emitted is proportional to:
(A) intensity of incident beam
(B) frequency of incident beam
(C) velocity of incident beam
(D) Work function of photo cathode

Q12 Increase in the frequency of the incident radiations increase the
(A) rate of emission of photo-electrons
(B) Work function
(C) kinetic energy of photo-electrons
(D) threshold frequency

Q13 Threshold wavelength depends upon :
(A) frequency of incident radiation
(B) velocity of electrons
(C) Work function
(D) None of the above

Q14 Photoelectric effect shows
(A) particle-like behaviour of light
(B) wave-like behaviour of light
(C) both wave-like and particle-like behaviour of light
(D) neither wave-like nor particle-like behaviour of light

Q15 Ultraviolet light of $6.2\ \mathrm{eV}$ falls on aluminium surface (work function $= 4.2\ \mathrm{eV}$). The kinetic energy in joule) of the fastest electron emitted is approximately
(A) 3×10^{-21}
(B) 3×10^{-19}
(C) 3×10^{-17}
(D) 3×10^{-15}

Q16 The threshold wavelength for photoelectric effect on sodium is 5000 $\mathring{\mathrm{A}}$. Its work function is:
(A) 4×10^{-19}
(B) $1\ \mathrm{J}$
(C) 2×10^{-19}
(D) $3 \times 10^{-10}\ \mathrm{J}$

Q17 The kinetic energy of the photoelectrons does not depend upon
(A) Intensity of incident radiation
(B) Frequency of incident radiation
(C) Wavelength of incident radiation
(D) Wave number of incident radiation.

Q18 If the threshold frequency of a metal for photoelectric effect is v_0, then which of the following will not happen?
(A) If the frequency of the incident radiation is v_0, the kinetic energy of the electrons ejected is zero.
(B) If the frequency of the incident radiation is v, the kinetic energy of the electrons ejected will be $\mathrm{hv} - \mathrm{hv}_0$.
(C) If the frequency is kept same at v but intensity is increased, the number of electrons ejected will increase.
(D) If the frequency of incident radiation is further increased, the number of photoelectrons ejected will increase.

Q19 In a photoelectric effect, the energy of the photon striking a metallic surface is 5.6×10^{-19} J. The kinetic energy of the ejected electrons is 12.0×10^{-20} J. The work function is:
(A) 6.4×10^{-19} J
(B) 6.8×10^{-19} J
(C) 4.4×10^{-19} J
(D) 6.4×10^{-20} J

Answer Key

Q1	(C)
Q2	(B)
Q3	(A)
Q4	(A)
Q5	(D)
Q6	(D)
Q7	(B)
Q8	(B)
Q9	(A)
Q10	(D)
Q11	(A)
Q12	(C)
Q13	(C)
Q14	(A)
Q15	(B)
Q16	(A)
Q17	(A)
Q18	(D)
Q19	(C)

Arjuna NEET 2026

Physical Chemistry

Structure of Atom

DPP: 4

Q1 Angular momentum of an electron moving in 5^{th} orbit is
(A) $\frac{10h}{\pi}$
(B) $\frac{5h}{\pi}$
(C) $\frac{2.5h}{\pi}$
(D) $\frac{h}{2\pi}$

Q2 According to Bohr model, angular momentum of an electron in the third orbit is:
(A) $\frac{3\ \text{h}}{\pi}$
(B) $\frac{1.5\ \text{h}}{\pi}$
(C) $\frac{3\pi}{h}$
(D) $\frac{9h}{\pi}$

Q3 According to Bohr's theory, the angular momentum of an electron in 5^{th} orbit is:
(A) $25\frac{\text{h}}{\pi}$
(B) $1.0\frac{\text{h}}{\pi}$
(C) $10\frac{\text{h}}{\pi}$
(D) $2.5\frac{\text{h}}{\pi}$

Q4 The angular momentum of an electron present in the excited state of Hydrogen is $\frac{1.5\ \text{h}}{\pi}$. The electron present in:
(A) Third orbit
(B) Second orbit
(C) Fourth orbit
(D) Fifth orbit

Q5 According to Bohr's theory, the angular momentum of an electron in the 4th orbit is:
(A) $\frac{\text{h}}{2\pi}$
(B) $\frac{2h}{\pi}$
(C) $\frac{3h}{2\pi}$
(D) $\frac{3\ \text{h}}{\pi}$

Q6 The scientist who proposed the atomic model based on the quantisation of energy for the first time is:
(A) Max Planck
(B) Neil Bohr
(C) De-Broglie
(D) Heisenberg

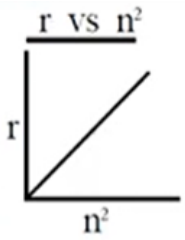
Q7 Radius of First Bohr's orbit of hydrogen atom is
(A) $0.24\ \overset{\text{o}}{\text{A}}$
(B) $0.48\ \overset{\text{o}}{\text{A}}$
(C) $0.53\ \overset{\text{o}}{\text{A}}$
(D) $1.06\ \overset{\text{o}}{\text{A}}$

Q8 Calculate the ratio of the radius of 1^{st} orbit of H atom to that of 4^{th} orbit.
(A) $1:4$
(B) $1:16$
(C) $1:36$
(D) $1:2$

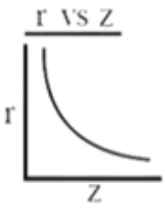
Q9 Ratio of the radius of first orbit of Li^{2+} to the third orbit of He^{+} ions will be
(A) 1 : 5
(B) 2 : 5
(C) 3 : 8
(D) 2 : 27

Q10 Gap between Bohrs atomic radii of He^{+} for 3^{rd} orbit and 5^{th} orbit will be
(A) $0.472\ \text{A}^{\circ}$
(B) $4.23\ \text{A}^{\circ}$
(C) $9.44\ \text{A}^{\circ}$
(D) $0.944\ \text{A}^{\circ}$

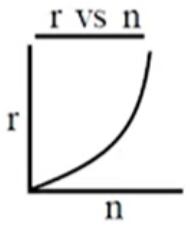
Q11 Which of the following graph is incorrect for radius calculation
(A)



(B)



(C)



(D)

Q12 Radius of 2^{nd} orbit of $\text{He}^{+} = \text{x}$ calculate radius for 3^{rd} orbit of Be^{+3}

(A) $9x/8$ (B) $27x/8$

(C) $8x/9$ (D) $8x/27$

Q13 The radius of first Bohr's orbit for hydrogen is 0.53Å. The radius of third Bohr's orbit would be:

(A) 0.79Å

(B) 1.59Å

(C) 3.18Å

(D) 4.77Å

Q14 The radius of first Bohr's orbit for hydrogen is $0.53A^o$. the radius of third Bohr's orbit would be

(A) $0.79A^o$ (B) $1.59A^o$

(C) $3.18A^o$ (D) $4.77A^o$

Q15 The Bohr orbit radius for the hydrogen atom $(n = 1)$ is approximately 0.530 Å. The radius of the first excited state $(n = 2)$ orbit is

(A) 0.13 Å

(B) 1.06 Å

(C) 4.77 Å

(D) 2.12 Å

Q16 Statement-I: The radius of second orbit of He^+ is equal to that of first orbit of hydrogen.
Statement-II: The radius of an orbit in hydrogen like species is directly proportional to n^2 and inversely proportional to Z.

(A) Both Statement-I and Statement-II are correct.

(B) Both Statement-I and Statement-II are incorrect.

(C) Statement-I is correct and Statement-II is incorrect.

(D) Statement-I is incorrect and Statement-II is correct.

Q17 If radius of second Bohr orbit of the He^+ ion is 105.8 pm, what is the radius of third Bohr orbit of Li^{2+} ion?

(A) 158.7 Å (B) 158.7 pm

(C) 15.87 pm (D) 1.587 pm

Q18 Which hydrogen like species will have the same radius as that of Bohr's orbit of hydrogen atom?

(A) n = 2, Li^{2+} (B) n = 2, Be^{3+}

(C) n = 2, He^+ (D) n = 3, Li^{2+}

Q19 If the radius of 1st Bohr orbit be a_0, then radius of 3rd Bohr orbit would be:

(A) $3a_0$ (B) $6a_0$

(C) $9a_0$ (D) $\frac{1}{9}a_0$

Q20 The radius of the first orbit of hydrogen atom is 0.52×10^{-8} cm. The radius of the first orbit of He^+ ion is:

(A) 0.26×10^{-8} cm

(B) 0.52×10^{-8} cm

(C) 1.04×10^{-8} cm

(D) 2.08×10^{-8} cm

Q21

Velocity for 1^{st} orbit of $H = x$. Velocity for 2^{nd} orbit of $He^{+} =$

(A) x

(B) $2x$

(C) $3x$

(D) $4x$

Q22 Calculate ratio of velocities of 3^{rd} and 4^{th} orbit of Li^{+2} and He^{+} respectively.

