CHEMISTRY

BOOKS - GRB CHEMISTRY (HINGLISH)

QUANTUM NUMBERS AND GENERAL CHEMISTRY

6

1. Slater's rule is used to calculare the shielding constant (σ) in multielectron systemnm and the electronic configuration the element in the following order and groupings :

$(1s), (2s, 2p), (3s, 3p), (4s, 4p), (4d), (4f), (5s, 5p), etc.$

the efetive nucleasr charge experienced by the oputer shell electrons of He is :

A. 0.35

B. 0.65

C. 1.65

D. none of these

Answer: d

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1. the effective nuclear cvhange (Z_{eff}) takes into account the interelectronic repulsisons in mutielectrons atoms Slaer's rules help us in evaluting z_{eff} fopr various species Apply Slter's Rules to answer the following questions :

Z_{eff} for 3d electrons of Zn =x

Z_{eff} for 3d electrons of $Zn^{2+} = y$Z_("eff") for 4s electrons of $Zn = z$

Chose the correct opptions (S) :

A. x $>$ y

B. y $>$ z

C. X=Y

D. All of these

Answer: d

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8

1. Isoeletronic species have same number of valence electrons or same number of total electrons as well as same number of artoms .

identfy the set os isoelectrons specipes :

A. N^{3-}, O^{2-}, F^{-}

B. N,O,F

C. H, H^{+}, H^{-}

D. $H^{-} Li, Be$

Answer: a

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9

1. imagnine a universe in which :

(A) Prinicipal quantum n can have values from 1,2,3,.....∞.

(b) Azimuthal quantum no. l can have values from 1 to n+1 correspoding to A,B,C,D,E,F,.....

(c) magntriic quantum no m can have interal values from $-\frac{l}{2}$to $+\frac{l}{2}$ (including zero if possible).

(d) spin quantum no s can have 6 possible values .

All rules of filling remains intact .

what will be the shell and subshell for an element with Z=36 ?

A. $2A$

B. $1B$

C. $1C$

D. $2B$

Answer: a

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1. information :

(a) prinicipal qunatum no n is defined as 1,2,3,.....

(b) Azimuthal quantum no .l hdefind as 1 to n +2 in integral steps .

(c) magntic quantum no m is defind as $-\frac{1}{2}\text{to}\ \ +\frac{1}{2}$ (including zero oif any , in in intergral steps).

(d) spin quntum no s has six possible values $\left(-2,\ -1,\ -\frac{1}{2},\ +\frac{1}{2},\ +1,\ +2\right)$.

(e) the subshell corresponding to l=1,2,3,4,5..... designeted as F,GltH,I,J,K.... respectively ,

(f) the values of m for given values of l give the number of orbitals in a sub-shell .

(g) the prionciple for filling of E^- in the shells remins unchanged .

the 2 nd period would begin with :

A. Ga

B. As

C. Cs

D. Sc

Answer: a

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1. if values of quantum number can be considered as follow : n=1,2,3,.....∞

l=- to (n+1)

m=- l to +l (interfral values incleuding zero)

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

According to above consideration the maximum number of electrons associataed with 3rd shell is :

A. 50

B. 32

C. 40

D. 60

Answer: a

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Straight Objective Type

1. Two pure organic compounds melt at 112° C and $114^\circ C$,reapectvely ,if equal quantites of them are mixed ,at what temperature will the mixure begin to melt ?

A. Below $112^\circ C$

B. At $112^\circ C$

C. Between $112^\circ C$ and 114°

D. Above 114° C

Answer: a

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2. Which pair consists of species that are isoelectnic

A. $Na^+ K^+$

B. Cl, Cl^-

C. Fe^{2+}, Mn^{2+}

D. Ar, Ca^{2+}

Answer: d

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3. Nucleus of an element contains 9 protons Its valency would be :

A. 1

B. 3

C. 2

D. 5

Answer: a

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4. Which of the following species are isotopic as well as isoelertrnic ?

