Q-1 - 12225289

For the energy level is an atom which one of the following statement is correct ?

(A) The $4s$ sub-energy level is a higher energy than the $3d$ sub-energy level

(B) The M-energy level can have maximum of 32 electrons

(C) The second principal energy level can have four orbitals and contain a maximum of 8 electrons

(D) The $5th$ main energy level can have maximum of 49 electrons.

CORRECT ANSWER: C

SOLUTION:

(c) for $n = 2$,

$$\begin{array}{llll} 2s & 2p & & \\ 1+ & 3 & = & 4orbitals \\ 2 & +6 & = & 8electrons \end{array}$$

It has 4 orbitals and contains 8 electrons.

Watch Video Solution On Doubtnut App

Q-2 - 34964406

Which orbital is non-directional

(A) s

(B) p

(C) d

(D) All

CORRECT ANSWER: A

SOLUTION:

The lobes of $d_{x^2-y^2}$ orbital are alligned along X and Y axis. Therefore the probability of finding the electron is maximum along x and y-axis.

Watch Text Solution On Doubtnut App

Q-3 - 12225293

In centre-symmetrical system, the orbital angular momentum, a measure of the momentum of a particle travelling around the nucleus, is quantised. Its magnitude is

(A) $\sqrt{l(l+1)}\frac{h}{2\pi}$

(B) $\sqrt{l(l-1)}\frac{h}{2\pi}$

(C) $\sqrt{s(s+1)}\frac{h}{2\pi}$

(D) $\sqrt{s(s-1)}\frac{h}{2\pi}$

CORRECT ANSWER: A

SOLUTION:

(a) $\sqrt{l(l+1)}\frac{h}{2\pi}$.

Watch Video Solution On Doubtnut App

Q-4 - 69094858

The maximum probability of finding electron in the d_{xy} orbital is

(A) along the x-axis

(B) along the y-axis

(C) at an angle of 45° from the x-axis and y-axis

(D) at an angle of 90° from the x-axis and y-axis

CORRECT ANSWER: C

SOLUTION:

The d_{xy} orbital has lobes between x-axis and y-axis, i.e., at an angle of 45 from x-axis and y-axis.

Watch Text Solution On Doubtnut App

Q-5 - 12225290

The electronic configurations of Cr^{24} and Cu^{29} are abnormal -

(A) Due to extra stability of exactly half filled and exactly fully filled sub shells

(B) Because they belong to d-block

(C) both (a) and (b)

(D) None of the above

CORRECT ANSWER: A

SOLUTION:

(a)

Cr_{24}

$-\ 1s^2 2s^2 2p^6 3s^2 4s^2 3d^4$

(original configuration)

but $-d^5-$ its's half-filled state and that is state most

stable than other state.

Cr_{24}

$-\ 1s^2 2s^2 2p^6 3s^6 4s^1 3d^5$

As above full filled stata that is most stable than other

state.

Cu

$-\ 1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^9$

but

$1s^2 2s^2 2p^6 3s^2 3p^6 4s^1 3d^{10}$

(full filled).

Watch Video Solution On Doubtnut App

Q-6 - 12225287

Which of the following statements about nodal planes is/are not true.

(A) A plane on which there is zero probability of finding an electron

(B) A plane on which there is maximum probability that the electron will be found

(C) Ψ^2 is non zero at nodal plane

(D) None of these

CORRECT ANSWER: B

SOLUTION:

(b) A plane on which there is maximum probability that the electron wll be found.

Watch Video Solution On Doubtnut App

Q-7 - 14157447

Which of the following sets of quantum numbers represent an impossible arrangement :-

	n	l	m	m_s
(A)	3	2	-2	$\frac{1}{2}$
(B)	4	0	0	$\frac{1}{2}$
(C)	3	2	-3	$\frac{1}{2}$
(D)	5	3	0	$\frac{1}{2}$

CORRECT ANSWER: C

SOLUTION:

Hund's rule

Watch Video Solution On Doubtnut App

Q-8 - 12225285

Maximum numbers of electrons in a subshell is given by-

(A) $(2l+1)$

(B) $2(2l+1)$

(C) $(2l+1)2$

(D) $2(2l+1)2$

CORRECT ANSWER: B

SOLUTION:

(b) $2(2l+1)$.