(A) $2:1$

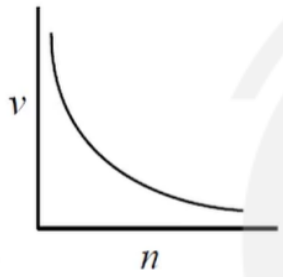
(B) $1:2$

(C) $1:3$

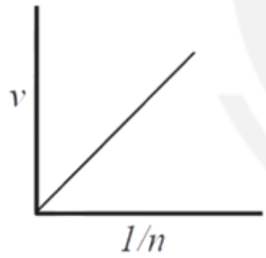
(D) $3:1$

Q23 Select the incorrect graph for velocity of electrons in an orbit vs. Z, $\frac{1}{n}$ and n.

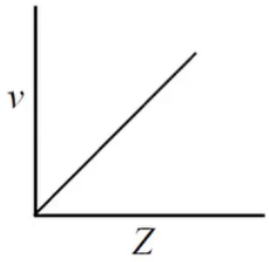
(A)



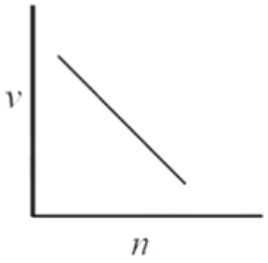
(B)



(C)



(D)



Q24 The ratio of the velocity of the electron in the third and fifth orbit of Li^{2+} would be:

(A) 3:5 (B) 5:3

(C) 25:9 (D) 9:25

Q25 The velocity of electron moving in 3^{rd} orbit of He^{+} is v. The velocity of electron moving in 2^{nd} orbit of Li^{2+} is

(A) $\frac{9}{4}$v

(B) $\frac{4}{9}$v

(C) v

(D) None of these

Q26 In two H atoms A and B the electrons move around the nucleus in circular orbits of radius r and 4 r respectively. The ratio of the times taken by them to complete one revolution is:

(A) 1 : 4 (B) 1 : 2

(C) 1 : 8 (D) 2 : 1

Q27 Ratio of total energy to potential energy for any electron in Bohr's orbit is

(A) -1

(B) $-\frac{1}{2}$

(C) 1

(D) $\frac{1}{2}$

Q28 Calculate energy of electron in He^{+} for 3^{rd} orbit

(A) $-13.6 \times \frac{2^2}{9}$eV/ atom

(B) $-2.18 \times 10^{-18} \times \frac{2^2}{9}$ J/ atom

(C) $-1312 \times \frac{2^2}{9}$ kJ/mol

(D) All of these

Q29 Calculate ratio of energy of 2^{nd} orbit of He^{+} to 3^{rd} orbit of Li^{+2}

(A) $1:2$ (B) $2:3$

(C) $3:1$ (D) $1:1$

Q30 In hydrogen atom, energy of first excited state is - $3.4\mathrm{eV}$. Then find out KE of same orbit of hydrogen atom

(A) $+3.4\mathrm{eV}$

(B) $+6.8\mathrm{eV}$

(C) $-13.6\mathrm{eV}$

(D) $+13.6\mathrm{eV}$

Q31 Ratio of energy of electron of 1^{st} orbit of hydrogen 2^{nd} orbit of $\mathrm{He}^{\oplus}$ and 3^{rd} orbit of Li^{2+} ion will be

(A) $1:2:3$ (B) $1:1:1$

(C) $1:4:9$ (D) $3:2:1$

Q32 In a hydrogen atom, if the energy of electron in the ground state is $-\mathrm{xeV}.$, then that in the 2^{nd} excited state of $\mathrm{He}^{+}$is

(A) $-\mathrm{xeV}$

(B) $-\frac{4}{9}\mathrm{xeV}$

(C) $+2\mathrm{xeV}$

(D) $-\frac{9}{4}\mathrm{xeV}$

Answer Key

Q1	(C)
Q2	(B)
Q3	(D)
Q4	(A)
Q5	(B)
Q6	(B)
Q7	(C)
Q8	(B)
Q9	(D)
Q10	(B)
Q11	(D)
Q12	(A)
Q13	(D)
Q14	(D)
Q15	(D)
Q16	(D)
Q17	(B)
Q18	(B)
Q19	(C)
Q20	(A)
Q21	(A)
Q22	(A)
Q23	(D)
Q24	(B)
Q25	(A)
Q26	(C)
Q27	(D)
Q28	(D)
Q29	(D)
Q30	(A)
Q31	(B)
Q32	(B)

Arjuna NEET (2026)

Physical Chemistry

Structure of Atom

DPP: 5

Q1 $E_n = -313.6/n^2 kcal/mole$. If the value of $E = -34.84$ kcal/mole, to which value does ' n ' correspond?
(A) 4 (B) 3
(C) 2 (D) 1

Q2 What is the energy associated with 3^{rd} energy shell of hydrogen atom?
(A) -2.18×10^{-18} J
(B) -0.342×10^{-19} J
(C) -0.726×10^{-18}
(D) -2.42×10^{-19} J

Q3 The potential energy of an electron in hydrogen atom is -3.02eV, its kinetic energy will be
(A) 1.51eV
(B) 15.10eV
(C) 13.6eV
(D) 1.36eV

Q4 The energy of electron in 3^{rd} orbit of hydrogen atom is
(A) -1311.8 kJ mol^{-1}
(B) -82.0 kJ mol^{-1}
(C) -145.7 kJ mol^{-1}
(D) -327.9 kJ mol^{-1}

Q5 Energy of electron of hydrogen atom in second Bohr orbit is
(A) -5.44×10^{-19} J
(B) -5.44×10^{-19} kJ
(C) -5.44×10^{-19}cal
(D) -5.44×10^{-19}eV

Q6 The energy of second Bohr orbit in the hydrogen atom is -3.4eV. The energy of fourth orbit of He^+ ion would be
(A) -3.4eV
(B) -4.2eV
(C) -6.8eV
(D) $+6.8$eV

Q7 The energy of an electron in the first Bohr orbit of H atom is -13.6 eV. The possible energy value(s) of the excited state(s) for electrons in Bohr orbits to hydrogen is (are)
(A) -3.4 eV
(B) -4.2 eV
(C) -6.8 eV
(D) $+6.8$ eV

Q8 An electron in H-atom is moving with a kinetic energy of 5.45×10^{-19} J. What will be the energy level for this electron?
(A) 1 (B) 2
(C) 3 (D) None of these

Q9 In a hydrogen atom, if the energy of an electron in the ground state is -13.6eV, then that in the second excited state is
(A) -1.51 eV
(B) -3.4 eV
(C) -6.04 eV
(D) -13.6 eV

Q10 The energy of an electron in the ground state (n=1) for He^+ ion is -x Joules then that for an electron in n=2 state for Be^{3+} ion in Joule is

(A) $-\frac{4}{9}x$ (B) $-\mathrm{x}$
(C) $-\frac{x}{9}$ (D) $-4\mathrm{x}$

Q11 The ratio of the difference in energy between the first and the second Bohr orbit to that between the second and the third Bohr orbit is:
(A) 1/2 (B) 34/19
(C) 102/121 (D) 27/5

Q12 Match the List-I with List-II.

	List-I		List-II
A.	Energy of ground state of He^+	P.	+ 6.04 eV
B.	Potential energy of I orbit of H-atom	Q.	–27.2 eV
C.	Kinetic energy of II excited state of He^+	R.	54.4 eV
D.	Ionisation potential of He^+	S.	– 54.4 eV

(A) A-(R); B-(Q); C-(P); D-(S)
(B) A-(Q); B-(R); C-(P); D-(S)
(C) A-(S); B-(Q); C-(P); D-(R)
(D) A-(P); B-(R); C-(S); D-(Q)

Q13 According to Bohr's theory
E_n = Total energy
K_n = Kinetic energy
V_n = Potential energy
r_n = Radius of nth orbit

	List I		List II
A.	$\mathrm{V_n/K_n = ?}$	P	0
B.	If radius of nth orbit $\propto \mathrm{E}_n^x$, x = ?	Q	-1
C.	Angular momentum in lowest orbital	R	-2
D.	$\frac{1}{r_n} \propto Z^y, y = ?$	S	1

(A) A-(R); B-(Q); C-(P); D-(S)
(B) A-(R); B-(Q); C-(S); D-(P)
(C) A-(Q); B-(R); C-(P); D-(S)
(D) A-(S); B-(Q); C-(P); D-(R)

Q14 The ratio of the energy required to remove an electron from the first three Bohr's orbits of hydrogen is
(A) $3:2:1$ (B) $9:4:1$
(C) $36:9:4$ (D) $1:4:9$

Q15 For hydrogen atom its energy is expressed as $\mathrm{E_n} = -\frac{13.6}{n^2}\mathrm{eV/}$ atom . The value of 2^{nd} ionization enthalpy of Helium atom will be:
(A) $51.5\mathrm{eV/}$ atom
(B) $+54.4\mathrm{eV/}$ atom
(C) $+13.6\mathrm{eV/}$ atom
(D) $+6.04\mathrm{eV/}$ atom

Q16 Bohr theory is not applicable for
(A) He^+
(B) Li^{2+}
(C) Be^+
(D) H

Q17 State true/ false.
$\mathbf{S}_1$: Bohr model is applicable for Be^{2+} ion.
$\mathbf{S}_2$: Total energy coming out of any light source is integral multiple of energy of one photon.
$\mathbf{S}_3$: Number of waves present in unit length is wave number.
$\mathbf{S}_4$: $\mathrm{e/m}$ ratio in cathode ray experiment is independent of the nature of the gas.
(A) F F T T (B) T T F F
(C) F T T T (D) T F F F