A. $^{40}Ca^{+2}, ^{40}Ar$

B. $^{39}K^{+2}, ^{40}K^{+}$

C. $^{24}Mg^{+2}, ^{425}Mg^{+}$

D. $^{23}Na^{+2}, ^{24}Na^{+}$

Answer: b

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5. Two particles (X) and(Y) have the comostion as shown in the table :

particle	numberof electons	number of neutrous	Number of protons
(X)	18	16	16
(Y)	18	18	17

the paricle (x) and(Y) are:

A. Isotopes of each other

B. isobars of each other

C. isotones of ech other

D. Isoelectronic ions

Answer: d

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6. A certain positive ion A^{+2}has 22 mass number of most abundant isotope of A?

A. 42

B. 38

C. 40

D. None of these

Answer: c

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7. which species carry the maximum charge?

A. proton

B. β -particle

C. α -particle

D. Hydronium ion

Answer: c

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8. The ratio between the neutrons present in nitrogen atom and silicon atoms with number 14 and 28 is :

A. $7:3$

B. $3:7$

C. $1:2$

D. $1:1$

Answer: c

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9. Which of the follwong nuclear reactiosn will generate an isotope?

A. neutron particle emission

B. Positron emission

C. α -particle emission

D. β -particle emission

Answer: a

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10. The number of neutrons in dipositive zinc ion with mass number 70 is.

A. 34

B. 40

C. 36

D. 38

Answer: b

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11. An ionic compound that attracts atmospheric water so strongly that a hydrate is formed is said to be :

A. dilute

B. hygroscopic

C. immisible

D. Miscible

Answer: b

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12. Pick out among the following species the onr which is not isoelectronic eith CO_2.

A. N_3^-

B. $(CNO)^-$

C. $(NCN)^{2-}$

D. NO_2^-

Answer: d

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13. X^{2+} is isoelectrnic with sulphur and has $(z+2)$ neutrons (Z is atomd no of X^{2+}) Hence ionic mass of X^{2+} is

A. 34

B. 36

C. 38

D. 40

Answer: c

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14. Z/e ratio for N^{3-}, O^{2-} and F^{-} respectively will be :

A. 0.7,0.8 and 0.9

B. 0.9 ,0.8 and 0.7

C. 7,8 and 9

D. 9,8 and 7

Answer: a

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15. which of the following group does not represent the isoelectronic species?

A. CH_4, H_2O, NH_3, HF

B. PH_3, SiH_4, HS^{-}, Ar

C. $OH^{-}, H_2O, NH_2^{-}, F^{-}$

D. H_2S, K^{+}, Ar, Cl

Answer: d

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16. Which one of the following sets of ions represents the collection of isoelectronic species?

A. $K^+ Cl^-, Mg^{2-}, Sc^{3+}$

B. $Na^+, Ca^{2+}, Sc^{3+}, F^-$

C. $K^+, Ca^{2+}, Sc^{3+}, Cl^-$

D. $Na^+, Mg^{2+}, Al^{3+}, Cl$

Answer: c

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17. Of the following sets ,which one does not contain isoeletronic species ?

A. $PO_4^{3-}, SO_4^{2-}, ClO_4^-$

B. CN^-, N_2, C_2^{2-}

C. $PO_3^{2-}, SO_3^{2-}, ClO_3^-$

D. $BO_3^{3-}, cO_3^{2-}, NO_3^-$

Answer: c

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18. which one of the following set of ions represent a collection of isoelectronic species?

A. $NO^+, C_2^{2-}, CN^-, N_2$

B. $CN^-, N_2, O_2^{2-}, C_2^{2-}$

C. N_2, O_2^-, NO^+, CO

D. $C_2^{2-}, O_2^{2-}, CO, NO$

Answer: a

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19. The pair NH_3 and BH_3 is isoelectronic with

A. B_2H_6

B. C_2H_6

C. C_2H_4

D. C_3H_6

Answer: b

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20. Which of the following species has some number of electrons as $F^{\ominus}$?

A. C^{-4}

B. Na^{+}

C. NH_2^{-}

D. All of these

Answer: d

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21. The increasing order of specific charge for the following substances electron (e), proton (p) unipositive helium atom (h), neutron (n) and α-particle is correctly represented in which of the following options.

A. e, n, p, h, α

B. n, h, α, p, e

C. n, α, h, p, e

D. None of these

Answer: b

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22. The ratio of the e/m values of a proton and an α-particle is:

A. $2:1$

B. $1:1$

C. $1:2$

D. $1:4$

Answer: a

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23. Which of the following pairs have identical values of e/m?