Watch Video Solution On Doubtnut App

Q-9 - 23583453

The quantum number not obtained from the schrodinger's wave equation is

(A) n

(B) l

(C) m

(D) s

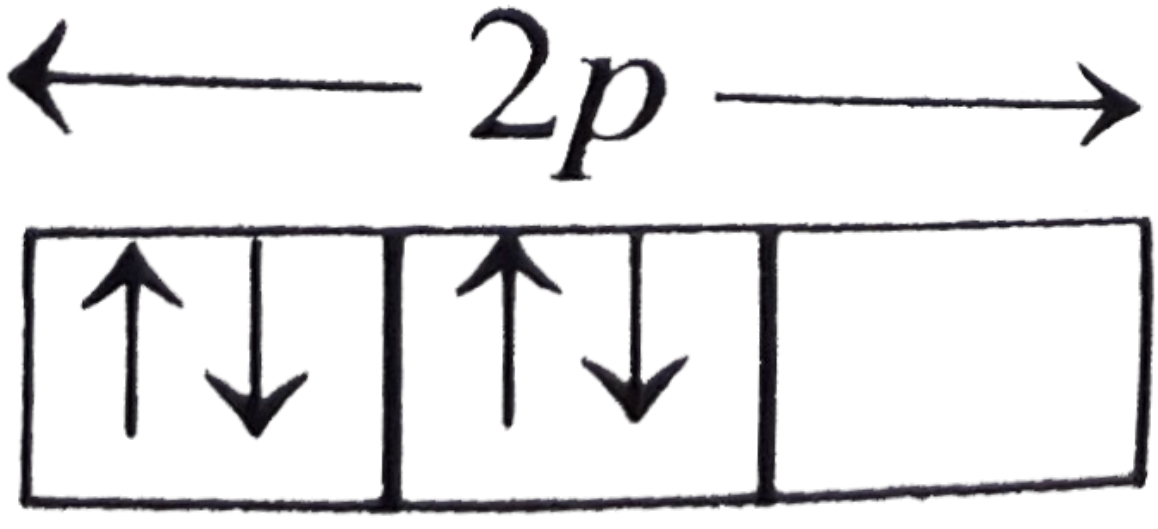
CORRECT ANSWER: D

SOLUTION:

Spin quantum number is not obtained from

Schrodinger's wave equation.

If the electronic structure of oxygen atom is written as



$1s^2, 2s^2$ it would violate-

(A) Hund's rule

(B) Pauli's exclusion principle

(C) Both Hund's and Pauli's principles

(D) None of these

CORRECT ANSWER: A

SOLUTION:

(a) According to this rule pairing of electrons does not

take place until all the orbitals of the sub-shell are singly occupied.

Watch Video Solution On Doubtnut App

Q-11 - 46827304

The following quantum numbers are possible for how many orbitals

n=3, l=2, m=+2

(A) 3

(B) 2

(C) 1

(D) 4

CORRECT ANSWER: C

Watch Text Solution On Doubtnut App

Q-12 - 12225344

The total energy of the electron in the hydrogen atom in the ground state is $-13.6eV$. The KE of this electron is.

(A) $13.6eV$

(B) zero

(C) $-13.6eV$

(D) $6.8eV$

CORRECT ANSWER: A

SOLUTION:

(a)

$$\because KE = \frac{1}{2}mv^2$$

$$= \frac{Ze^2}{2r}, TE =$$

$$- \frac{Ze^2}{2r}$$

.

Watch Video Solution On Doubtnut App

Q-13 - 12225345

In hydrogen atom, energy of first excited state is $-3.4eV$. Then,

KE of the same orbit of hydrogen atom is.

(A) $+3.4eV$

(B) $+6.8eV$

(C) $-13.6eV$

(D) $+13.6eV$

CORRECT ANSWER: A

SOLUTION:

(a) $\because$ Total energy $(E_n) = KE + PE$

In the first excited state

$$= \frac{1}{2}mv^2 + \left[-\frac{Ze^2}{r} \right]$$

$$= +\frac{1}{2}\frac{Ze^2}{r} - \frac{Ze^2}{r}$$

$$-3.4eV = -\frac{1}{2}\frac{Ze^2}{r}$$

$$\therefore KE = \frac{1}{2}\frac{Ze^2}{2} =$$

$$+3.4eV$$

.

Watch Video Solution On Doubtnut App

Q-14 - 46827379

The value of Planck's contant is 6.63×10^{-34} Js. The velocity of light is $3.0 \times 10^{8} ms^{-1}$. Which value is closest to the wavelength in nanometers of a quantum of light with frequency of $8 \times 10^{15} s^{-1}$

(A) 3×10^{7}

(B) 2×10^{-25}

(C) 5×10^{-18}

(D) 4×10^{1}

CORRECT ANSWER: D

SOLUTION:

$$\lambda = \frac{c}{v} = \frac{3 \times 10^{8}}{8 \times 10^{15}}$$

$$= 3.75 \times 10^{-8}$$

$$= 3.75 \times 10^{-8}$$

$$\times 10^{9} \mathrm{nm} = 4 \times 10^{1}$$

nm.