Q18 Which is correct for any H like species :-
(A) $(\mathrm{E_2 - E_1}) > (\mathrm{E_3 - E_2}) > (\mathrm{E_4 - E_3})$
(B) $(\mathrm{E_2 - E_1}) < (\mathrm{E_3 - E_2}) < (\mathrm{E_4 - E_3})$

(C) $(E_2 - E_1) = (E_3 - E_2) = (E_4 - E_3)$
(D) $(E_2 - E_1) = 1/4\,(E_3 - E_2) = 1$
$/9\,(E_4 - E_3)$

Answer Key

Q1	(B)
Q2	(D)
Q3	(A)
Q4	(C)
Q5	(A)
Q6	(A)
Q7	(A)
Q8	(B)
Q9	(A)
Q10	(B)
Q11	(D)
Q12	(C)
Q13	(A)
Q14	(C)
Q15	(B)
Q16	(C)
Q17	(C)
Q18	(A)

Arjuna NEET 2026

Physical Chemistry

Structure of Atom

DPP: 6

Q1 When an electron moves from higher orbit to a lower orbit ..... is produced.
(A) absorption spectra
(B) emission spectra
(C) α-particle
(D) None of these

Q2 In Bohr series of lines of hydrogen spectrum, the third line from the red end corresponds to which one of the following inner-orbit jumps of the electron for Bohr orbits in an atom of hydrogen?
(A) $3 \rightarrow 2$
(B) $5 \rightarrow 2$
(C) $4 \rightarrow 1$
(D) $2 \rightarrow 5$

Q3 Electrons in a sample of H-atom from an excited state returns to ground state in one or more steps show emission of 10 lines. How many of these belong to visible region?
(A) 6 (B) 5
(C) 4 (D) 3

Q4 The number of lines obtained in the Lyman series when an electron jumps from 6th orbit to 2nd orbit is
(A) 4 (B) 10
(C) 15 (D) Zero

Q5 If the shortest wavelength of H-atom in Lyman Series is ' X ' then the longest wavelength in Balmer Series of He^{+} is
(A) $\frac{9X}{5}$
(B) $\frac{38X}{5}$
(C) $\frac{X}{4}$
(D) $\frac{5X}{9}$

Q6 Frequency of photons emitted in Paschen series is given by $\mathrm{v} = 3.29 \times 10^{15}(\mathrm{hz})\left[\frac{1}{3^2} - \frac{1}{\mathrm{n}^2}\right]$. Value of n for photon having wavelength $1285\ \mathrm{nm}$ will be:
(A) $n = 3$ (B) $n = 4$
(C) $n = 5$ (D) $n = 6$

Q7 The spectrum of He is expected to be similar to that of:
(A) H
(B) Na
(C) He^{+}
(D) Li^{+}

Q8 The limiting line in Balmer series of hydrogen atom will have a frequency of:-
(A) $3.65 \times 10^{14}\mathrm{sec}^{-1}$
(B) $3.29 \times 10^{15}\mathrm{sec}^{-1}$
(C) $8.22 \times 10^{14}\mathrm{sec}^{-1}$
(D) $-8.22 \times 10^{14}\mathrm{sec}^{-1}$

Q9 The ratio of minimum frequency of Lyman & Balmer series will be :-
(A) 1.25 (B) 0.25
(C) 5.4 (D) 10

Q10 The wavelength of third line of the Balmer series for a H atom is
(A) $\frac{21}{100\mathrm{R}}$
(B) $\frac{100}{21R}$

(C) $\frac{21R}{100}$
(D) $\frac{100R}{21}$

Q11 When the electron of a hydrogen atom jumps from $n = 4$ to $\mathrm{n} = 1$ state, the number of spectral lines emitted is
(A) 15 (B) 6
(C) 3 (D) 4

Q12 The ratio of minimum wavelengths of Lyman & Balmer series will be
(A) 1.25 (B) 0.25
(C) 5 (D) 10

Q13 The first emission line in the H-atom spectrum in the Balmer series will have wave number:-
(A) $\frac{5\mathrm{R}}{36}\ \mathrm{cm}^{-1}$
(B) $\frac{3R}{4}\ \mathrm{cm}^{-1}$
(C) $\frac{7\mathrm{R}}{144}\ \mathrm{cm}^{-1}$
(D) $\frac{9\mathrm{R}}{400}\ \mathrm{cm}^{-1}$

Q14 The wavelength of the first line of the Lyman series for hydrogen is 1216 Å. The wavelength for the first line of this series for a 10 time ionized sodium atom $(Z = 11)$ will be:-
(A) 1000 Å (B) 100 Å
(C) 10 Å (D) 1 Å

Q15 The line spectrum observed when electron jumps from higher level to M level is known as
(A) Balmer series
(B) Lyman series
(C) Paschen series
(D) Brackett series

Q16 How many spectral lines are produced in the spectrum of hydrogen atom from 5 th energy level?
(A) 5 (B) 10
(C) 15 (D) 4

Q17 What transition in He^{+}ion shall have the same wave number as the first line in Balmer series of H atom?
(A) $7 \rightarrow 5$
(B) $5 \rightarrow 3$
(C) $6 \rightarrow 4$
(D) $4 \rightarrow 2$

Q18 An electron jumps from 6th energy level to 3rd energy level in H-atom, how many lines belong to visible region?
(A) 1 (B) 2
(C) 3 (D) Zero

Q19 The wavenumber for the shortest wavelength transition in the Balmer series of atomic hydrogen is
(A) $27420\ \mathrm{cm}^{-1}$
(B) $28420\ \mathrm{cm}^{-1}$
(C) $29420\ \mathrm{cm}^{-1}$
(D) $12186\ \mathrm{cm}^{-1}$

Q20 The difference in wavelength of second and third lines of Balmer series in the atomic spectrum is
(A) 131 Å (B) 520 Å
(C) 324 Å (D) 262 Å

Q21 The third line in Balmer series corresponds to an electronic transition between which Bohr's orbits in hydrogen atom
(A) $5 \rightarrow 3$
(B) $5 \rightarrow 2$
(C) $4 \rightarrow 3$
(D) $4 \rightarrow 2$

Q22 When electrons in N shell of excited hydrogen atom return to ground state, the number of possible lines spectrum is:
(A) 6 (B) 4
(C) 3 (D) 2

Q23 The wave number of the first line of Balmer series of H atom is $15200\ \mathrm{cm}^{-1}$. What is the wave number of the first line of Balmer series of Li^{2+} ion?
(A) $15200\ \mathrm{cm}^{-1}$
(B) $6080\ \mathrm{cm}^{-1}$
(C) $76000\ \mathrm{cm}^{-1}$
(D) $136800\ \mathrm{cm}^{-1}$

Q24 In hydrogen spectrum, the series of lines appearing in ultra violet region of electromagnetic spectrum are called
(A) Balmer lines (B) Lyman lines
(C) Pfund lines (D) Brackett lines

Q25 A certain transition in H spectrum from an excited state to the ground state in one or more steps gives rise to a total of 10 lines. How many of these belong to the UV spectrum?
(A) 3 (B) 4
(C) 6 (D) 5

Q26 The wavelength of the radiation emitted, when in a hydrogen atom electron falls from infinity to stationary state 1, would be (Rydberg constant = $1.097 \times 10^{7}\ \mathrm{m}^{-1}$)
(A) $91\ \mathrm{nm}$
(B) $192\ \mathrm{nm}$
(C) $406\ \mathrm{nm}$
(D) $9.1 \times 10^{-8}\ \mathrm{nm}$

Q27 The line spectrum observed when electron jumps from higher level to M level is known as
(A) Balmer series
(B) Lyman series
(C) Paschen series
(D) Brackett series

Q28 How many spectral lines are produced in the spectrum of Hydrogen atom from 5^{th} energy level to ground level?
(A) 5 (B) 10
(C) 15 (D) 4

Q29 What transition in He^{+} ion shall have the same wave number as the first line in Balmar series of H atom?
(A) $7 \rightarrow 5$
(B) $5 \rightarrow 3$
(C) $6 \rightarrow 4$
(D) $4 \rightarrow 2$

Q30 An electron jumps from $6\mathrm{th}$ energy level to $3\mathrm{rd}$ energy level in H-atom, how many lines belong to visible region?
(A) 1 (B) 2
(C) 3 (D) Zero

Q31 The wavenumber for the shortest wavelength transition in the Balmer series of atomic hydrogen is
(A) $27420\ \mathrm{cm}^{-1}$
(B) $28420\ \mathrm{cm}^{-1}$
(C) $29420\ \mathrm{cm}^{-1}$
(D) $12186\ \mathrm{cm}^{-1}$

Q32 When electrons in N shell of excited hydrogen atom return to ground state, the number of possible lines spectrum is:
(A) 6 (B) 4
(C) 2 (D) 3

Q33 Which of the following lines will have a wave no. equal in magnitude to the value of R in the H - Spectral series?
(A) Limiting line of Balmer series
(B) Limiting line of Lyman series
(C) First line of Lyman series
(D) First line of Balmer series