A. A proton and a neutron

B. A proton and deuterium,

C. Deiterium and α-particle

D. An electron and γ-rays

Answer: c

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24. the correct increasing order of $\frac{e}{m}$ ratio of the given particles is :

A. $Na^+ < Mg^{2+} < Al^{3+}$

B. $Li^+ < Na^+ < K^+$

C. $F^- < Cl^- < Br^-$

D. $Ca^{2+} < Al^{3+} < Be^{2+}$

Answer: a

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25. The element having no neutron in the nucleus of its atom is-

(a). hydrogen

(b). nitrogen

(c). helium

(d). boron

A. hydrogen

B. Nitrogen

C. helium

D. Boron

Answer: a

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26. The ration of the e/m (specific charge) values of an electron and an $\alpha-\text{particle}$ is

A. $2:1$

B. $1:1$

C. $1:2$

D. $1:1$

Answer: d

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27. A monoatomic ion that has 18 electrons and $+2$ charge:

A. Has 16 ptotons

B. Has the symbol Ar^{2+}

C. has 18 neutroons

D. is isoeoleecttronnic with Ar

Answer: d

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28. what is the total number of valence eleectrrons in the chlorate ion , ClO_3^- ?

A. 24

B. 26

C. 28

D. 32

Answer: b

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29. which list includes species with the same number of eletrons?

A. Mg, Ca, Sr

B. Li^+, Na^+, K^+

C. K^+, Cl^-, S^{2-}

D. $Fe^{2+}, CO^{2+}, Ni^{2+}$

Answer: c

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30. which pair of symbols represent nucler with the same number of neutrons ?

A. $\hat{}\ (56)CO$ and ^{58}Co

B. $\hat{}\ (57)Mn$ and ^{57}Fe

C. $\hat{}\ (57)Fe$ and ^{58}Ni

D. $\hat{}\ (57)Co$ and ^{58}Ni

Answer: d

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31. A meterial Safety Date sheet (MSDS) provides what types (S) of information anout a chemical ?

(P) First aid measures

(Q) Handing and storage tips

A. P only

B. Q only

C. Both pand Q

D. Neither P nor Q

Answer: c

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32. which pair of sysbols represent nuclei that have the same number of neurons ?

A. ${}_{26}^{56}Fe$ and ${}_{28}^{58}NI$

B. ${}_{26}^{56}Fe$ and ${}_{26}^{58}Fe^{2+}$

C. ${}_{27}^{57}Co$ and ${}_{26}^{58}Ni$

D. $^{57}_{28}Ni$ and $^{58}_{28}Ni$

Answer: a

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33. which ion not isooelectronic with Ar?

A. S^{2-}

B. K^{+}

C. SC^{2+}

D. Ti^{4+}

Answer: c

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34. the on $\hat{}\,(55)Mn^{2+}$ contains which comnination of protons neutrous and eleectrons?

	protons	neutrons	Electrons
A	25	30	23
B	25	55	23
C	27	30	25
D	30	25	28

A. A

B. B

C. C

D. D

Answer: a

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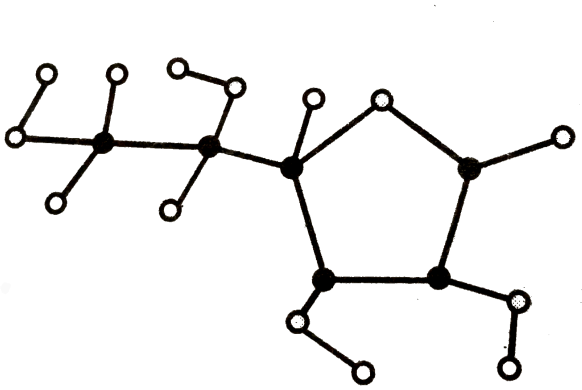
35. Examine the model of vitamin C and determine the molecular foemula .In the model shown ,the black

sphere =Catom o sphere = Hstom ,O sphere =O atom



A. $C_8H_6O_6$

B. $C_6H_8O_6$

C. $C_6H_{10}O_6$

D. None of these

Answer: b

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36. Molten potassium chlorde consucts electricity due th the presence of :

A. Free eletrons

B. Free molecules

C. Free potassium and chlorine atoms

D. Free potassium and choride ions

Answer: d

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37. the materical used in photoelectric cells sontains ,

A. Cs

B. Si

C. Sn

D. Ti

Answer: a

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38. If the mass of proton is doubled and that of neutron is havled th emolecular weight of CO_2 consisting only isoeletronic series?