The frequency of radiation emitted when the electron falls from n=4 to n=1 in a hydrogen atom will be (Given ionization energy of $H = 2.18 \times 10^{-18}$J atom^{-1} and $h = 6.625 \times 10^{-34}$ js)

(A) $3.08 \times 10^{15} s^{-1}$

(B) $2.00 \times 10^{15} s^{-1}$

(C) $1.54 \times 10^{15} s^{-1}$

(D) $1.03 \times 10^{15} s^{-1}$

CORRECT ANSWER: A

SOLUTION:

$$E_{\text{Ionisation}} = E_{\infty} - E_{n}$$
$$= \frac{13.6 Z_{\text{eff}}^{2}}{n^{2}} eV$$

$$= \left[\frac{13.6Z^2}{n_2^2} - \frac{13.6Z^2}{n_1^2} \right]$$

$$E = hv = \frac{13.6 \times 1^2}{(1)^2} - \frac{(13.6 \times 1)^2}{(4)^2}, hv$$

$$= 13.6 - 0.85$$

$$\because h = 6.625 \times 10^{-34}$$

$$v = \frac{13.6 - 0.85}{6.625 \times 10^{-34}} \times 1.6 \times 10^{-19} = 3.08 \times 10^{15} s^{-1}$$

Watch Text Solution On Doubtnut App

Q-16 - 12225126

The energy of second Bohr orbit of the hydrogen atom is

$-328kJmol^{-1}$, hence the energy of fourth Bohr orbit would be.

(A) $-41kJmol^{-1}$

(B) $-1312kJmol^{-1}$

(C) $-164kJmol^{-1}$

(D) $-82kJmol^{-1}$

CORRECT ANSWER: D

SOLUTION:

(d)

$$\frac{E_4}{E_2} = \frac{2^2}{4^2} = \frac{4}{16}$$

$$= \frac{1}{4},$$

$$E_4 = \frac{E_2}{4} = \frac{-328}{4} =$$

$$-82kJ/mol$$

.

Watch Video Solution On Doubtnut App

Q-17 - 74865140

Given: The mass of electron is 9.1110^{31}Kg Planck constant is 6.62610^{34}Js, the uncertainty involved in the measurement of velocity within a distance of 0.1 is:-

(A) $5.79 \ \square \ 10^{6} ms(\ \square \ 1)$

(B) $5.79 \ \square \ 10^{7} ms^{9} \ \square \ 1)$

(C) $5.79 \ \square \ 10^{8} ms^{\square 1}$

(D) $5.79 \ \square \ 10^{5} ms^{\square 1}$

CORRECT ANSWER: A

SOLUTION:

$$\Delta \times x\Delta v \geq \frac{h}{4\pi m}$$
$$\therefore \Delta x = 0.1$$
$$= 1 \times 10^{-11} m$$

$$\Delta V \geq \frac{h}{4\pi m \times \Delta x}$$

$$\Delta V \geq \frac{6.626 \times 10^{-34} J \sec}{4 \times 3.14 \times 9.11 \times 10^{-31} kg \times 10^{-11} m}$$

$$\Delta \geq 5.79 \times 10^{6} m \sec^{-1}$$

Watch Text Solution On Doubtnut App

Q-18 - 30545666

Consider the following sets of quantum numbers:

	n	l	m	s
(A)	3	0	0	$+1/2$
(B)	2	2	1	$+1/2$
(C)	4	3	-2	$-1/2$
(D)	1	0	-1	$-1/2$
(E)	3	2	3	$+1/2$

Which of the following sets of quantum nubmers is not possible?

(A) A,B,C and D

(B) B,D and E

(C) A and C

(D) B,C and D

CORRECT ANSWER: B

Watch Video Solution On Doubtnut App

Q-19 - 12225354

The measurement of the electron position is associated with an uncertainty in momentum, which is equal to $1 \times 10^{-18} gcms^{-1}$. The uncertainty in electron velocity is (mass of an electron is $9 \times 10^{-28} g$)

(A) $1 \times 10^{6} cms^{-1}$

(B) $1 \times 10^{5} cms^{-1}$

(C) $1 \times 10^{11} cms^{-1}$

(D) $1.1 \times 10^{9} cms^{-1}$

CORRECT ANSWER: D

SOLUTION:

(d)

$$\Delta x = \Delta p \therefore \Delta x \Delta p$$

$$= \frac{h}{4\pi}$$

$$\text{or } \Delta x = \sqrt{\frac{h}{4\pi}}$$

$$\Delta x . \Delta u = \frac{h}{4\pi m}$$

$$\Delta p = 1$$

$$\times 10^{-18} g cm \sec^{-1}$$

$$m \times \Delta u = 1 \times 10^{-18}$$

$$\therefore \Delta u = \frac{1 \times 10^{-18}}{9 \times 10^{-28}}$$

$$= 1.1 \times 10^{9} cm \sec^{-1}$$

.

Q-20 - 12225355

Maximum number of electrons in a sub-shell of an atom is determined by the following.

(A) $2n^2$

(B) $4l + 2$

(C) $2l + 1$

(D) $4l - 2$

CORRECT ANSWER: B

SOLUTION:

(b) Total number of subshells $= (2l + 1)$

$\therefore$ Maximum number of electrons in the subshells

$= 2(2l + 1)$

$=4l + 2.$

Watch Video Solution On Doubtnut App

Q-21 - 12973042

Which of the following sate of quantum numbers is not permissible for an electron in an atom?