Answer Key

Q1	(B)
Q2	(B)
Q3	(D)
Q4	(D)
Q5	(A)
Q6	(C)
Q7	(D)
Q8	(C)
Q9	(C)
Q10	(B)
Q11	(B)
Q12	(B)
Q13	(A)
Q14	(C)
Q15	(C)
Q16	(B)
Q17	(C)
Q18	(D)
Q19	(A)
Q20	(B)
Q21	(B)
Q22	(A)
Q23	(D)
Q24	(B)
Q25	(B)
Q26	(A)
Q27	(C)
Q28	(B)
Q29	(C)
Q30	(D)
Q31	(A)
Q32	(A)
Q33	(B)

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Physical Chemistry

Structure of Atom

DPP: 7

Q1 The spectrum of He^+ is expected to be similar to that of
(A) Li^+
(B) H
(C) Na
(D) He

Q2 Find out the number of waves made by a Bohr electron in one complete revolution in its third orbit.
(A) 1 (B) 2
(C) 3 (D) 4

Q3 De-Broglie wavelength for electron is related to applied voltage as:-
(A) $\lambda = \frac{12.3}{\sqrt{h}} A^\circ$
(B) $\lambda = \frac{12.3}{\sqrt{V}} A^\circ$
(C) $\lambda = \frac{12.3}{\sqrt{r}} A^\circ$
(D) $\lambda = \frac{12.3}{\sqrt{m}} A^\circ$

Q4 Calculate the momentum of the particle which has de Broglie wavelength 1 Å $\left(10^{-10}\ \text{m}\right)$ and $h = 6.6 \times 10^{-34}\ \text{J} - \text{sec.}$
(A) $6.1 \times 10^{-22}\ \text{kg msec}^{-1}$
(B) $6.6 \times 10^{-24}\ \text{kg msec}^{-1}$
(C) $6.2 \times 10^{23}\ \text{kg msec}^{-1}$
(D) $6.4 \times 10^{-24}\ \text{kg msec}^{-1}$

Q5 If the kinetic energy of an electron is increased 4 times, the wavelength of the de-Broglie wave associated with it would become:
(A) 4 times
(B) 2 times
(C) $\frac{1}{2}$ times
(D) $\frac{1}{4}$ times

Q6 A moving electron has 2.8×10^{-25} J of kinetic energy calculate its wavelength.
(Mass of electron $= 9.1 \times 10^{-31}\ \text{kg}$)
(A) $9.5524 \times 10^{-7}\ \text{m}$
(B) $92.455 \times 10^{-5}\ \text{m}$
(C) $9.2455 \times 10^{-7}\ \text{m}$
(D) $924.55 \times 10^{-5}\ \text{m}$

Q7 Which of the following has least de-Broglie wavelength, moving with same speed?
(A) e^-
(B) p
(C) CO_2
(D) SO_2

Q8 The mass of photon having wavelength $1\ \text{nm}$ is
(A) $2.21 \times 10^{-35}\ \text{kg}$
(B) $2.21 \times 10^{-30}\ \text{kg}$
(C) $2.21 \times 10^{-33}\ \text{kg}$
(D) $2.21 \times 10^{-26}\ \text{kg}$

Q9 The de Broglie wavelength of 1mg grain of sand blown by a $20\ \text{ms}^{-1}$ wind is:
(A) $3.3 \times 10^{-29}\ \text{m}$
(B) $3.3 \times 10^{-21}\ \text{m}$
(C) $3.3 \times 10^{-49}\ \text{m}$
(D) $3.3 \times 10^{-42}\ \text{m}$

Q10 The de-Broglie wavelength associated with a material particle is
(A) Directly proportional to its energy
(B) Directly proportional to momentum
(C) Inversely proportional to its energy
(D) Inversely proportional to momentum

Q11 The de Broglie wavelength of a tennis ball of mass $66\ \text{g}$ moving with the velocity of 10 meters per second is approximately
(A) 10^{-35} metres
(B) 10^{-33} metres
(C) 10^{-31} metres

(D) 10^{-36} metres

Q12 The wavelength of a cricket ball weighing $100\ \mathrm{g}$ and travelling with a velocity of $50\ \mathrm{m/s}$ is
(A) $1.3 \times 10^{-28}\ \mathrm{m}$
(B) $1.3 \times 10^{-37}\ \mathrm{m}$
(C) $1.3 \times 10^{-34}\ \mathrm{m}$
(D) $1.3 \times 10^{-30}\ \mathrm{m}$

Q13 An electron has kinetic energy $2.8 \times 10^{-23}\ \mathrm{J}$ de-Broglie wavelength will be nearly $\left(\mathrm{m_e} = 9.1 \times 10^{-31}\ \mathrm{kg}\right)$
(A) $9.24 \times 10^{-4}\ \mathrm{m}$
(B) $9.24 \times 10^{-7}\ \mathrm{m}$
(C) $9.24 \times 10^{-8}\ \mathrm{m}$
(D) $9.24 \times 10^{-10}\ \mathrm{m}$

Q14 A cricket ball of $0.5\ \mathrm{kg}$ is moving with a velocity of $100\ \mathrm{ms^{-1}}$. The wavelength associated with its motion is
(A) $1/100\ \mathrm{cm}$
(B) $66 \times 10^{-34}\ \mathrm{m}$
(C) $1.32 \times 10^{-35}\ \mathrm{m}$
(D) $6.6 \times 10^{-28}\ \mathrm{m}$

Q15 An electron with velocity v is found to have a certain value of de Broglie wavelength. The velocity that the neutron should process to have the same de Broglie wavelength is
(A) v
(B) $\mathrm{v}/1840$
(C) 1840
(D) $1840/\mathrm{v}$

Q16 Calculate the wavelength (in nanometre) in associated with a proton moving at $1.0 \times 10^{3}\ \mathrm{ms^{-1}}$ (mass of proton $= 1.67 \times 10^{-27}\ \mathrm{kg}$ and $\mathrm{h} = 6.63 \times 10^{-34}\mathrm{Js}$)
(A) $0.032\ \mathrm{nm}$
(B) $0.40\ \mathrm{nm}$
(C) $2.5\ \mathrm{nm}$
(D) $14.0\ \mathrm{nm}$

Q17 The velocities of two particles A and B are 0.05 and 0.02 $\mathrm{ms^{-1}}$ respectively. The mass of B is five times the mass of A. The ratio of their de-Broglie's wavelength is:
(A) 2 : 1 (B) 1 : 4
(C) 1 : 1 (D) 4 : 1

Q18 For an electron, if the uncertainty in velocity is Δv, the uncertainty in its position $(\Delta \mathrm{x})$ is given by:
(A) $\frac{\mathrm{h}}{2}\pi \mathrm{m}\Delta v$
(B) $\frac{2\pi}{\mathrm{hm}\Delta v}$
(C) $\frac{\mathrm{h}}{4\pi \mathrm{m}\Delta v}$
(D) $\frac{2\pi \mathrm{m}}{\mathrm{h}\Delta v}$

Q19 A ball of mass $200\ \mathrm{g}$ is moving with a velocity of $10\ \mathrm{m\ s^{-1}}$. If the error in measurement of velocity is 0.1%, the uncertainty in its position is:
(A) $3.3 \times 10^{-31}\ \mathrm{m}$
(B) $3.3 \times 10^{-27}\ \mathrm{m}$
(C) $5.3 \times 10^{-25}\ \mathrm{m}$
(D) $2.64 \times 10^{-32}\ \mathrm{m}$

Q20 The Heisenberg's Uncertainty Principle states that...
(A) no two electrons in the same atom can have the same set of four quantum numbers
(B) two atoms of the same element must have the same number of protons
(C) it is impossible to determine accurately both the position and momentum of an electron simultaneously
(D) electrons of atoms in their ground states enter energetically equivalent sets of orbitals singly before they pair up in any orbital of the set

Q21 If the uncertainty in the position of an electrons is zero, the uncertainty in its momentum be
(A) Zero
(B) $\frac{\mathrm{h}}{2\pi}$
(C) $\frac{\mathrm{h}}{4\pi}$
(D) Infinity

Q22 If uncertainty in the measurement of position and momentum of an electron are equal then

uncertainty in the measurement of its velocity is approximately:
(A) $8 \times 10^{12}\ \mathrm{ms}^{-1}$
(B) $6 \times 10^{12}\ \mathrm{ms}^{-1}$
(C) $4 \times 10^{12}\ \mathrm{ms}^{-1}$
(D) $2 \times 10^{12}\ \mathrm{ms}^{-1}$

Q23 Uncertainty in position of particle of $25\ \mathrm{g}$ in space is $10^{-5}\ \mathrm{m}$. Hence, uncertainty in velocity $\left(\mathrm{ms}^{-1}\right)$ is (Planck's constant, $\mathrm{h} = 6.6 \times 10^{-34}\,\mathrm{Js}$
(A) 2.1×10^{-28}
(B) 2.1×10^{-34}
(C) 0.5×10^{-34}
(D) 5.0×10^{-24}

Q24 In an atom, an electron is moving with a speed of $600\ \mathrm{m/s}$ with an uncertainty of 0.005%, the position of the electron can be $\left(\mathrm{h} = 6.6 \times 10^{-34}\ \mathrm{kg\ m^2\ s^{-1}}\right.$, mass of electron $\left.\mathrm{m_e} = 9.1 \times 10^{-31}\ \mathrm{kg}\right)$
(A) $1.52 \times 10^{-4}\ \mathrm{m}$
(B) $5.01 \times 10^{-3}\ \mathrm{m}$
(C) $1.92 \times 10^{-3}\ \mathrm{m}$
(D) $3.8 \times 10^{-3}\ \mathrm{m}$

