ST. LAWRENCE HIGH SCHOOL

A JESUIT CHRISTIAN MINORITY INSTITUTION

FOR GOD AND COUNTRY

WORKSHEET-22(CLASS-11)

TOPIC- STRUCTURE OF ATOM

SUBTOPIC-ATOMIC ORBITALS AND QUANTUM NUMBERS

SUBJECT – CHEMISTRY **F.M. - 15**

DURATION – 30 mins **DATE -10.07.20**

1.1 **The orbital angular momentum for an electron revolving in an orbit is given by $\sqrt{l(l+1)}.\frac{h}{2\pi}$. This momentum from an s-electron will be given by**

(a) $+\frac{1}{2}.\frac{h}{2\pi}$ (b) zero (c) $\frac{h}{2\pi}$ (d) $\sqrt{2}.\frac{4}{2\pi}$

1.**2 What of the following sets of quantum numbers is correct for an electron in 4f orbital?**

(a) n = 4, *l* = 3, m = +4, s = $+\frac{1}{2}$ (b) n = 3, *l* = 2, m = –2, s = $+\frac{1}{2}$

(c) n = 4, *l* = 3, m = +1, s = $+\frac{1}{2}$ (d) n = 4, *l* = 4, m = –4, s = $-\frac{1}{2}$

1.3 **In a multi–electron atom, which of the following orbitals described by the three quantum numbers will have the same energy in the absence of magnetic and electric fields?**

(1) n = 1, *l* = 0, m = 0 (2) n = 2, *l* = 0, m = 0

(3) n = 2, *l* = 1, m = 1 (4) n = 2, *l* = 0, m = 0

(5) n = 3, *l* = 2, m = 0

(a) (4) and (5) (b) (3) and (5) (c) (2) and (3) (d) (1) and (2)

1.4 **For a d–electron, the orbital angular momentum is:**

(a) $\sqrt{6}(h/2\pi)$ (b) $\sqrt{2}(h/2\pi)$ (c) $(h/2\pi)$ (d) $(h/2\pi)$

1.5**The number of nodal planes in a p_x orbital is:**

(a) One (b) Two (c) Three (d) Four

1.6 **Three quantum numbers +1/2 and –1/2 for the electron spin represent:**

(a) Rotation of the electron in clockwise and anticlockwise direction respectively

(b) Rotation of the electron in anticlockwise and clockwise direction respectively

(c) Magnetic moment of the electron pointing up and down respectively

(d) Two quantum mechanical spin states which have no classical analogue

1.7 **The magnitude of the spin angular momentum of an electron is given by:**

(a) $S=\sqrt{s(s+1)}\frac{h}{2\pi}$ (b) $S=s\frac{h}{2\pi}$ (c) $S=\frac{\sqrt{3}}{2}\times\frac{h}{2\pi}$ (d) $S=\pm\frac{1}{2}\times\frac{h}{2\pi}$

1.8 **If m = magnetic quantum number and *l* = azimuthal quantum number, then**

$1 = \frac{m-1}{2}$

(a) m = *l* + 2 (b) m = $2l^2$ + 1(c) (d) *l* = 2m + 1

1.9 **The total number of orbitals in a shell with principal quantum number n is**
(a) 2n (b) $2n^2$(c) n^2(d) n + l

1.10**The following sets of quantum numbers represent four electrons in an atom.**
(i) n = 4, *l* = 1 (ii) n = 4, *l* = 0 (iii) n = 3, *l* = 2 (iv) n = 3, *l* = 1
In this context, which of the following represents the order of increasing energy?
(a) (iv)< (ii)< (iii)< (i) (b) (ii)< (iv)<(i)< (iii) (c) (i)< (iii)< (ii)< (iv) (d) (iii)< (i)< (iv)< (ii)

1.11 **Which of the following sets of quantum numbers represents the highest energy of an atom?**

(a) n = 4, *l* = 0, m = 0, s = $+\frac{1}{2}$ (b) n = 3, *l* = 0, m = 0, s = $+\frac{1}{2}$

(c) n = 3, *l* = 1, m = 0, s = $+\frac{1}{2}$ (d) n = 3, *l* = 2, m = 1, s = $+\frac{1}{2}$

1.12 **Which of the following statements is incorrect regarding the probability of finding an electron in a p_z orbital?**
(a) It is zero at the nucleus.(b) It will be uniform throughout the nucleus.
(c) It is zero along the x–axis.(d) Both (b) and (c) are correct.

1.13 **Which of the following 3d orbitals has electron density in all three exes?**
(a) $3d_{xy}$(b) $3d_{yz}$(c) $3d_z2$ (d) $3d_{zx}$

1.14 **Which of the following statements in correct in the context of $3d_z^2$ orbital?**
(a) The orbital consists of two positive lobes along the ±z axis and a negative doughnut in the xy plane.
(b) The orbital consists of two negative lobes along the ±z axis and a positive doughnut in the xy plane.
(c) The orbital consists of one negative along the ±z axis and a negative doughnut in the xy plane
(d) This orbital consists of one positive lobe along the ±z axis and a negative doughnut in the xy plane.

1.151.15 **The maximum number of electrons in a subshell is given by the expression**
(a) $4l - 2$ (b) $4l + 2$ (c) $2l + 1$ (d) $2n^2$

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