



NEET 2023 – Chemistry NCERT Based OB Atomic Structure NCERT Exercise

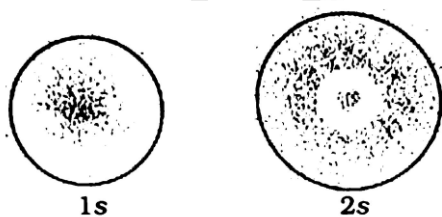
Q.1 Which of the following conclusions could not be derived from Rutherford's α - particle scattering experiment?

- (1) Most of the space in the atom is empty.
- (2) The radius of the atom is about 10^{-10} m while that of nucleus is 10^{-15} m.
- (3) Electrons move in a circular path of fixed energy called orbits.
- (4) Electrons and the nucleus are held together by electrostatic forces of attraction.

Q.2 Which of the following options does not represent ground state electronic configuration of an atom?

- (1) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^8 4s^2$
- (2) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^9 4s^2$
- (3) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^1$
- (4) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^5 4s^1$

Q.3 The probability density plots of 1 s and 2 s orbitals are given in Fig.:



The density of dots in a region represents the probability density of finding electrons in the region.

on the basis of above diagram which of the following statements is incorrect?

- (1) 1 s and 2 s orbitals are spherical in shape.
- (2) The probability of Finding the election is maximum near the nucleus.

(3) The Probability Finding the electron at a given distance is equal in all directions.

(4) The probability density of electrons for 2s Orbital decreases uniformly as distance from the nucleus increases.

Q.4 Which of the following statement is not correct about the characteristics of cathode rays?

- (1) They start from the cathode and move towards the anode.
- (2) They travel in straight line in the absence of an external electrical or magnetic field.
- (3) Characteristics of cathode rays do not depend upon the material of electrodes in cathode ray tube.
- (4) Characteristics of cathode rays depend upon the nature of gas present in the cathode ray tube.

Q.5 Which of the following statements about the electron is incorrect?

- (1) It is a negatively charged particle.
- (2) The mass of electron is equal to the mass of neutron.
- (3) It is a basic constituent of all atoms.
- (4) It is a constituent of cathode rays.

Q.6 Which of the following properties of atom could be explained correctly by Thomson Model of atom?

- (1) Overall neutrality of atom
- (2) Spectra of hydrogen atom.
- (3) Position of electrons, protons and neutrons in atom.
- (4) Stability of atom.

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- Q.7 Two atoms are said to be isobars if.
- (1) they have same atomic number but different mass number.
 - (2) they have same number of electrons but different number of neutrons.
 - (3) they have same number of neutrons but different number of electrons.
 - (4) sum of the number of protons and neutrons is same but the number of protons is different.
- Q.8 The number of radial nodes for 3p orbital is _____.
- (1) 3
 - (2) 4
 - (3) 2
 - (4) 1
- Q.9 Number of angular nodes for 4d orbital is _____
- (1) 4
 - (2) 3
 - (3) 2
 - (4) 1
- Q.10 Which of the following is responsible to rule out the existence of definite paths or trajectories of electrons?
- (1) Pauli's exclusion principle.
 - (2) Heisenberg's uncertainty principle.
 - (3) Hund's rule of maximum multiplicity.
 - (4) Aufbau principle.
- Q.11 Total number of orbitals associated with third shell will be _____
- (1) 2
 - (2) 4
 - (3) 9
 - (4) 3
- Q.12 Orbital angular momentum depends on _____.
- (1) l
 - (2) n and l
 - (3) n and m
 - (4) m and s
- Q.13 Chlorine exists in two isotopic forms, Cl-37 and Cl-35 but its atomic mass is 35.5. This indicates the ratio of Cl-37 and Cl-35 is approximately
- (1) 1 : 2
 - (2) 1 : 1
 - (3) 1 : 3
 - (4) 3 : 1
- Q.14 The pair of ions having same electronic configuration is _____

- (1) Cr^{3+} , Fe^{3+}
- (2) Fe^{3+} , Mn^{2+}
- (3) Fe^{3+} , Co^{3+}
- (4) Sc^{3+} , Cr^{3+}