(i)

$n = 1, l = 1, m_l 0, m_s = +1/2$

(ii)

$n = 3, l = 1, m_1 = -2, m_s = -1/2$

(iii)

$n = 1, l = 1, m_l = 0, m_s = +1/2$

(iv)

$n = 2, l = 0, m_l = 0, m_s = 1$

(A) $(i), (ii), (iii), (iv)$

(B) $(ii), (iii), (iv)$

(C) $(i), (ii), (iv)$

(D) $(i), (iii), (iv)$

CORRECT ANSWER: C

SOLUTION:

(i) is not permissible because the l quantum number is equal to n, it must be less than n. (ii) is not permissible because the magnitude of the m_l quantum number (that is, the m_l value, ignoring its sign) must not be greater than l. (iv) is not permissible beacuse m_s,quantum number can be only $+1/2$ or $-1/2$.

Watch Video Solution On Doubtnut App

Q-22 - 69094897

The energy absorbed by each molecule (A_2) of a substance is $4.4 \times 10^{-19} J$ and bond energy per molecule is $4.0 \times 10^{-19} J$.

The kinetic energy of the molecule per atom will be

(A) $2.2 \times 10^{-19} J$

(B) $2.0 \times 10^{-19} J$

(C) $4.0 \times 10^{-20} J$

(D) $2.0 \times 10^{-20} J$

CORRECT ANSWER: D

SOLUTION:

$$\text{K.E. per atom } = \frac{\left(4.4 \times 10^{-19}\right) - \left(4.0 \times 10^{-19}\right)}{2} J$$

$$= \frac{0.4 \times 10^{-19}}{2} J$$

$$= 2.0 \times 10^{-20} J$$

Q-23 - 12225358

A $0.66kg$ ball is moving wih a speed of $100m/s$. The associated wavelength will be.

(A) $6.6 \times 10^{-32}m$

(B) $6.6 \times 10^{-34}m$

(C) $1.0 \times 10^{-35}m$

(D) $1.0 \times 10^{-32}m$

CORRECT ANSWER: C

SOLUTION:

(c)

$$\lambda = \frac{h}{mv}$$

$$= \frac{6.6 \times 10^{-34}}{0.66 \times 100} = 1 \times 10^{-35} m$$

.

Watch Video Solution On Doubtnut App

Q-24 - 12225359

The total number of atomic orbitals in fourth energy level of an atom is.

(A) 4

(B) 8

(C) 16

(D) 32

CORRECT ANSWER: C

SOLUTION:

(c) Number of atomic orbitals $= n^2$

Number of atomic orbitals in 4^{th} energy shell

$= 4^2 = 16.$

Watch Video Solution On Doubtnut App

Q-25 - 69094787

The energines E_1 and E_2 of two radiations are 25 eV and 50 eV respectively. The relation between their wavelengths, i.e., λ_1 and λ_2 will be

(A) $\lambda_1 = \frac{1}{2}\lambda_2$

(B) $\lambda_1 = \lambda_2$

(C) $\lambda_1 = 2\lambda_2$

(D) $\lambda_1 = 4\lambda_2$

CORRECT ANSWER: C

SOLUTION:

$$E = hv = h\frac{c}{\lambda} \therefore \frac{E_1}{E_2}$$

$$= \frac{\lambda_2}{\lambda_1}$$

i.e.,

$$\frac{\lambda_1}{\lambda_2} = \frac{E_2}{E_1} = \frac{50eV}{25eV}$$

$$= 2 \text{ or } \lambda_1 = 2\lambda_2$$

Watch Text Solution On Doubtnut App

Q-26 - 12225362

Maximum number of electrons in a sub-shell with $l = 3$ and $n = 4$ is.

(A) 10

(B) 12

(C) 14

(D) 16

CORRECT ANSWER: C

SOLUTION:

(c) If $n = 4$ and $l = 3$, it means it is a 4 f-orbital

Therefore, the total number od electrons in 4 f-orbital is

$14.$

Watch Video Solution On Doubtnut App

Q-27 - 34964647

The correct set of four quantum numbers for the valence electrons of rubidium atim $(Z = 37)$ is:

(A) $5, 0, 0, +\frac{1}{2}$

(B) $5, 1, 0, +\frac{1}{2}$

(C) $5, 1, 1, +\frac{1}{2}$

(D) $5, 0, 1, +\frac{1}{2}$

CORRECT ANSWER: 1

SOLUTION:

$Z = 37$

Rb is in fifth period.

$[Kr]5s^1$ is its configuration: " " So

$n = 5, l = 0, m = 0, s$

$= +\frac{1}{2}$

or $-\frac{1}{2}$

Watch Text Solution On Doubtnut App

Q-28 - 11034236

The orbital angular momentum of a p electron is equal to $\sqrt{2}\frac{h}{2\pi}$

SOLUTION:

1

Watch Video Solution On Doubtnut App

Q-29 - 69094789

The value of Planck's constant is $6.63 \times 10^{-34} Js$. The speed of light is $3 \times 10^{17} nms^{-1}$. Which value is closest to the wavelength in nanometer of a quantum of light with frequency of $6 \times 10^{15} s^{-1}$?