Q25 Uncertainty in the position of an electron (mass $= 9.1 \times 10^{-31}\ \mathrm{kg}$) moving with a velocity $300\ \mathrm{ms}^{-1}$, Accurate up to 0.001%, will be $\left(\mathrm{h} = 6.63 \times 10^{-34}\ \mathrm{J.S}\right)$
(A) $19.2 \times 10^{-2}\ \mathrm{m}$
(B) $5.76 \times 10^{-2}\ \mathrm{m}$
(C) $1.93 \times 10^{-7}\ \mathrm{m}$
(D) $9.84 \times 10^{-2}\ \mathrm{m}$

Q26 A ball of mass 200 g is moving with velocity of 10 $\mathrm{m.s^{-1}}$. If the error in measurement of velocity is 0.1%, the uncertainity in its position is:
($\mathrm{h} = 6.6 \times 10^{-34}$ J s)
(A) 3.3×10^{-37} m
(B) 3.3×10^{-27} m
(C) 5.3×10^{-25} m
(D) 2.63×10^{-32} m

Q27 The uncertainty in the velocity of particle of mass 6.626×10^{-28} kg is 10^{-6} m/sec. What is the uncertainty in its position in nm?
(A) $\frac{1}{2\pi}$ (B) $\frac{2.5}{\pi}$
(C) $\frac{4}{\pi}$ (D) $\frac{1}{4\pi}$

Q28 The uncertainty in the position of an electron and proton is equal, the ratio of the uncertainties in the velocity of an electron and proton is:
(A) $10^3 : 1$ (B) 1 : 1838
(C) 3672 : 1 (D) 1836:1

Q29 Which of the following is responsible to rule out the existence of definite paths or trajectories of electrons?
(A) Pauli's exclusion principle
(B) Heisenberg's uncertainty principle
(C) Hund's rule of maximum multiplicity
(D) Aufbau principle

Q30 If uncertainty in position and momentum are equal, then uncertainly in velocity is:
(A) $\frac{1}{2m}\sqrt{\frac{h}{\pi}}$ (B) $\sqrt{\frac{\mathrm{h}}{2\pi}}$
(C) $\frac{1}{\mathrm{m}}\sqrt{\frac{\mathrm{h}}{\pi}}$ (D) $\sqrt{\frac{\mathrm{h}}{\pi}}$

Answer Key

Q1	(B)
Q2	(C)
Q3	(B)
Q4	(B)
Q5	(C)
Q6	(C)
Q7	(D)
Q8	(C)
Q9	(A)
Q10	(D)
Q11	(B)
Q12	(C)
Q13	(C)
Q14	(C)
Q15	(B)
Q16	(B)
Q17	(A)
Q18	(C)
Q19	(D)
Q20	(C)
Q21	(D)
Q22	(A)
Q23	(A)
Q24	(C)
Q25	(C)
Q26	(D)
Q27	(D)
Q28	(D)
Q29	(B)
Q30	(A)

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Physical Chemistry

Structure of Atom

Q1 Heisenberg uncertainity principle is not valid for
(A) Moving electron
(B) Motor car
(C) Stationary particles
(D) B and C both

Q2 In the Schrodinger's wave equation ψ represents
(A) Orbit
(B) Wave function
(C) Wave
(D) Radial probability

Q3 Orbital angular momentum of electron in $5\ d_{z^2}$ orbital
(A) $\sqrt{5}\hbar$
(B) $\sqrt{6}\hbar$
(C) $\sqrt{2}\hbar$
(D) Zero

Q4 Total number of orbitals in any shell is given by
(A) n
(B) n^2
(C) $2n^2$
(D) $2l+1$

Q5 The total number of subshells in fourth energy level of an atom is
(A) 4 (B) 8
(C) 16 (D) 32

Q6 How many electrons can fit in the subshell for which $n = 3$ and $l = 1$?
(A) 2 (B) 6
(C) 10 (D) 14

Q7 Maximum number of electrons in a subshell with $l = 3$ and $n = 4$ is
(A) 10 (B) 12
(C) 14 (D) 16

Q8 The maximum number of such electrons in an atom with quantum number $n = 3, l = 2$ is:
(A) 2 (B) 6
(C) 10 (D) 14

Q9 The number of orbitals in $n = 3$ are:
(A) 1 (B) 4
(C) 9 (D) 16

Q10 The correct set of quantum numbers for the unpaired electron of chlorine atom is
(A)

n	l	m
2	1	0

(B)

n	l	m
2	1	1

(C)

n	l	m
3	1	1

(D)

n	l	m
3	0	0

Q11 Azimuthal quantum number for the last electron in Na atom is
(A) 1 (B) 0
(C) 2 (D) 3

Q12 The quantum numbers for the outermost electron of an element are given below
$n = 2, \ell = 0, m = 0, m_s = +\frac{1}{2}$ The atom is
(A) hydrogen (B) lithium
(C) beryllium (D) boron

Q13 The magnetic quantum number for the last electron in sodium is:
(A) 3 (B) 1
(C) 2 (D) Zero

Q14 For each value of l, the number of m_l values are
(A) $2l$ (B) nl
(C) $2l+1$ (D) $n-l$

Q15

A subshell with $n = 6, l = 2$ can accommodate a maximum of

(A) 10 electrons (B) 12 electrons

(C) 36 electrons (D) 72 electrons

Q16 For a d-electron the orbital angular momentum is

(A) $\sqrt{6}(\mathrm{h}/2\pi)$

(B) $\sqrt{2}(\mathrm{h}/2\pi)$

(C) $h/2n$

(D) zero

Q17 The correct designation of an electron with $\mathrm{n} = 4, l = 3, \mathrm{m} = 2$, and $\mathrm{s} = +1/2$ is:

(A) $3d$

(B) 4f

(C) 5p

(D) 6s

Q18 A 3 d-electron having $s = +1/2$ can have a magnetic quantum no:

(A) +2 (B) +3

(C) -3 (D) +4

Q19 The orbital angular momentum for an electron revolving in an orbit is given by $\sqrt{\ell(\ell+1)}\mathrm{h}/2\pi$. This momentum for an s-electron will be given by

(A) $+\frac{1}{2} \cdot \frac{\mathrm{h}}{2\pi}$

(B) zero

(C) $\frac{h}{2\pi}$

(D) $\sqrt{2} \cdot \frac{h}{2\pi}$

Q20 The number of orbitals in n^{th} Bohr orbit of an atom equal to

(A) n^2

(B) $2n^2$

(C) $(2l+1)$

(D) $(3l+2)$

Q21 g-orbital is possible if

(A) $n = 5, l = 4$

(B) it will have 18 electrons

(C) it will have 9 types of orbitals

(D) all of the above.

Q22 For a d-electron, the orbital angular momentum is

(A) $\sqrt{6}\left(\frac{\mathrm{h}}{2\pi}\right)$

(B) $\sqrt{2}\left(\frac{\mathrm{h}}{2\pi}\right)$

(C) $\left(\frac{\mathrm{h}}{2\pi}\right)$

(D) $2\left(\frac{\mathrm{h}}{2\pi}\right)$

Q23 The principal quantum number of an atom is related to the

(A) size of the orbital

(B) spin angular momentum

(C) orientation of the orbital in space

(D) orbital angular momentum

Q24 The angular momentum of electron in $'d'$ orbital is equal to

(A) 0 h

(B) $\sqrt{6}\hbar$

(C) $\sqrt{2}\hbar$

(D) $2\sqrt{3}\hbar$

Q25 The total number of orbitals present for principal quantum number, n = 4 is:

(A) 30 (B) 12

(C) 15 (D) 16

Q26 Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R:

Assertion A: For n = 3, l may be 0, 1 and 2 and m may be (0, ± 1 and ± 2).

Reason R: For each value of n, there are 0 to (n – 1) possible values of l; and for each value of l, there are 0 to ± l values of m.

In the light of the above statements, choose the **correct** answer from the options given below:

(A) A is true but R is false.

(B) A is false but R is true.

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

(D) Both A and R are true but R is NOT the correct explanation of A.

Q27 How many electrons can fit in the orbital for which: n = 3 and l = 1?

(A) 10 (B) 14

(C) 6 (D) 2

Answer Key

Q1	(D)
Q2	(B)
Q3	(B)
Q4	(B)
Q5	(A)
Q6	(B)
Q7	(C)
Q8	(C)
Q9	(C)
Q10	(C)
Q11	(B)
Q12	(B)
Q13	(D)
Q14	(C)
Q15	(A)
Q16	(A)
Q17	(B)
Q18	(A)
Q19	(B)
Q20	(A)
Q21	(D)
Q22	(A)
Q23	(A)
Q24	(B)
Q25	(D)
Q26	(C)
Q27	(C)

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Physical Chemistry

DPP: 9

Structure of Atom

Q1 Match column I with column II.