- Q.15 For the electrons of Oxygen atom, which of the following statements is correct?
- (1) Z_{eff} for an electron in a 2s orbital is the same as Z_{eff} for an electron in a 2p orbital.
 - (2) An electron in the 2s orbital has the same energy as an electron in the 2p orbital.
 - (3) Z_{eff} for an electron in 1s orbital is the same as Z_{eff} for an electron in a 2s orbital.
 - (4) The two electrons present in the 2s orbital have spin quantum numbers m_s but of opposite sign.
- Q.16 If travelling at same speeds, which of the following matter waves have the shortest wavelength?
- (1) Electron
 - (2) Alpha particle (He^{2+})
 - (3) Neutron
 - (4) Proton
- Q.17 Assertion (A): All isotopes of a given element show the same type of chemical behaviour. Reason (R): The chemical properties of an atom are controlled by the number of electrons in the atom.
- (1) Both A and R are true and R is the correct explanation of A.
 - (2) Both A and R are true but R is not the correct explanation of A.
 - (3) A is true but R is false.
 - (4) Both A and R are false.
- Q.18 Assertion (A): Black body is an ideal body that emits and absorbs radiations of all frequencies. Reason (R): The frequency of radiation emitted by a body goes from a lower frequency to higher frequency with an increase in temperature.
- (1) Both A and R are true and R is the correct explanation of A.
 - (2) Both A and R are true but R is not the explanation of A.

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- (3) A is true and R is false.
 (4) Both A and R are false.

Q.19 Assertion (A): It is impossible to determine the exact position and exact momentum of an electron simultaneously.

Reason (R): The path of an electron in an atom is clearly defined.

- (1) Both A and R are true and R is the correct explanation of A.
 (2) Both A and R are true and R is not the correct explanation of A.
 (3) A is true and R is false.
 (4) Both A and R are false.

Q.20 Match the following species with their corresponding ground state electronic configuration.

| Atom / Ion | Electronic configuration |
|---------------|---|
| (1) Cu | (a) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10}$ |
| (2) Cu^{2+} | (b) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2$ |
| (3) Zn^{2+} | (c) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^1$ |
| (4) Cr^{3+} | (d) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^9$ |
| | (e) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^3$ |

- (1) (1) → (c), (2) → (d), (3) → (a), (D) → (e)
 (2) (1) → (d), (2) → (a), (3) → (a), (D) → (c)
 (3) (1) → (a), (2) → (d), (3) → (b), (D) → (e)
 (4) (1) → (c), (2) → (e), (3) → (a), (D) → (b)

Q.21 Match the quantum numbers with the information provided by these.

| Quantum number | Information provided |
|------------------------------|--------------------------------|
| (1) Principal quantum number | (a) orientation of the orbital |
| (2) Azimuthal quantum number | (b) energy and size of orbital |
| (3) Magnetic quantum number | (c) spin of electron |
| (4) Spin quantum number | (d) shape of the orbital |

- (1) (1) → (c), (2) → (b), (3) → (d), (D) → (a)
 (2) (1) → (b), (2) → (d), (3) → (a), (D) → (c)
 (3) (1) → (a), (2) → (d), (3) → (c), (D) → (b)
 (4) (1) → (b), (2) → (c), (3) → (a), (D) → (d)

Q.22 Match the following rules with their statements:

| Rules | Statements |
|--|--|
| (1) Hund's Rule | (a) No two electrons in an atom can have the same set of four quantum numbers. |
| (2) Aufbau Principle | (b) Half-filled and completely filled orbitals have extra stability. |
| (3) Pauli Exclusion Principle | (c) Pairing of electrons in the orbitals belonging to the same subshell does not take place until each orbital is singly occupied. |
| (4) Heisenberg's Uncertainty Principle | (d) It is impossible to determine the exact position and exact momentum of a subatomic particle simultaneously. |
| | (e) In the ground state of atoms, orbitals are filled in the order of their increasing energies. |

- (1) (1) → (c), (2) → (b), (3) → (d), (D) → (a)
 (2) (1) → (b), (2) → (d), (3) → (a), (D) → (e)
 (3) (1) → (c), (2) → (e), (3) → (a), (D) → (d)
 (4) (1) → (e), (2) → (c), (3) → (d), (D) → (a)

Q.23 Match the following

| | |
|----------------------|----------------------------|
| (1) X – rays | (a) $\nu = 10^0 - 10^4$ Hz |
| (2) UV | (b) $\nu = 10^{10}$ Hz |
| (3) Long radio waves | (c) $\nu = 10^{16}$ Hz |
| (4) Microwave | (d) $\nu = 10^{18}$ Hz |