(A) 10

(B) 25

(C) 50

(D) 75

CORRECT ANSWER: C

SOLUTION:

$$v = \frac{c}{\lambda} \text{ or } \lambda = \frac{c}{v}$$

$$= \frac{3 \times 10^{17} nms^{-1}}{6 \times 10^{15} x^{-1}}$$

$$= 50nm$$

Watch Text Solution On Doubtnut App

Q-30 - 12225366

What is the maximum number of electrons that can be associated with a following set of quantum numbers ? $(n = 3, l = 1 \text{ and } m = -1)$.

(A) 2

(B) 4

(C) 6

(D) 10

CORRECT ANSWER: A

SOLUTION:

(a) $n = 3, l = 1$ is $3p$ sub-shell and thus 2 electrons

can exists in one of the 3p-orbital (m = -1).

Watch Video Solution On Doubtnut App

Q-31 - 12225367

Based on equation

$E = -2.178 \times 10^{-18} J \left(\frac{Z^2}{n^2} \right)$

, certain conclusions are written. Which of them is not correct ?

(A) the larger the value of n. The larger is the orbit radius.

(B) Equation can be used to calculate the change in energy when the electron changes orbit.

(C) For $n = 1$, the electron has a more negative energy than it does for $n = 6$ which means that the electron is more loosely bound in the smallest allowed orbit

(D) The negative sign in equation simply means that the energy of electron bound to the nucleus is lower than it would be if the electrons were at the infinite distance from the nucleus.

CORRECT ANSWER: C

SOLUTION:

(c) For $n = 1$, the electron has a more negative energy

than it does for $n = 6$ which means that the electron is more loosely bound in the smallest allowed orbit. This is not correct. Electron is more tightly held in the $1st$ orbit.

Watch Video Solution On Doubtnut App

Q-32 - 69094800

Based on the equation

$E = -2.178 \times 10^{-18} J\left(\frac{Z^2}{n^2}\right)$

certain conclusions are written. Which of them is not correct ?

(A) The negative sign in equation simply means that the energy of electron bound to the nucleus is lower than it would be if the electrons were at infinite distance from the nucleus.

(B) Lower the value of n, the larger is the orbit radius

(C) Equation can be used to claculate the change in energy when the electron changes orbit

(D) For $n = 1$, the electron has a more negative energy that it does for $n = 6$ which means that the electron is more lossely bound in the smallest allowed orbit.

CORRECT ANSWER: D

SOLUTION:

Statement (d) is not correct because in the smallest allowed orbit, the electron is more tightly bound and not loosely bound

Q-33 - 12225368

What is the maximum number of orbitals that can be identified with the following quantum numbers ? $n = 3, l = 1, m_l = 0.$

(A) 1

(B) 2

(C) 3

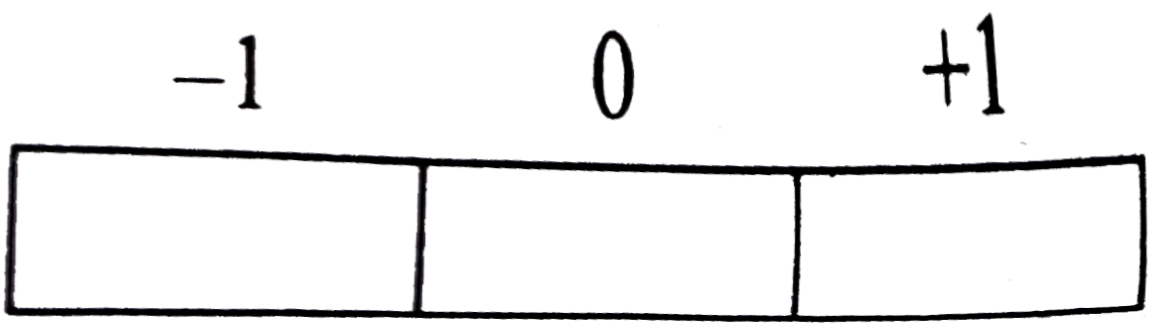
(D) 4

CORRECT ANSWER: A

SOLUTION:

(a) Given : $n = 3, l = 1, m = 0$

Hence orbital is $3p$



Hence the number of orbital identified by $m = 0$ can be one only.

Watch Video Solution On Doubtnut App

Q-34 - 12225369

Calculate the energy in joule corresponding to light of wavelength $45nm$: (Planck' constant $h = 6.63 \times 10^{-34} Js$, speed of light $c = 3 \times 10^{8} ms^{-1}$)

(A) 6.67×10^{15}

(B) 6.67×10^{11}

(C) 4.42×10^{-15}

(D) 4.42×10^{-18}

CORRECT ANSWER: D

SOLUTION:

(d)

$$\frac{hc}{\lambda}$$

$$= \frac{6.63 \times 10^{-34} \times 3 \times 10^{8}}{45 \times 10^{-9}}$$

$$= 4.42 \times 10^{-18} J.$$

Watch Video Solution On Doubtnut App

Q-35 - 69094806

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

(A) $2\sqrt{3}h$

(B) $0h$

(C) $\sqrt{6}h$

(D) $\sqrt{2}h$

CORRECT ANSWER: C

SOLUTION:

Angular momentum $= \sqrt{l(l+1)}h$

For d-orbital, l = 2

$\therefore$ Angular momentum

$= \sqrt{2(2+1)}h$

$= \sqrt{6}h$

Watch Text Solution On Doubtnut App

Q-36 - 12225371

Magnetic moments $2.84B$. M is given by :

(At. nos. ni = 28, Ti = 22, Cr = 24, Co = 27).