Column I		Column II	
a.	Number of sub-shell in a shell	(i)	$2(2l+1)$
b.	Maximum number of electrons in a sub-shell	(ii)	$n-l-1$
c.	Number of spherical nodes	(iii)	n
d.	Number of spectral lines in Lyman series for a gas (for n to 1 transition)	(iv)	$(n-1)$

The correct match is

(A) a(iii), b(i), c(iv), d(ii)

(B) a(iii), b(i), c(ii), d(iv)

(C) a(i), b(ii), c(iii), d(iv)

(D) a(i), b(iv), c(ii), d(iii)

Q2 (X) Matching Column Types

	Quantum number		Orbitals
(1)	$n=2, l=1, m=-1$	(P)	$2p_x$ or $2p_y$
(2)	$n=4, l=2, m=0$	(Q)	$4dz^2$
(3)	$n=3, l=1, m=\pm1$	(R)	$3p_x$ or $3p_y$
(4)	$n=4, l=0, m=0$	(S)	4s
(5)	$n=3, l=2, m=\pm2$	(T)	$3d_{x^2-y^2}$, $3d_{xy}$

Choose the correct option from the following combinations

(A) 1-P, 2-Q, 3-R, 4-S, 5-T

(B) 1-T, 2-S, 3-R, 4-Q, 5-P

(C) 1-S, 2-T, 3-P, 4-Q, 5-R

(D) 1-P, 2-Q, 3-R, 4-T, 5-S

Q3

Which of the following statement about quantum number is correct?

(A) If the value of $l=0$, the electron distribution is spherical.

(B) The shape of orbital is given by subsidiary quantum number.

(C) The Zeeman's effect is explained by magnetic quantum number.

(D) all of the above.

Q4 The correct set of quantum numbers for the unpaired electron of the chlorine atom is

	n	ℓ	m
(1)	2	1	0
(2)	2	1	1
(3)	3	1	1
(4)	3	0	0

(A) 1 (B) 2

(C) 3 (D) 4

Q5 Azimuthal quantum number for the last electron in Na atom is

(A) 1 (B) 0

(C) 2 (D) 3

Q6 The quantum numbers for the outermost electron of an element are given below

$N=2, 1=0,\ m=0,\ m,=+\frac{1}{2}.$

The atom is

(A) hydrogen (B) lithium

(C) beryllium (D) boron

Q7 Magnetic quantum number for the last electron in sodium is:

(A) 3 (B) 1

(C) 2 (D) zero

Q8 Assertion (A): The orbital angular momentum of d-orbital is $\sqrt{6}\frac{h}{2\pi}$

Reason (R): d-orbitals have double dumb-bell shaped except d_z^2

(A) If both Assertion (A) and Reason (R) are True and the Reason (R) is a correct explanation of the Assertion (A).

(B) If both Assertion (A) and Reason (R) are True but Reason (R) is not a correct explanation of the Assertion (A).

(C) If Assertion (A) is True but the Reason (R) is False.

(D) Assertion (A) is False but Reason (R) is True.

Q9 What is the maximum number of orbitals that can be identified with the following quantum numbers?

n = 3, l = l, m_l = 0?

(A) 2 (B) 3

(C) 4 (D) 1

Q10 Statement-I: The orbital with l = 0 is spherical in shape.

Statement-II: Azimuthal quantum number describes the shape of an orbital which is according to the quantum theory, in the space around the nucleus.

(A) Both Statement-I and Statement-II are correct.

(B) Both Statement-I and Statement-II are incorrect.

(C) Statement-I is correct and Statement-II is incorrect.

(D) Statement-I is incorrect and Statement-II is correct.

Q11 The maximum number of electrons which can be held by subshell with azimuthal quantum number "l" in an atom is given by:

(A) 2l+1 (B) 2l+2

(C) 2(2l+ 1) (D) 2(2l + 2)

Q12 The correct quantum number of 3p-electrons, are:

(A) $n = 3, l = 2, m = 2, s = +\frac{1}{2}$

(B) $n = 3, l = 1, m = -1, s = -\frac{1}{2}$

(C) $n = 3, l = -2, m = -2, s = +\frac{1}{2}$

(D) None of the above

Q13 The set of quantum no. not applicable for an electron.

(A) $2, 0, 0, -\frac{1}{2}$ (B) $3, 1, -2, +\frac{1}{2}$

(C) $4, 2, -2, -\frac{1}{2}$ (D) $6, 0, 0, +\frac{1}{2}$

Q14 Match the column :

Column-I (n, l)		Column-II (Orbital)	
(A)	2, 1	(P)	4s
(B)	4, 0	(Q)	3d
(C)	5, 3	(R)	2p
(D)	3, 2	(S)	5f

Choose the correct answer from the options given below :

(A) A – P B – R C – Q D – S

(B) A – R B – P C – Q D – S

(C) A – R B – P C – S D – Q

(D) A – P B – R C – S D – Q

Q15 Splitting of spectral lines under the influence of magnetic field is called:

(A) Zeeman effect

(B) Stark effect

(C) Photoelectric effect

(D) None of these

Q16 The quantum number not obtained from Schrodinger equation is:

(A) n (B) l

(C) m (D) s

Q17 The correct set of four quantum numbers of a $3\mathrm{d}-$ electron is

(A) $\mathrm{n}=3, \ell=2, \mathrm{m}=0, \mathrm{s}=+1/2$

(B) $\mathrm{n}=3, \ell=3, \mathrm{m}=0, \mathrm{s}=+1/2$

(C) $\mathrm{n}=3, \ell=1, \mathrm{m}=2, \mathrm{s}=+1/2$

(D) $\mathrm{n}=3, \ell=1, \mathrm{m}=0, \mathrm{s}=+1/2$

Q18 Consider the following sets of quantum numbers

	n	ℓ	m	s
I.	3	0	0	$+\frac{1}{2}$
II.	3	3	−1	$-\frac{1}{2}$
III.	1	0	−1	$+\frac{1}{2}$
IV.	4	2	3	$-\frac{1}{2}$

Which of the above sets of quantum numbers is not permissible?

(A) II, III only

(B) Only I

(C) III and IV only

(D) II, III and IV

Q19 Maximum number of electrons, that can be present in a d-orbital is

(A) 2 (B) 10

(C) 8 (D) 6

Q20 Any f-orbital can accommodate upto

(A) 2 electrons with parallel spin

(B) 6 electrons

(C) 2 electrons with opposite spin

(D) 14 electrons

Q21 The maximum number of $4\ \mathrm{d}$-electrons having spin quantum number $\mathrm{s}=+\frac{1}{2}$ are

(A) 10 (B) 7

(C) 1 (D) 5

Q22 Which of the following sets of quantum numbers is correct for an electron in 4 f orbital?

(A) $\mathrm{n}=4, l=3, \mathrm{m}=+4, \mathrm{s}=-1/2$

(B) $\mathrm{n}=4, l=4, \mathrm{m}=-4, \mathrm{s}=-1/2$

(C) $\mathrm{n}=4, l=3, \mathrm{m}=+1, \mathrm{s}=+1/2$

(D) $\mathrm{n}=3, l=2, \mathrm{m}=-2, \mathrm{s}=+1/2$

Q23 Match the column:

	Column-I		**Column-II**
(1)	Orbit angular momentum	(P)	$\sqrt{n(n+2)}$
(2)	Orbital angular momentum	(Q)	$nh/2\pi$
(3)	Spin angular momentum	(R)	$\sqrt{s(s+1)}\frac{h}{2\pi}$
(4)	Magnetic moment	(S)	$\sqrt{l(l+1)}\frac{h}{2\pi}$
		(T)	$\sqrt{n(n+1)}h$

Choose the correct option from the following combinations:

(A) 1-P, 2-Q, 3-R, 4-S

(B) 1-Q, 2-R, 3-S, 4-T

(C) 1-Q, 2-S, 3-R, 4-P

(D) 1-T, 2-S, 3-R, 4-P

Q24 Any p-orbital can accommodate up to

(A) four electrons

(B) six electrons

(C) two electrons with parallel spins

(D) two electrons with opposite spins

Q25 If protium, tritium and deuterium have one electrons then the spin quantum number of that electron is;

(A) $+\frac{1}{2}$
(B) $+\frac{1}{2}$ or $-\frac{1}{2}$
(C) $-\frac{1}{2}$
(D) None of these

Q26 Match List I with List II

List I Quantum Number	List II Information provided
A. m_l	I. shape of orbital
B. m_s	II. size of orbital
C. ℓ	III. orientation of orbital
D. n	IV. orientation of spin of electron

Choose the **correct** answer from the options given below:
(A) A-II, B-I, C-IV, D-III
(B) A-I, B-III, C-II, D-IV
(C) A-III, B-IV, C-I, D-II
(D) A-III, B-IV, C-II, D-I

Q27 Two electrons occupying the same orbital are distinguished by:
(A) Spin quantum number
(B) Principal quantum number
(C) Magnetic quantum number
(D) Azimuthal quantum number

Q28 Calculate the spin multiplicity for H-atom
(A) 10 (B) 2
(C) $\frac{5}{2}$ (D) 11