- (1) (1) → (c), (2) → (d), (3) → (b), (D) → (a)
 (2) (1) → (d), (2) → (c), (3) → (a), (D) → (b)
 (3) (1) → (b), (2) → (a), (3) → (d), (D) → (c)
 (4) (1) → (d), (2) → (a), (3) → (b), (D) → (c)

Q.24 Match species given in Column I with the electronic configuration given in Column II.

| Column I | Column II |
|-----------------|------------------------|
| (I) Cr | (a) $[Ar]3d^8 4s^0$ |
| (II) Fe^{2+} | (b) $[Ar]3d^{10} 4s^1$ |
| (III) Ni^{2+} | (c) $[Ar]3d^6 4s^0$ |
| (IV) Cu | (d) $[Ar]3d^5 4s^1$ |
| | (e) $[Ar]3d^6 4s^2$ |

- (1) (1) → (c), (2) → (d), (3) → (b), (D) → (a)
 (2) (1) → (d), (2) → (a), (3) → (b), (D) → (c)

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(3) (1) → (b), (2) → (a), (3) → (d), (D) → (c)

(4) (1) → (d), (2) → (c), (3) → (a), (D) → (b)

Q.25 Which experiment is responsible for finding out the charge on an electron?

- (1) Millikan's oil drop experiment
- (2) Cathode ray discharge tube experiment
- (3) Rutherford's α -rays scattering experiment
- (4) Photoelectric experiment

Q.26 Which of the following observations was not correct during Rutherford's scattering experiment?

- (1) Most of the α - particles passed through the gold foil undeflected.
- (2) A small fraction of the α - particles was deflected by small angles.
- (3) A large number of the α - particles were bounced back.
- (4) A very few α - particles (~ 1 in 20,000) were bounced back.

Q.27 The number of electrons which will together weigh one gram is

- (1) 1.098×10^{27} electrons
- (2) 9.1096×10^{31} electrons
- (3) 1 electron
- (4) 1×10^4 electrons

Q.28 How many neutrons are there in $^{88}_{38}\text{Sr}$?

- (1) 38
- (2) 50
- (3) 126
- (4) 88

Q.29 What is the maximum number of emission lines when the excited electron of a hydrogen atom in $n = 6$ drops to ground state?

- (1) 6
- (2) 15
- (3) 30
- (4) 10

Q.30 What is the lowest value of n that allows g orbital to exist?

- (1) 6
- (2) 7
- (3) 4
- (4) 5

Q.31 How many orbitals and electrons are associated with $n = 4$?

- (1) 32, 64
- (2) 16, 32
- (3) 4, 16
- (4) 8, 16

Q.32 Match the constants given in column I with their values given in column II and mark the appropriate choice.

| Column I | | Column II | |
|----------|-------------------------|-----------|-------------------------------------|
| (A) | Rydberg constant | (i) | $6.626 \times 10^{-34} \text{ J s}$ |
| (B) | Planck's constant | (ii) | $3.00 \times 10^8 \text{ m s}^{-1}$ |
| (C) | Velocity of light | (iii) | $750 \times 10^{-9} \text{ m}$ |
| (D) | Wavelength of red light | (iv) | $109,677 \text{ cm}^{-1}$ |

- (1) (A)→(iii), (B)→(ii), (C)→(i), (D)→(iv)
- (2) (A)→(ii), (B)→(iv), (C)→(i), (D)→(iii)
- (3) (A)→(i), (B)→(iii), (C)→(iv), (D)→(ii)
- (4) (A)→(iv), (B)→(i), (C)→(ii), (D)→(iii)

Q.33 What will be the wavenumber of yellow radiation having wavelength 240 nm?

- (1) $1.724 \times 10^4 \text{ cm}^{-1}$
- (2) $4.16 \times 10^6 \text{ m}^{-1}$
- (3) $4 \times 10^{14} \text{ Hz}$
- (4) $219.3 \times 10^3 \text{ cm}^{-1}$

Q.34 Mark the incorrect statement regarding the photoelectric effect.

- (1) There is no time lag between the striking of light beam and the ejection of electrons from the metal surface.
- (2) The number of electrons ejected is inversely proportional to the intensity of light.
- (3) Photoelectric effect is not observed below threshold frequency.
- (4) The kinetic energy of the electrons increases with increase in frequency of light used.