(A) Cr^{2+}

(B) Co^{2+}

(C) Ni^{2+}

(D) Ti^{3+}

CORRECT ANSWER: C

SOLUTION:

(c) Magnetic momentum $(m) = \sqrt{n(n+2)}$ $2.84B$. M corresponding to 2 unpaired electrons.

Cr^{2+} $-$ $3d^4$, 3 unpaired electrons

Co^{2+} $-$ $3d^7$, 3 unpaired electrons

Ni^{2+} $-$ $3d^8$, 2 unpaired electrons

Ti^{3+} $-$ $3d^1$, 1 unpaired electron.

Watch Video Solution On Doubtnut App

Q-37 - 33031317

The number of d-electrons in Fe^{2+} (Z=26) is not equal to the number of electrons in which one of the following ?

(A) s-electrons in Mg (Z=12)

(B) p-electrons in Cl (Z=17)

(C) d-electrons in Fe (Z=26)

(D) p-electrons in Ne (Z=10)

CORRECT ANSWER: B

SOLUTION:

(b) Electronic configuration of Fe^{2+} is [Ar] $3d^6 4s^0$.

$\therefore$ Number of electrons = 6

Mg - $1s^2 2s^2 2p^6 3s^2$ (6s electrons)

It matches with the 6d electrons of Fe^{2+}

$Cl - 1s^2 2s^2 2p^6 3s^2 3p^5$ (11 p electrons)

It does not match with the 6d electrons of Fe^{2+}

Fe - [Ar] $3d^6 4s^2$ (6d electrons)

It does not match with the 6d electrons of Fe^{2+}

Ne - $1s^2 2s^2 2p^6$ (6 p electrons)

It matches with the 6d electrons of Fe^{2+} .

Hence, Cl had 11p electrons which does not matches in number with 6d electrons of Fe^{2+} .

Watch Video Solution On Doubtnut App

Q-38 - 46826814

The discovery of neutron becomes very late because

(A) Neutrons are present in nucleus

(B) Neutrons are highly unstable particles

(C) Neutrons are chargeless

(D) Neutrons do not move

CORRECT ANSWER: C

SOLUTION:

This is because chargeless particles do not undergo any deflection in electric or magnetic field unlike proton and electron.

Q-39 - 12225377

Proton was discovered by

(A) Chadwick

(B) Thomson

(C) Goldstein

(D) Bohr

CORRECT ANSWER: C

SOLUTION:

(c) Proton is represented by p having charge $+1$

discovered in 1988 by Goldstein.

Q-40 - 12225378

Which of the following has the same mass as that of an electron ?

(A) Photon

(B) Neutron

(C) Positron

(D) Proton

CORRECT ANSWER: C

SOLUTION:

(c) Positron $\left(+1e^{0} \right)$ has the same mass as that of an

electron $\left(-1e^{0}\right)$.

Watch Video Solution On Doubtnut App

Q-41 - 12225380

The most probable radius (in pm) for finding the electron in He^{+} is.

(A) 0.0

(B) 52.9

(C) 26.5

(D) 105.8

CORRECT ANSWER: C

SOLUTION:

(c) Most probable radius $= a_0 / Z$

where $a_0 = 52.9$ pm. For helium ion, $Z = 2$.

$$r_{mp} = \frac{52.9}{2} = 26.45 \text{ pm.}$$

Watch Video Solution On Doubtnut App

Q-42 - 12225055

If the atomic weight of an element is 23 times that of the lightest element and it has 11 protons, then it contains.

(A) 11 protons, 23 neutrons, 11 electrons

(B) 11 protons, 11 neutrons, 11 electrons

(C) 11 protons, 12neutrons, 11 electrons

(D) 11 protons, 11 neutrons, 23 electrons.

CORRECT ANSWER: C

SOLUTION:

(c) Mass no $\approx At.Wt$

Mass no. = no. of protons + no. of neutrons

At. No = no. of protons = no. of electrons.

Watch Video Solution On Doubtnut App

Q-43 - 12225382

The hydride ions $\left(H^{-}\right)$ are isoelectronic with

(A) Li

(B) He^{+}

(C) He

(D) Be

CORRECT ANSWER: C

SOLUTION:

(c)

$H^{-} = 1s^2$ and He

$= 1s^2$

.

Watch Video Solution On Doubtnut App

Q-44 - 12225383

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

(A) 6

(B) 12

(C) 0

(D) 3

CORRECT ANSWER: C

SOLUTION:

(c) In the nucleus of an atom only proton and neutrons are present.