Answer Key

Q1	(B)	Q15	(A)
Q2	(A)	Q16	(D)
Q3	(D)	Q17	(A)
Q4	(C)	Q18	(D)
Q5	(B)	Q19	(B)
Q6	(B)	Q20	(C)
Q7	(D)	Q21	(D)
Q8	(B)	Q22	(C)
Q9	(D)	Q23	(C)
Q10	(A)	Q24	(D)
Q11	(C)	Q25	(B)
Q12	(B)	Q26	(C)
Q13	(B)	Q27	(A)
Q14	(C)	Q28	(B)

Arjuna NEET 2026

Physical Chemistry

Structure of Atom

DPP: 10

Q1 The number of lobes in most of the d orbitals are
(A) 6 (B) 8
(C) 10 (D) 4

Q2 Which of the following pairs of d-orbitals will have electron density along the axes?
(A) d_{z^2}
(B) $\mathrm{d_{xz}}, \mathrm{d_{yz}}$
(C) $d_{z^2}, d_{x^2-y^2}$
(D) $d_{xy}, d_{x^2-y^2}$

Q3 What is the shape of orbital having radial node one and n = 3?
(A) Spherical
(B) Dumbbell
(C) Double dumbbell
(D) Complex

Q4 Identify the incorrect statements from the following.
(A) The shapes of d_{xy}, d_{yz}, and d_{zx} orbitals are similar to each other; and $d_{x^2-y^2}$ and d_{z^2} are similar to each other.
(B) All the five 5d orbitals are different in size when compared to the respective 4d orbitals.
(C) All the five 4d orbitals have shapes similar to the respective 3d orbitals.
(D) In an atom, all the five 3d orbitals are equal in energy in free state.

Q5 Among the three types of orbitals p, d and f
(A) Both p and f orbitals have center of symmetry.
(B) Both p and d orbitals have center of symmetry
(C) Only d orbitals have center of symmetry.
(D) F orbitals alone have center of symmetry

Q6 Which of the following is incorrect?
(A) The allowed vibrations of an electron in 3D space is known as orbitals.
(B) All s-orbitals are spherical.
(C) All p-orbitals have 2 nodes.
(D) All p-orbitals are directional.

Q7 Which orbital has two angular nodal planes:
(A) s
(B) p
(C) d
(D) f

Q8 An orbital with orbitals angular momentum zero and three radial node
(A) 3s (B) 3p
(C) 3d (D) 4s

Q9 Assertion (A): 2p orbital does not have any spherical node.
Reason (R): The number of nodes in p-orbitals is given by (n – 2) where n is the principal quantum number.
(A) Both Assertion (A) and Reason (R) are True and the Reason (R) is a correct explanation of the Assertion (A).
(B) Both Assertion (A) and Reason (R) are True but Reason (R) is not a correct explanation of the Assertion (A).

(C) Assertion (A) is True but the Reason (R) is False.
(D) Assertion (A) is False but Reason (R) is True.

Q10 For radial probability curves, which of the following is/are incorrect?
(A) The number of radial node in $2\ \mathrm{s}$ orbital is one.
(B) The number of spherical or radial nodes is equal to $\mathrm{n}- l - 1$
(C) The number of angular nodes is l
(D) $3\ \mathrm{d}_{\mathrm{z}}^2$ has 3 angular nodes.

Q11 Assertion (A): The number of radial nodes in 3s and 4p orbitals is are equal.
Reason (R): The number of radial nodes in any orbital depends upon the values of 'n' and 'l' which are different for 3s and 4p orbitals.
(A) Both Assertion (A) and Reason (R) are True and the Reason (R) is a correct explanation of the Assertion (A).
(B) Both Assertion (A) and Reason (R) are True but Reason (R) is not a correct explanation of the Assertion (A).
(C) Assertion (A) is True but the Reason (R) is False.
(D) Assertion (A) is False but Reason (R) is True.

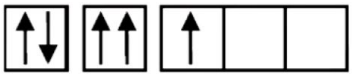
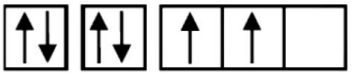
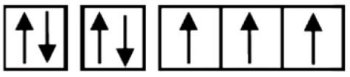
Q12 The number of angular nodes and radial nodes in 3s orbital are:
(A) 1 and 0, respectively
(B) 3 and 0, respectively
(C) 0 and 1, respectively
(D) 0 and 2, respectively

Q13 The electrons identified by quantum numbers n and l
(a) $\mathrm{n} = 4, l = 1$
(b) $\mathrm{n} = 4, l = 0$
(c) $\mathrm{n} = 3, l = 2$
(d) $\mathrm{n} = 3, l = 1$
can be placed in order of increasing energy as
(A) (d) < (b) < (c) < (a)
(B) (b) < (d) < (a) < (c)
(C) (a) < (c) < (b) < (d)
(D) (c) < (d) < (b) < (a)

Q14 Which of the following is not permissible arrangement of electrons in an atom?
(A) $\mathrm{n} = 5, \ell = 3,\ \mathrm{m} = 0,\ \mathrm{s} = +\frac{1}{2}$
(B) $\mathrm{n} = 3, \ell = 2,\ \mathrm{m} = -3,\ \mathrm{s} = -\frac{1}{2}$
(C) $\mathrm{n} = 3, \ell = 2,\ \mathrm{m} = -2,\ \mathrm{s} = -\frac{1}{2}$
(D) $\mathrm{n} = 4, \ell = 0,\ \mathrm{m} = 0,\ \mathrm{s} = +\frac{1}{2}$

Q15 If the value of (n + *l*) is more than 3 and less than 6, then what will be the minimum possible number of orbitals?
(A) 6 (B) 9
(C) 10 (D) 13

Q16 For which one of the following sets of four quantum numbers an electron will have the highest energy
(A) n=3 , l= 2 , m= 1, s =$+\frac{1}{2}$
(B) n = 4 , l =1 , m = 0, s =$-\frac{1}{2}$
(C) n= 4 , l = 2 , m = -1 , s= $+\frac{1}{2}$
(D) n= 5 , l =0 , m=0, s= $-\frac{1}{2}$

Q17 Which configuration does not obey paulis exclusion principle.
(A) 
(B) 
(C) 
(D) 

Q18 In potassium the probable order of energy level for 19^{th} electron is:
(A) $3\ \mathrm{s} > 3\ \mathrm{d}$

(B) $4\ \mathrm{s} < 3\ \mathrm{d}$
(C) $4\ \mathrm{s} > 4\mathrm{p}$
(D) $4\ \mathrm{s} = 3\ \mathrm{d}$

Q19 The orbital with maximum energy is
(A) $3\ \mathrm{d}$
(B) $5\mathrm{p}$
(C) $4\ \mathrm{s}$
(D) $6\ \mathrm{d}$

Q20 According to $(\mathrm{n}+l)$ rule after completing 'np' level the electron enters to:
(A) $(\mathrm{n}-1)\mathrm{d}$
(B) $(\mathrm{n}+1)\mathrm{s}$
(C) nd
(D) $(n+1)p$

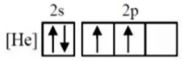
Q21 Which electronic configuration does not follow the Pauli's exclusion principle?
(A) $1\ \mathrm{s}^2, 2\ \mathrm{s}^2 2\mathrm{p}^4$
(B) $1\ \mathrm{s}^2, 2\ \mathrm{s}^2 2\mathrm{p}^6, 3\ \mathrm{s}^2$
(C) $1\ \mathrm{s}^2, 2\ \mathrm{s}^2 2\mathrm{p}^6$
(D) $1\ \mathrm{s}^2, 2\ \mathrm{s}^2 2\mathrm{p}^6, 3\ \mathrm{s}^3$

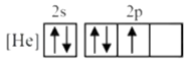
Q22 4d, 5p, 5f and 6p orbitals are arranged in the order of decreasing energy. The correct option is:
(A) 5f > 6p > 5p > 4d
(B) 6p > 5f > 5p > 4d
(C) 6p > 5f > 4d > 5p
(D) 5f > 6p > 4d > 5p

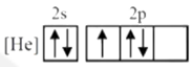
Q23 For which of the following sets of quantum numbers, an electron will have the highest energy?
(A) $\mathrm{n}=3, l=2,\ \mathrm{m}=1,\ \mathrm{s}=-1/2$
(B) $\mathrm{n}=4, l=3,\ \mathrm{m}=-1,\ \mathrm{s}=+1/2$
(C) $\mathrm{n}=4, l=1,\ \mathrm{m}=-1,\ \mathrm{s}=+1/2$
(D) $\mathrm{n}=5, l=0,\ \mathrm{m}=0,\ \mathrm{s}=-1/2$

Q24 Which of the following is correct statement about energy of an orbital in multielectronic species:
(A) $4s > 3d$
(B) $5p < 4d$
(C) $4f > 6s$
(D) $4s = 3d$

Q25 In P-atom find out the number of paired electrons for $l=1$ and $m=0$:
(A) 3
(B) 1
(C) 2
(D) 0

Q26 Which of the following configuration follows the Hund's rule:-
(A) 

(B) 

(C) 

(D) 

Q27 Presence of three unpaired electrons in phosphorus atom can be explained by
(A) Pauli's rule
(B) Uncertainty principle
(C) Aufbau's rule
(D) Hund's rule