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Q.35 What will be the energy of one photon of radiation whose frequency is 5×10^{14} Hz?

- (1) $199.51 \text{ kJ mol}^{-1}$ (2) $3.3 \times 10^{-19} \text{ J}$
 (3) $6.626 \times 10^{-34} \text{ J s}$ (4) $2.31 \times 10^5 \text{ J}$

Q.36 The spectrum of white light ranging from red to violet is called a continuous spectrum because

- (1) different colours are seen as different bands in the spectrum
 (2) the colours continuously absorb energy to form a spectrum
 (3) the violet colour merges into blue, blue into green, green into yellow and so on
 (4) it is a continuous band of coloured and white light separating them.

Q.37 _____ series of lines are the only lines in hydrogen spectrum which appear in the visible region.

- (1) Lyman (2) Balmer
 (3) Paschen (4) Brackett

Q.38 The radius of the stationary state which is also called Bohr radius is given by the expression

$r_n = n^2 a_0$ where the value of a_0 is

- (1) 52.9 pm (2) 5.29 pm
 (3) 529 pm (4) 0.529 pm

Q.39 Bohr's theory can also be applied to the ions like

- (1) He^+ (2) Li^{2+}
 (3) Be^{3+} (4) all of these

Q.40 Compare the energies of two radiations E_1 with wavelength 800 nm and E_2 with wavelength 400 nm.

- (1) $E_1 = 2E_2$ (2) $E_1 = E_2$
 (3) $E_2 = 2E_1$ (4) $E_2 = \frac{1}{2} E_1$

Q.41 Time taken for an electron to complete one revolution in Bohr orbit of hydrogen atom is

- (1) $\frac{4\pi^2 m r^2}{nh}$ (2) $\frac{nh}{4\pi^2 m r}$

(3) $\frac{2\pi m r}{n^2 h^2}$

(4) $\frac{h}{2\pi m r}$

Q.42 According to Bohr's theory, the angular momentum of an electron in 5th orbit is

- (1) $\frac{10h}{\pi}$ (2) $\frac{25h}{\pi}$
 (3) $\frac{1.5h}{\pi}$ (4) $\frac{2.5h}{\pi}$

Q.43 A body of mass 10 g is moving with a velocity of 100 m s^{-1} . The wavelength associated with it is

- (1) $6.626 \times 10^{-7} \text{ m}$ (2) $6.626 \times 10^{-34} \text{ m}$
 (3) $6.626 \times 10^{-4} \text{ m}$ (4) $6.626 \times 10^{-35} \text{ m}$

Q.44 An electron is in one of the 3d-orbitals. What are the possible values of n , l and m for this electron?

- (1) $n = 3, l = 0, m_l = 0$
 (2) $n = 3, l = 1, m_l = -1, 0, +1$
 (3) $n = 3, l = 2, m_l = -2, -1, 0, +1, +2$
 (4) $n = 3, l = 3, m_l = -3, -2, -1, 0, +1, +2, +3$

Q.45 Describe the orbital with following quantum numbers.

- (i) $n = 3, l = 2$ (ii) $n = 4, l = 3$
 (1) (i) 3p, (ii) 4f (2) (i) 3d, (ii) 4d
 (3) (i) 3f, (ii) 4f (4) (i) 3d, (ii) 4f

Q.46 Effective nuclear charge ($Z_{\text{eff}} e$) for a nucleus of an atom is defined as

- (1) shielding of the outermost shell electrons from the nucleus by the innermost shell electrons
 (2) the net positive charge experienced by electron from the nucleus
 (3) the attractive force experienced by the nucleus from electron
 (4) screening of positive charge on nucleus by innermost shell electrons.

Q.47 Which of the following is not a correct statement regarding the energies of orbitals?

- (1) The lower the value of $(n + l)$ for an orbital, lower is its energy.
 (2) Energies of the orbitals in the same subshell decreases with increase in atomic number.
 (3) Energy of s-orbital is lower than the p-orbital and that of p-orbital is lower than the d-orbital.
 (4) If two orbitals have same value for $(n + l)$, the orbital with higher value of n will have lower energy.