A. $N^{3-}, O^{2-}, Cl^{-}, Ne$

B. $F^{-}, Ar, S^{2-}, Cl^{-}$

C. $P^{3-}, S^{2-}, Cl^{-}, Ar$

D. $N^{3-}, F^{-}, O^{2-}, Ar$

Answer: b

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39. which of the following combination contains only isoelectronic series?

A. 3,2,0

B.

C. 2,0,0

D. 1,1,0

Answer: c

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B

1. which set of wuantum number (n,l,m) is forbidden?

A. 3,2,0

B. 3,1,-1

C. 2,0,0

D. 1,1,0

Answer: d

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2. which characteristic of an atomic orbital ia most closeluy associated with the magnetic quantum number m_1?

A. Size

B. shape

C. Occupancy

D. Orientation

Answer: d

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3. How many jorbitals are in an f sublevel (l=3) ?

A. 3

B. 5

C. 7

D. 14

Answer: c

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4. which set of quantum number correspond t an eletron in a 4d orbital?

A. n=4, l=1, $m_l = -1, m_s = +\frac{1}{2}$

B. n=4, l=2, $m_l = -2, m_s = -\frac{1}{2}$

C. n=4, l=3, $m_l = 3, m_s = \frac{1}{2}$

D. n=4, l=3, $m_l = -1, m_s = -\frac{1}{2}$

Answer: b

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5. which set of quantum unmber is not allowed ?

A.

n	l	m_l	m_s
1	0	0	$+\frac{1}{2}$

B. $2 \quad 2 \quad 1 \quad -\frac{1}{2}$

C. $3 \quad 1 \quad 1 \quad -\frac{1}{2}$

D. $4 \quad 3 \quad -3 \quad +\frac{1}{2}$

Answer: b

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6. How many orbitals have the quantum numbers :

A. 7

B. 3

C. 1

D. 0

Answer: c

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7. If the principal quantum has a value of 3, what are the permitted values of the quantum number l?

A. $2, 1, 0$

B. $3, 2, 1, 0$

C. $2, 1, 0, -1, -2$

D. $3, 2, 1, 0, -1, -2, -3$

Answer: d

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8. all of the energy levels listed are allowed except:

A. $3f$

B. $4d$

C. $5p$

D. $7s$

Answer: a

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9. A sulphur atom in its ground state has the electrons confiuration

$1s^2 2s^2 2p^6 3s^2 3p^4$

How many orbitals are occpied by at least one electron ?

A. 12

B. 9

C. 8

D. 5

Answer: b

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10. the shapes of are determinted by which quantum number (s) ?

P. n

Q. l

R. m_1

A. P only

B. Q only

C. R only

D. Q and R only

Answer: b

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11. which set of quantum numbers (n,l,m_1,m_2) is permissible fopr an electron in an atom?

A. $1, 0, 0, -\frac{1}{2}$

B. $1, 1, 0, +\frac{1}{2}$

C. $2, 1, 2, +\frac{1}{2}$

D. $3, 2, -2, 0$

Answer: a

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12. what is the maximum number of electrons that can occupy n=3 energy level ?

A. 6

B. 8

C. 10

D. 18

Answer: d

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13. which quantum number determines the number of angular nodes in an atomes orbital ?

A. n

B. l

C. m_1

D. m_s

Answer: b

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14. which set of quantum mumbers (n,l,.$_1$, m_2) is not permitted by the rules of quantum mechanics?

A. $1, 0, 0, \frac{1}{2}$

B. $2, 1, -1, -\frac{1}{2}$

C. $3, 3, 1, -\frac{1}{2}$

D. $4, 3, 2, \frac{1}{2}$

Answer: c

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15. Given this set of quantum numbers for a multi -electron ataom :2,0,0,1/2 what is the next higher allowed set of n and l qunantum numbers for this higher allowed set of n and l quantum numbers for this atom in its ground state ?