Watch Video Solution On Doubtnut App

Q-45 - 12225384

The charge on the atom containing 17 protons, 18 neutrons and 18 electrons is.

(A) $+1$

(B) -2

(C) -1

(D) zero

CORRECT ANSWER: C

SOLUTION:

(c) Cl^{-} has 17 protons, 18 neutrons and 18 electrons.

Watch Video Solution On Doubtnut App

Q-46 - 12225385

Number of protons, neutrons and electrons in the element $._{89}^{231}Y$ is.

(A) 89, 231, 89

(B) 89, 89, 242

(C) 89, 142, 89

(D) 89, 71, 89

CORRECT ANSWER: C

SOLUTION:

(c) In Xe_{89}^{231}, number of protons and electrons is 89 and

no. of neutrons

$$= A - Z = 231 - 89$$

$$= 142$$

.

Watch Video Solution On Doubtnut App

Q-47 - 12225053

When atoms are bombarded with alpha particles, only a few in millon suffer deflection, other pass out undeflected. This is because.

(A) The force of repulsion on the moving alpha particle is small

(B) The force of attraction on the alpha particle to the oppositely charged electrons is very small

(C) There is only one nucleus and large number of electrons

(D) The nucleus occupies much smaller volume compared to the volume of the atom.

CORRECT ANSWER: D

SOLUTION:

(d) The nucleus occupies much smaller volume compared to the volume of the atom.

Watch Video Solution On Doubtnut App

Q-48 - 12225091

Which of the following is not correct according to Planck's quantum theory ?

(A) Energy is emitted or absorbed discontinuously

(B) Energy of a quatum is directly proportional to its frequency

(C) A photon is also a quantum of light

(D) Energy less than a quantum can also be emitted or

absorbed

CORRECT ANSWER: D

SOLUTION:

(d) $E = nhv, n = 1, 2, 3$

Only integer quantum can be emitted or absorbed.

Watch Video Solution On Doubtnut App

Q-49 - 12225388

The spectrum of He is expected to be similar to.

(A) H

(B) Li^+

(C) Na

(D) He^+

CORRECT ANSWER: B

SOLUTION:

(b) Both He and Li^{+} contain 2 electrons each.

Q-50 - 12225389

What is the packet of enegry called ?

(A) Electron

(B) Photon

(C) Positron

(D) Proton

CORRECT ANSWER: B

SOLUTION:

(b) According to quantum theory of radiation, a hot body emits radiant enegry not continuously but discontinuously in the form of small packets of energy called quanta or photons.

Watch Video Solution On Doubtnut App

Q-51 - 12225390

The ratio of area covered by second orbital to the first orbital is.

(A) $1:2$

(B) $1:16$

(C) $8:1$

(D) $16:1$

CORRECT ANSWER: D

SOLUTION:

(d) $r_n \propto n^2 : A_n \propto n^4$

$$\frac{A_2}{A_1} = \frac{n_2^4}{n_1^4} = \frac{2^4}{1^4}$$

$$= \frac{16}{1} = 16:1$$

.

Watch Video Solution On Doubtnut App

Q-52 - 12225210

Which of the following best explains light both as a stream of particles and wave motion ?

(A) $c = v \times \lambda$

(B) $\lambda = \frac{h}{p}$

(C) diffraction

(D) photoelectric effect.

CORRECT ANSWER: B

SOLUTION:

(b) In the expression $\lambda = \frac{h}{p}$, λ is a characteristic of wave motion and momentum $'p'$ is a characteristic of particle motion.

Watch Video Solution On Doubtnut App

Q-53 - 12225393

The de-Broglie wavelength of a particle with mass $1g$ and velocity $100m/\sec$ is.

(A) 6.63×10^{-33}

(B) $6.63 \times 10^{-34}m$

(C) $6.63 \times 10^{-35}m$

(D) $6.65 \times 10^{-35}m$

CORRECT ANSWER: A

SOLUTION:

(a)

$$\lambda = \frac{h}{mv}$$

$$= \frac{6.63 \times 10^{-34}}{10^{-3} \times 100}$$

$$= 6.63 \times 10^{-33} m$$

.

Watch Video Solution On Doubtnut App

Q-54 - 12225184

If the velocity of hydrogen molecule is $5 \times 10^4 cm \sec^{-1}$, then its de-Broglie wavelength is.

(A) 2 ◆

(B) 4 ◆

(C) 8

(D) 100

CORRECT ANSWER: B

SOLUTION:

(b) According to de-Broglie

$$\lambda = \frac{h}{mv}$$

$$= \frac{6.62 \times 10^{-20} erg.\sec}{\frac{2}{6.023 \times 10^{23}} \times 5 \times 10^{4} cm / \sec}$$

$$= \frac{6.62 \times 10^{-27} \times 6.023 \times 10^{23}}{2 \times 5 \times 10^{4}} cm$$

$$= 4 \times 10^{-8} cm = 4.$$

Watch Video Solution On Doubtnut App

Q-55 - 12225197

The uncertainty in momentum of an electron is

$1 \times 10^{-5} kg - m/s$. The uncertainty in its position will be

$(h = 6.62 \times 10^{-34} kg = m^2$

$/ s)$

.