- Q.48 The probability of finding out an electron at a point within an atom is proportional to the
 (1) square of the orbital wave function i.e., Ψ^2
 (2) orbital wave function i.e., Ψ
 (3) Hamiltonian operator i.e., H
 (4) principal quantum number i.e., n

- Q.49 How many electrons in an atom have the following quantum numbers?
 $n = 4, m_s = -1/2$
 (1) 32 (2) 18
 (3) 8 (4) 16

- Q.50 Few electrons have following quantum numbers,
 (i) $n = 4, l = 1$ (ii) $n = 4, l = 0$
 (iii) $n = 3, l = 2$ (iv) $n = 3, l = 1$
 Arrange them in the order of increasing energy from lowest to highest.
 (1) (iv) < (ii) < (iii) < (i)
 (2) (ii) < (iv) < (i) < (iii)
 (3) (i) < (iii) < (ii) < (iv)
 (4) (iii) < (i) < (iv) < (ii)

- Q.51 A certain metal when irradiated by light ($\nu = 3.2 \times 10^{16}$ Hz) emits photoelectrons with twice K.E. as did photoelectrons when the same metal is irradiated by light ($\nu = 2.0 \times 10^{16}$ Hz). The ν_0 of the metal is
 (1) 1.2×10^{14} Hz (2) 8×10^{15} Hz
 (3) 1.2×10^{16} Hz (4) 4×10^{12} Hz

- Q.52 Though the five d-orbitals are degenerate, the first four d-orbitals are similar to each other in shape whereas the fifth d-orbital is different from others. What is the name of the fifth orbital?

- (1) $d_{x^2-y^2}$ (2) d_{z^2}
 (3) d_{xz} (4) d_{xy}

- Q.53 Which of the sequences given below shows the correct increasing order of energy?

- (1) 3s, 3p, 4s, 4p, 3d, 5s, 5p, 4d
 (2) 3s, 3p, 3d, 4s, 4p, 4d, 5s, 5p
 (3) 3s, 3p, 4s, 3d, 4p, 5s, 4d, 5p
 (4) 3s, 3p, 4s, 4p, 5s, 3d, 4d, 5p

- Q.54 An element with mass number 81 contains 31.7% more neutrons as compared to protons. Find the symbol of the atom.

- (1) ${}^{81}_{34}\text{Se}$ (2) ${}^{81}_{35}\text{Br}$
 (3) ${}^{81}_{36}\text{Kr}$ (4) ${}^{81}_{37}\text{Rb}$

- Q.55 Match the column I with column II and mark the appropriate choice.

| Column I | | Column II | |
|----------|---------------------------------|-----------|-----------------------------|
| (A) | Uncertainty of an object | (i) | $\frac{5.29 \times n^2}{Z}$ |
| (B) | Bohr's radius of an orbit | (ii) | $\frac{h}{4\pi m}$ |
| (C) | Angular momentum of an electron | (iii) | $\frac{h}{mv}$ |
| (D) | de Broglie wavelength | (iv) | $n \cdot \frac{h}{2\pi}$ |

- (1) (A) \rightarrow (iii), (B) \rightarrow (iv), (C) \rightarrow (i), (D) \rightarrow (ii)
 (2) (A) \rightarrow (ii), (B) \rightarrow (i), (C) \rightarrow (iv), (D) \rightarrow (iii)
 (3) (A) \rightarrow (iv), (B) \rightarrow (iii), (C) \rightarrow (i), (D) \rightarrow (ii)
 (4) (A) \rightarrow (i), (B) \rightarrow (ii), (C) \rightarrow (iv), (D) \rightarrow (iii)

- Q.56 If the velocity of an electron in Bohr's first orbit is $2.19 \times 10^6 \text{ m s}^{-1}$, what will be the de Broglie wavelength associated with it?

- (1) $2.19 \times 10^{-6} \text{ m}$ (2) $4.38 \times 10^{-6} \text{ m}$

(3) 3.32×10^{-10} m (4) 3.32×10^{10} m

Q.57 If the radius of first Bohr orbit is x pm, then the radius of the third orbit would be

(1) $(3 \times x)$ pm (2) $(6 \times x)$ pm

(3) $\left(\frac{1}{2} \times x\right)$ pm (4) $(9 \times x)$ pm

Q.58 If the ionisation energy of hydrogen atom is 13.6 eV, the energy required to excite it from ground state to the next higher state is approximately

(1) 3.4 eV (2) 10.2 eV

(3) 17.2 eV (4) 13.6 eV

Q.59 Splitting of spectral lines under the influence of magnetic field is called

(1) Stark effect

(2) Zeeman effect

(3) Photoelectric effect

(4) Screening effect.