A. n=2,l=0

B. n=2,l=1

C. n=3, l=0

D. n=3,l=1

Answer: b

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16. For nitrogen ataom ,if 5^{th} electron has quntum numbers n=2 ,l=1m=-1, $s = +\frac{1}{2}$ .then ,what will be the correct option for 6^{th} electron's quantum numbers?

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17. which of the following quantum will have higher numercal value among rhe other three corresponsing quantum numbers for a given subshell?

A. Spin quantum number

B. Azimuthal quantum number

C. Magnetic quantum number

D. Principal quntum number

Answer: d

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18. pair of orbitals which have identical orientation and common nodal plane (s) :

A. $3d_{xy}, 3d_{yz}$

B. $3d_{xy}, 3p_x$

C. $3d_{yz}, 4p_y$

D. $3d_{xy}, 4d_{xz}$

Answer: a::d

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19. Choose the correct option for the quantum numbers of the last electron of $3p^6$

A. $4, 0, 0, +\frac{1}{2}$

B. $3, 1, -1, -\frac{1}{2}$

C. $4, 1, 0, -\frac{1}{2}$

D. $3, 0, 1, \frac{1}{2}$

Answer: b

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20. Select set of quantum numbers which is possible for maximum number of electrons in an atom:

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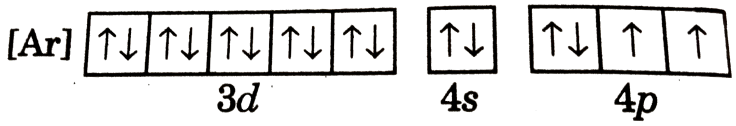
21. Which is a possible set of quantum numbers for the unpaired electrons in the orbital box diagram below?



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22. Principal azimuthal , and magnetic quantum numbers are respetively related to

A. size ,shape and orientation

B. shape ,size and orientation

C. Size orientation and shape

D. none of the above

Answer: a

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23. Degensrate atomic orbitals have :

A. equal energy in absemce of magnetic field

B. nearly equal energy

C. different energy

D. equal in presence of magnetic field

Answer: a

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24. How many maximum electrons can be dessribed by the quantum number n=5,l=2 in a particularatom?

A. 2

B. 6

C. 10

D. 14

Answer: c

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25. Any p- orbital can accomedate upto:

A. Four electrons

B. two eletrons with parallel spin

C. six electroons

D. Two eletrons with opposite spin

Answer: d

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26. which type of orbital is designated by n=2,l=3,$m_1 = -2$?

A. 4P

B. 4d

C. 4f

D. None of these

Answer: d

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27. which of the following statements regarding subdhell filling for s neutrsl stom is /are

Correct

(P) Electrons are assigned to the 4s subshell before they are assogned to the 3d subshell

(Q) electrons are assigned to the 4f subshell they are assigned to the 6s subshell

(R) elecrons are assigned to the 4d subshell before they are assigned to the 5p subshell

A. P only

B. Q only

C. P and R

D. P,Q and R

Answer: c

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28. Out of the following orbitals which have nodal plane perpendiclar to the plane orbital ?

A. $3d_{z^2}$

B. $4_{x^2-y^2}$

C. 5s

D. All of these

Answer: b

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29. total number of possible unique sts of gour quantum numbers in the 5th shell of an atom ,if it is complatey filled :

A. 20

B. 5

C. 25

D. 50

Answer: d

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30. Which combinations of quantum number n, l, m, s for the electron in an atom does not provide a permissible solution of the wave equation ?

A. $3, 2, -2, -\frac{1}{2}$

B. $3, 3, 1, +\frac{1}{2}$

C. $4, 2, 1, +\frac{1}{2}$

D. $2, 1, 1, -\frac{1}{2}$

Answer: b

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31. Maximum number of orbitals are present for which of the following set quantum number ?

A. l=2,m=2

B. l=3,m=0

C. l=0,m=0

D. l=3,m=0

Answer: c

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32. m=- 1 is not possible for :

A. $3p_x$ orbital

B. $4d_{x^2-y^2}$ orbital

C. 2s orbital

D. 4f orbital

Answer: c

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33. the highest probability of finding the electron in an orbital having values of quantum hnumbers n=3 l=1 and m=1.