Q28 Nitrogen has the electronic configuration $1\ \mathrm{s}^2, 2\ \mathrm{s}^2 2\mathrm{p}_\mathrm{x}^1 2\mathrm{p}_\mathrm{y}^1 2\mathrm{p}_\mathrm{z}^1$ and not $1\ \mathrm{s}^2, 2\ \mathrm{s}^2 2\mathrm{p}_\mathrm{x}^2 2\mathrm{p}_\mathrm{y}^1 2\mathrm{p}_\mathrm{z}^0$ It was proposed by:
(A) Aufbau principle
(B) Pauli's exclusion principle
(C) Hund's rule
(D) Uncertainty principle

Q29 If Hund's rule is not obeyed by some elements given below then which atom has the maximum magnetic moment?
(A) Fe
(B) Cu
(C) Cr
(D) Mn

Q30 The total spin resulting from a d^9 configuration is:
(A) $\frac{1}{2}$
(B) 2
(C) 1
(D) $\frac{3}{2}$

Q31 Which of the following has maximum number of unpaired electrons?
(A) Mg^{2+}
(B) Ti^{3+}
(C) V^{3+}
(D) Fe^{3+}

Q32 Which of the following has maximum number of unpaired electron (atomic number of Fe 26)
(A) Fe
(B) Fe (II)
(C) Fe (III)
(D) Fe (IV)

Q33 A compound of vanadium has magnetic moment of 1.73 B.M. The electronic configuration of the vanadium ion in the compound is
(A) $[Ar]4s^0 3d^1$
(B) $[Ar]4s^1 3d^0$
(C) $[Ar]4s^2 3d^0$
(D) $[Ar]4s^0 3d^3$

Q34 The total spin and magnetic moment for the atom with atomic number 7 are
(A) $\pm 3, \sqrt{3}$ BM
(B) $\pm 1, \sqrt{8}$ BM
(C) $\pm \frac{3}{2}, \sqrt{15}$ BM
(D) $0, \sqrt{8}$ BM

Q35 The spin only magnetic moment of $V(Z=23)$, $Cr(Z=24)$ and $Mn(Z=25)$ are x, y and z respectively. Which of the following is are correct relationships?
(A) $x > y$ (B) $x > z$
(C) $y > z$ (D) $z < y$

Q36 The correct ground state electronic configuration of chromium atom $(Z=24)$ is
(A) $[Ar]3d^5 4s^1$
(B) $[Ar]3d^4 4s^2$
(C) $[Ar]3d^6 4s^0$
(D) $[Ar]4s^1 4p^5$

Q37 A neutral atom of an element has $2\,K, 8\,L, 11M$ and $2\,N$ electrons. The number of p-electrons in the atom are:
(A) 2 (B) 12
(C) 10 (D) 6

Q38 Which of the following is the correct set of quantum numbers for last filled electron of $_{21}Sc$?
(A) $3, 2, 0, \pm 1/2$
(B) $4, 0, 0, \pm 1/2$
(C) $3, 0, 0, \pm 1/2$
(D) $4, 0, -1, \pm 1/2$

Q39 Which of the following electronic level would allow the hydrogen to absorb a photon but not emit a photon?
(A) $3s$
(B) $2p$
(C) $2s$
(D) $1s$

Q40 In an atom, which has $2\,K, 8\,L, 18M$ and $2\,N$ electrons in the ground state. The total number of electrons having magnetic quantum number, $m = 0$ is
(A) 6 (B) 10
(C) 7 (D) 14

Q41 An atom has 2 electrons in K-shell, 8 electrons in L- shell and 8 electrons in M-shell. The number of p- electrons present in the element is:

(A) 10 (B) 7
(C) 12 (D) 4

Q42 The quantum number of 20^{th} electron of $\text{Fe}(Z = 26)$ will be
(A) 3. 2. $-2, \frac{1}{2}$
(B) $3, 2, 0, +\frac{1}{2}$
(C) $4, 0, 0, +\frac{1}{2}$
(D) $4, 1, -1, +\frac{1}{2}$

Q43 An atom of $\text{Cr}[Z = 24]$ loses 2 electrons. How many unpaired electrons shall be there in Cr^{+2}.
(A) 4 (B) 3
(C) 2 (D) 1

Q44 The atomic number of the element having maximum number of unpaired 3p electrons is (in ground state):
(A) 15 (B) 10
(C) 12 (D) 8

Q45 In manganese atom, $\text{Mn}(Z = 25)$, the total number of orbitals populated by one or more electrons (in ground state) is
(A) 15 (B) 14
(C) 12 (D) 10

Q46 Which of the following pairs of ions have the same electronic configuration?
(A) $\text{Cr}^{3+}, \text{Fe}^{3+}$
(B) $\text{Fe}^{3+}, \text{Mn}^{2+}$
(C) $\text{Fe}^{3+}, \text{Co}^{3+}$
(D) $\text{Sc}^{3+}, \text{Cr}^{3+}$

Q47 The atomic number of an element 'M' is 26. How many electrons are present in the M-shell of the element in its M^{3+} state?
(A) 11 (B) 15
(C) 14 (D) 13

Q48 Total number of electrons present in $_{24}\text{Cr}$ and $_{29}\text{Cu}$ having quantum number $l = 2$ and m = 0
(A) 3 (B) 6
(C) 4 (D) 8

Q49 Which is an incorrect statement?
(A) Zeeman effect explains the splitting of spectral lines in a magnetic field.
(B) Cu^+ (Z = 29) is paramagnetic
(C) Number of orbitals present in N-shell = 16
(D) Number of subshells present in M-shell = 3

Q50 Which atom has as many as s-electrons as p electrons?
(A) H
(B) Mg
(C) N
(D) Na

Q51 Magnesium reacts with an element (X) to form an ionic compound. If the ground state electronic configuration of (X) is $1s^2\ 2s^2\ 2p^3$, the simplest formula for this compound is:
(A) $\text{Mg}_2\ \text{X}_3$ (B) MgX_2
(C) Mg_3X_2 (D) Mg_2X

Q52 Assertion (A): The paramagnetism of Cu+ ion is zero.
Reason (R): Cu+ has no unpaired electron.
(A) Both Assertion (A) and Reason (R) are True and the Reason (R) is a correct explanation of the Assertion (A).
(B) Both Assertion (A) and Reason (R) are True but Reason (R) is not a correct explanation of the Assertion (A).
(C) Assertion (A) is True but the Reason (R) is False.
(D) Assertion (A) is False but Reason (R) is True.

Q53

Which of the following pair of ions have same magnetic moment?

(A) Cu^{+2}, Ti^{+3} (B) Mn^{+2}, Cu^{+2}

(C) Ti^{+4}, Cu^{+2} (D) Ti^{+3}, Ni^{+2}

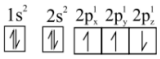
Q54 Which one is a wrong statement?

(A) Total orbital angular momentum of electron in 's' orbital is equal to zero.

(B) An orbital is designated by three quantum numbers while an electron in an atom is designated by four quantum numbers.

(C) The value of m for d_{z^2} is zero.

(D) The electronic configuration of N atom is:



Q55 Consider the ground state of Cr atom (Z = 24). The number of electrons with the azimuthal quantum numbers l = 1 and 2 are respectively.

(A) 12 and 4 (B) 16 and 5

(C) 16 and 4 (D) 12 and 5

Q56 Select the **correct** statements from the following

A. Atoms of all elements are composed of two fundamental particles.

B. The mass of the electron is 9.10939×10^{-31} kg.

C. All the isotopes of a given elements show same chemical properties.

D. Protons and electrons are collectively known as nucleons.

E. Dalton's atomic theory, regarded the atom as an ultimate particle of matter.

Choose the **correct** answer from the options given below

(A) C,D and E only (B) A and E only

(C) B,C and E only (D) A,B and C only

Q57 Match the principle (in List-I) with discoverer (in List-II):

List-I (Principle)	List-II (Discoverer)
A. Exclusion principle	P. Hund
B. Multiplicity rule	Q. Heisenberg
C. Uncertainty principle	R. Planck
D. Quantum theory	S. Pauli

(A) A-(S); B-(R); C-(Q); D-(P)

(B) A-(P); B-(Q); C-(R); D-(S)

(C) A-(S); B-(P); C-(Q); D-(R)

(D) A-(R); B-(S); C-(Q); D-(P)

Answer Key

Q1	(D)
Q2	(C)
Q3	(B)
Q4	(A)
Q5	(C)
Q6	(C)
Q7	(C)
Q8	(D)
Q9	(A)
Q10	(D)
Q11	(A)
Q12	(D)
Q13	(A)
Q14	(B)
Q15	(D)
Q16	(C)
Q17	(B)
Q18	(B)
Q19	(D)
Q20	(B)
Q21	(D)
Q22	(A)
Q23	(B)
Q24	(C)
Q25	(C)
Q26	(A)
Q27	(D)
Q28	(C)
Q29	(C)
Q30	(A)
Q31	(D)
Q32	(C)
Q33	(A)
Q34	(C)
Q35	(C)
Q36	(A)
Q37	(B)
Q38	(A)
Q39	(D)
Q40	(D)
Q41	(C)
Q42	(C)
Q43	(A)
Q44	(A)
Q45	(A)
Q46	(B)
Q47	(D)
Q48	(A)
Q49	(B)
Q50	(B)
Q51	(C)
Q52	(A)
Q53	(A)
Q54	(D)

Q55 (D)

Q56 (C)

Q57 (C)