Q.60 Bohr's model can explain

(1) the spectrum of hydrogen atom only

(2) spectrum of atoms or ions containing one electron only

(3) spectrum of all the atoms

(4) spectrum of ground state atoms only

Q.61 An element has 13 electrons in its M shell and 1 electron in N shell in ground state. Identify the element.

(1) Chromium (2) Iron

(3) Manganese (4) Copper

Q.62 What are the possible values of l and m_l for an atomic orbital $4f$?

(1) $n = 4, l = 0, 1, 2, 3, m_l = -2, -1, 0, +1, +2$

(2) $n = 4, l = 3, m_l = -3, -2, -1, 0, +1, +2, +3$

(3) $n = 4, l = 2, m_l = -2, -1, 0, +1, +2, +3$

(4) $n = 4, l = 0, 1, m_l = -1, 0, +1$

Q.63 According to Bohr's theory, the electronic energy of H-atom in Bohr's orbit is given by

$$(1) E_n = -\frac{2.18 \times 10^{-19} \times Z}{2n^2} J$$

$$(2) E_n = -\frac{2.179 \times 10^{-18} \times Z^2}{n^2} J$$

$$(3) E_n = -\frac{21.79 \times 10^{-18} \times Z}{2n^2} J$$

$$(4) E_n = -\frac{21.8 \times 10^{-21} \times Z^2}{n^2} J$$

Q.64 The energy difference between the ground state of an atom and its excited state is 3×10^{-19} J. What is the wavelength of the photon required for this transition?

(1) 6.6×10^{-34} m (2) 3×10^{-8} m

(3) 1.8×10^{-7} m (4) 6.6×10^{-7} m

Q.65 In the following question, a statement of assertion is followed by a statement of reason. Mark the correct choice.

Assertion: The energy of the electron in a hydrogen atom has a negative sign for all possible orbits.

Reason: When the electron is attracted by the nucleus and is present in orbit n , the energy is emitted and its energy is lowered.

(1) Both assertion and reason are true and reason is the correct explanation of assertion.

(2) Both assertion and reason are true but reason is not the correct explanation of assertion.

(3) Assertion is true but reason is false.

(4) Both assertion and reason are false.

Q.66 Two values of spin quantum numbers i.e., $+1/2$ and $-1/2$ represent

(1) up and down spin of the electrons respectively

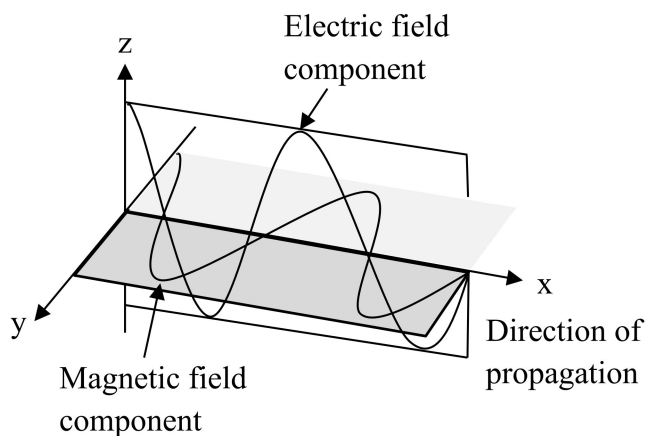
(2) two quantum mechanic spin states which refer to the orientation of spin of the electron

(3) clockwise and anti-clockwise spin of the electrons respectively

(4) anti-clockwise and clockwise spin of the electrons respectively.

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Q.67 Consider the figure of electromagnetic wave,



and choose the correct information related to it.