A. in between any two axis out of three

B. On any two axis simultaneously ,perpendicular to each other

C. On any one axis out of the three at a time

D. on all the three axis simultaneously at a time

Answer: a

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34. the maximum number of electrons that can be accommodated in the M^{th}) shell is :

A. 2

B. 8

C. 18

D. 32

Answer: c

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35. If an elevtronsd has spin quantum number of $= \frac{1}{2}$ and magnetic quantum number of -1 it cannot be present in:

A. f- orbital

B. d- orbittal

C. p- orbital

D. s- orbital

Answer: d

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36. when the quntum number n, l,m,s are represented by $3, 3, 2, = \frac{1}{2}$ the correct representation is:

A. 3s

B. 3d

C. 3f

D. impossible det of quantum number

Answer: d

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37. for a 6s eleectron the vales of n,l,m,s respectiivelty could be :

A. $6, 4, 4, -\frac{1}{2}$

B. $1, 00, 0, +\frac{1}{2}$

C. $6, 1, 0, -\frac{1}{2}$

D. $6, 0, 0, +\frac{1}{2}$

Answer: d

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38. Which of the following sets of quantum numbers represents an impossible arrangement?

A. $3, 2, -2, +\frac{1}{2}$

B. $4, 0, 0, +\frac{1}{2}$

C. $3, 2, -3 + \frac{1}{2}$

D. $5, 3, 0, +\frac{1}{2}$

Answer: c

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39. Priincipal quantum number of an atom represents :

A. size of the orbit

B. Spin angular momentum

C. Orbital angular momentum

D. space orientation of the orbital

Answer: a

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40. d_{z^2}0orbital has :

A. has lobes along z- axis and a ring along xy plane

B. two lobes slong z-axis and two lobes along xy -plane

C. two lobes along z-axis and two a ring along yz -plane

D. two lobes and a ring along z-axis

Answer: a

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41. Which of the following statement is correct in relation to the hydrogen atom :

A. 3s ,3p and 3p orbitals all have the same energy

B. 3s and 3p otbitals are of lower energy thean 3d orbital

C. 3p orbital is lower in energy than 3d orabital

D. 3s orbital is lower in energy than 3p orbital

Answer: a

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42. In case of $D_{x^{2^{20}-y}}$ orbital :

A. probailty of finding the electron along x-axis is zero

B. probabilty os finding the electron along y-axis is zero

C. probabilty of finding the eletron is maximum along xand y-axis

D. probabilty of finding the eletron is zero in xy plane

Answer: c

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43. which of the following set of quantum number is correct for the an electron4f irvital ?

A. n=4,l=3,,=-+4,$s = +\frac{1}{2}$

B. n=4,l=4,m=-4,$s = -\frac{1}{2}$

C. n=4,l=3,m=+1,$s = +\frac{1}{2}$

D. n=3,l=2,m=-2,„$s = +\frac{1}{2}$

Answer: c

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44. which orbital is non - sirectinal ?

A. S

B. P

C. D

D. F

Answer: a

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45. For which orbital angular probability distribution is maximum at an angle of 45° to the axial direction ?

A. $d_{x^2-y^2}$

B. d_{x^2}

C. d_{xy}

D. p_x

Answer: c

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46. If n and l are respectively the principal and azimuthal quantum numbers , then the expression for calculating the total number of electrons in any energy level is :

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47. The quatum numbers $+\frac{1}{2}$ and $-\frac{1}{2}$ for the electron spin represent

A. Rotation of the elecr=tron in clockwise and anticlockwise direction respectively

B. ectivty

C. Magnetic moment mechanical spain states which have no classical analgoue

D. Two quantum mechanical, spain states which have no classical analoue

Answer: d

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48. Number of nodal plane (S) present in s,p_x, $P_y p_z$ are respecticvely:

A. 0,1,1,1

B. 0,2,1,1

C. 0,2,2,2

D. 0,0,0,0

Answer: a

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49. Which of the following set of quantum numbers is not valid ?