(A) $1.05 \times 10^{-28} m$

(B) $1.05 \times 10^{-26} m$

(C) $5.27 \times 10^{-30} m$

(D) $5.25 \times 10^{-28} m$

CORRECT ANSWER: C

SOLUTION:

(c) According to $\Delta x \times \Delta p = \frac{h}{4\pi}$

$$\Delta x = \frac{h}{\Delta p \times 4\pi}$$

$$= \frac{6.62 \times 10^{-34}}{1 \times 10^{-5} \times 4 \times 3.14}$$

$$=5.27 \times 10^{-32} m.$$

Watch Video Solution On Doubtnut App

Q-56 - 11033634

Principal azimuthal , and magnetic quantum numbers are respetively related to

(A) Size,orbital,and shape

(B) size, shape, and orientation

(C) shape, size and oricutation

(D) None of these

SOLUTION:

Principal quantum number gives size azimaller gives shape red magnetic orientation

Watch Video Solution On Doubtnut App

Q-57 - 12225398

Elements up to atomic number 103 have been synthesized and studied. If a newly discovered element is found to have an atomic number 106, its electronic configuration will be

(A) $[Rn]5f^{14}, 6d^4, 7s^2$

(B) $[Rn]5f^{14}, 6d^1, 7s^27p^3$

(C) $[Rn]5f^{14}, 6d^6, 7s^0$

(D) $[Rn]5f^{14}, 6d^5, 7s^1$

CORRECT ANSWER: D

SOLUTION:

(d)

$UnH_{106} = [Rn]5f^{14},$

$6d^5, 7s^1$

.

Watch Video Solution On Doubtnut App

Q-58 - 12225258

For principle quantum number $n = 4$ the total number of orbitals having $l = 3$.

(A) 3

(B) 7

(C) 5

(D) 9

CORRECT ANSWER: B

SOLUTION:

(b)

$n = 4 \rightarrow 1s^2 2s^2 2p^6,$

$3s^2 3p^6, 3d^{10}, 4s^2 4p^6,$

$4d^{10} 4f^{14}$

So l = (n-1) = 4 -1 =3 is for f orbit which contains 7

orbitals.

Watch Video Solution On Doubtnut App

Q-59 - 46827165

Number of unpaired electrons in $1s^2 2s^2 2p^3$ is

(A) 2

(B) 0

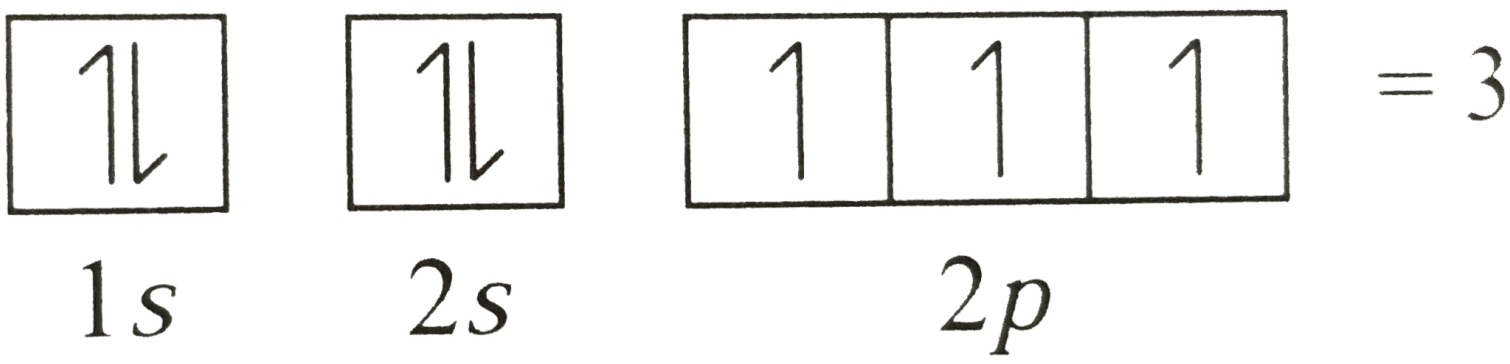
(C) 3

(D) 1

CORRECT ANSWER: C

SOLUTION:

In this type of electronic configuration the number of unpaired electrons are 3.



Watch Text Solution On Doubtnut App

Q-60 - 46827134

For the energy levels in an atom, which one of the following statements is correct

(A) There are seven principal electron energy levels

(B) The second principal energy level can have four sub-

energy levels and contains a maximum of eight electrons

(C) The M energy level can have maximum of 32 electrons

(D) The 4s sub-energy level is at a higher energy than the 3d sub-energy level

---

CORRECT ANSWER: B

SOLUTION:

The second principal shell contains four orbitals viz 2s , $2p_x$, $2p_y$ and $2p_z$

Watch Text Solution On Doubtnut App