- (1) These components have same wavelength and speed.
 (2) They vibrate in two mutually perpendicular planes.
 (3) Electromagnetic waves do not require medium and can move in vacuum.
 (4) All of these.
- Q.68 Two electrons present in M shell will differ in
 (1) principal quantum number
 (2) azimuthal quantum number
 (3) magnetic quantum number
 (4) spin quantum number
- Q.69 The 3d-orbitals having electron density in all the three axis is
 (1) $3d_{xy}$ (2) $3d_{z^2}$
 (3) $3d_{yz}$ (4) $3d_{zx}$
- Q.70 An electron in excited hydrogen atom falls from fifth energy level to second energy level. In which of the following regions, the spectrum line will be observed and is part of which series of the atomic spectrum?
 (1) Visible, Balmer (2) Ultraviolet, Lyman
 (3) Infrared, Paschen (4) Infrared, Brackett
- Q.71 A 100 watt bulb emits monochromatic light of wavelength 400 nm. Calculate the number of photons emitted per second by the bulb.

- (1) 3×10^{20} (2) 2×10^{-20}
 (3) 2×10^{20} (4) 1×10^{-20}

- Q.72 What will be the orbital angular momentum of an electron in 2s orbital?
 (1) Zero (2) One
 (3) Two (4) Three
- Q.73 Which of the following quantum numbers are correct for the outermost electron of sodium atom?
 (1) $n = 4, l = 0, m = 0, s = +1/2$
 (2) $n = 3, l = 0, m = 0, s = -1/2$
 (3) $n = 3, l = 1, m = +1, s = +1/2$
 (4) $n = 3, l = 2, m = -1, s = -1/2$
- Q.74 What will be the mass of a particle if uncertainty in its position is 10^{-8} m and velocity is 5.26×10^{-25} m s⁻¹?
 (1) 0.01 kg (2) 0.1 kg
 (3) 1 kg (4) 10 kg
- Q.75 Match the values of column II with column I and mark the appropriate choice.

| Column I | | Column II | |
|----------|---------------------|-----------|----------------------------|
| (A) | Mass of electron | (i) | 1.673×10^{-27} kg |
| (B) | Mass of proton | (ii) | -1.602×10^{-19} C |
| (C) | Charge of electron | (iii) | 9.1×10^{-31} kg |
| (D) | e/m for an electron | (iv) | 1.76×10^8 C/g |

- (1) (A)→(i), (B)→(ii), (C)→(iv), (D)→(iii)
 (2) (A)→(iii), (B)→(i), (C)→(ii), (D)→(iv)
 (3) (A)→(ii), (B)→(iii), (C)→(iv), (D)→(i)
 (4) (A)→(i), (B)→(iii), (C)→(ii), (D)→(iv)
- Q.76 The third line of the Balmer series in the emission spectrum of the hydrogen atom is due to the transition from the
 (1) fourth Bohr orbit to the first Bohr orbit
 (2) fifth Bohr orbit to the second Bohr orbit
 (3) sixth Bohr orbit to the third Bohr orbit
 (4) seventh Bohr orbit to the third Bohr orbit.

Q.77 What will be the uncertainty in velocity of an electron when the uncertainty in its position is 1000 \AA ?

- (1) $5.79 \times 10^2 \text{ m s}^{-1}$ (2) $5.79 \times 10^8 \text{ m s}^{-1}$
 (3) $5.79 \times 10^4 \text{ m s}^{-1}$ (4) $5.79 \times 10^{-10} \text{ m s}^{-1}$

Q.78 Three elements 'X', 'Y' and 'Z' have atomic numbers 18, 19 and 20 respectively. How many electrons are present in the M shells of these elements?

- (1) 8, 9, 10 (2) 8, 10, 13
 (3) 8, 8, 8 (4) 8, 9, 12

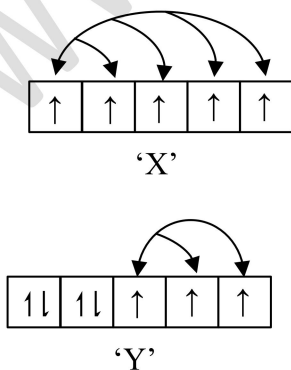
Q.79 The wavelength of visible light is

- (1) 200 nm - 370 nm (2) 780 nm - 890 nm
 (3) 380 nm - 760 nm (4) 900 nm - 2000 nm

Q.80 The orbital diagram in which the Aufbau principle is violated is

- (1) $\begin{array}{c} 2s \\ \uparrow\downarrow \end{array} \quad \begin{array}{c} 2p \\ \uparrow \quad \uparrow \quad \square \end{array}$
 (2) $\begin{array}{c} 2s \\ \uparrow\downarrow \end{array} \quad \begin{array}{c} 2p \\ \uparrow \quad \uparrow \quad \uparrow \end{array}$
 (3) $\begin{array}{c} 2s \\ \uparrow \end{array} \quad \begin{array}{c} 2p \\ \uparrow \quad \uparrow \quad \uparrow \end{array}$
 (4) $\begin{array}{c} 2s \\ \uparrow\downarrow \end{array} \quad \begin{array}{c} 2p \\ \uparrow\downarrow \quad \uparrow \quad \uparrow \end{array}$

Q.81 Study the orbital diagrams of two atoms 'X' and 'Y'. Which subshell will be more stable and why?



(1) X, exchange energy is maximum, so is stability.

(2) Y, exchange energy is maximum, so is stability.

(3) X, exchange energy is minimum, so stability is maximum.

(4) Y, exchange energy is minimum, so stability is maximum.

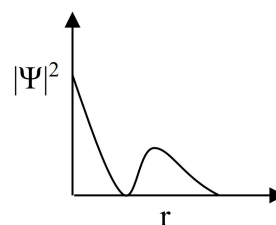
Q.82 Which of the following are isoelectronic species?

- (1) Ca^{2+} , K^+ and Zn^{2+}
 (2) Mn^{2+} , Fe^{2+} and Ni^{2+}
 (3) Na^+ , Al^{3+} and Ne
 (4) Sc , Co^{2+} and Cu^{2+}

Q.83 Uncertainty in position of an electron (mass = $9.1 \times 10^{-28} \text{ g}$) moving with a velocity of $3 \times 10^4 \text{ cm/s}$ accurate upto 0.001% will be (use $h/4\pi$ in uncertainty expression where $h = 6.626 \times 10^{-27} \text{ erg second}$)

- (1) 5.76 cm (2) 7.68 cm
 (3) 1.93 cm (4) 3.84 cm

Q.84 The graph between $|\Psi|^2$ and r (radial distance) is shown below. This represents



- (1) 3s orbital (2) 2p orbital
 (3) 1s orbital (4) 2s orbital



Atomic Structure

Answer Key NCERT Exercise

| | | | | | | | | | |
|------|---|------|---|------|---|------|---|------|---|
| Q.1 | 3 | Q.2 | 2 | Q.3 | 4 | Q.4 | 4 | Q.5 | 2 |
| Q.6 | 1 | Q.7 | 4 | Q.8 | 4 | Q.9 | 3 | Q.10 | 2 |
| Q.11 | 3 | Q.12 | 1 | Q.13 | 3 | Q.14 | 2 | Q.15 | 4 |
| Q.16 | 2 | Q.17 | 1 | Q.18 | 2 | Q.19 | 3 | Q.20 | 1 |
| Q.21 | 2 | Q.22 | 3 | Q.23 | 2 | Q.24 | 4 | Q.25 | 1 |
| Q.26 | 3 | Q.27 | 1 | Q.28 | 2 | Q.29 | 2 | Q.30 | 4 |
| Q.31 | 2 | Q.32 | 4 | Q.33 | 2 | Q.34 | 2 | Q.35 | 2 |
| Q.36 | 3 | Q.37 | 2 | Q.38 | 1 | Q.39 | 4 | Q.40 | 3 |
| Q.41 | 1 | Q.42 | 4 | Q.43 | 2 | Q.44 | 3 | Q.45 | 4 |
| Q.46 | 2 | Q.47 | 4 | Q.48 | 1 | Q.49 | 4 | Q.50 | 1 |
| Q.51 | 2 | Q.52 | 2 | Q.53 | 3 | Q.54 | 2 | Q.55 | 2 |
| Q.56 | 3 | Q.57 | 4 | Q.58 | 2 | Q.59 | 2 | Q.60 | 2 |
| Q.61 | 1 | Q.62 | 2 | Q.63 | 2 | Q.64 | 4 | Q.65 | 1 |
| Q.66 | 2 | Q.67 | 4 | Q.68 | 4 | Q.69 | 2 | Q.70 | 1 |
| Q.71 | 3 | Q.72 | 1 | Q.73 | 2 | Q.74 | 1 | Q.75 | 2 |
| Q.76 | 2 | Q.77 | 1 | Q.78 | 3 | Q.79 | 3 | Q.80 | 3 |
| Q.81 | 1 | Q.82 | 3 | Q.83 | 3 | Q.84 | 4 | | |