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

B. $n = 2, l = 0, m = 0, s = -\frac{1}{2}$

C. $n = 4, l = 2, m = -1, s = +\frac{1}{2}$

D. $n = 4, l = 3, m = 4, s = -\frac{1}{2}$

Answer: d

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50. IF spin quantum number have the values +1/2,0 and -1/2 but all other quantum number have values as they have, then the maximum number of electrons in 5^{th} orbit should be

A. 25

B. 50

C. 75

D. 33

Answer: c

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51. The correct option regarding size of orbitals is :

A. $2p > 3p > 4p > 5p$

B. $2p = 3p < 4p = 5p$

C. $2p < 3p < 4p < 5p$

D. $2p = 3p = 4p = 5p$

Answer: c

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52. which of the following is an impossible set of quantum number ?

A. $n = 3, l = 2, m = 0, s = +\frac{1}{2}$

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

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

D. $n = 3, l = 2, m = -1, s = -\frac{1}{2}$

Answer: c

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53. Calculate the total number of electrons for $n = 3, l = 2$ and $m = -2$

A. 2

B. 6

C. 10

D. 18

Answer: a

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54. Which set of quantum numbers could repesent an electron in a 5f orbital ?

A. $l = 4, m_1 = 2$

B. $l = 2, m_1 = -3$

C. $l = 3, m_1 = 4$

D. $l = 3, m_1 = 0$

Answer: d

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55. which orbital possesses one angular node and one radial node ?

A. 2s

B. 2p

C. 3p

D. $3d_{xy}, 4d_{xz}$

Answer: c

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56. The correct set of four quantum numbers for valence electrons of rubidium atom (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. $6, 0, 0, +\frac{1}{2}$

Answer: a

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57. which of the following options consits of only those orbitals which have number of radial nodes exactly same as their angular nodes ?

A. $1s, 2p, 3d$

B. $1s, 2s, 3s$

C. $1s, 3p, 5d$

D. $4f, 5g, 6h$

Answer: c

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58. Each of the following atomic orbitals is possible except :

A. 1s

B. 2p

C. 3f

D. 4d

Answer: c

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59. which set of quantum number si not possible ?

A. $n = 1, l = 1, m_1 = +1, m_s = -\frac{1}{2}$

B. $n = 3, l = 2, m_1 = +1, m_s = +\frac{1}{2}$

C. $n = 4, l = 4, m_1 = -1, m_s = +\frac{1}{2}$

D. $n = 5, l = 2, m_1 = 2, m_s = -\frac{1}{2}$

Answer: c

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60. which is an acceptable set of quantum number for an eletron ?

A. $1, 1, 0, \frac{1}{2}$

B. $2, 1, 0, 0$

C. $2, 1, -1, -\frac{1}{2}$

D. $3, 2, -3, -\frac{1}{2}$

Answer: c

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61. which orbital has most radial modes ?

A. 4s

B. 4p

C. 4d

D. 4f

Answer: a

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62. the energy of an electron in hydrogen atom is determined solely by its:

A. principal quantum number

B. azimuthal quantum number

C. (n+1) value

D. none of these

Answer: a

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63. which of the following sets of quantum numbers n, l_1, m_S correspond to a valence electron in a neutral atom of arsenic (As) ?

A. $3, 0, 0, +\frac{1}{2}$

B. $3, 2, 1, -\frac{1}{2}$

C. $4, 0, 0, +\frac{1}{2}$

D. $4, 2, 1, -\frac{1}{2}$

Answer: c

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64. Read carefully four statements:

(P) S- subshell consists of one orbital

(Q) p- orbital consists od there subshell

(R) d- subshelll can accommodate maximum of ten electrons

(S) H-orbital can accommodate maximum of two electrons

Choose the corect statements :

A. P,Q,R and S

B. P and R

C. Q and S

D. P,R and S

Answer: d

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65. Which of the following pairs of d-orbitals will hare electron density along the axes ?

A. d_{xy}, d_{yz}

B. $d_{x^2-y^2}, d_{xy}$

C. d_{xz}, d_{z^2}

D. $d_{x^2-y^2}, d_{z^2}$

Answer: d

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66. How amny maximum number of eletrons are present in an element (z=35) which have quantum, number values ?

$l \leq 2, \quad |m| < 2, s = +\frac{1}{2}$

A. 15

B. 16

C. 18

D. 13

Answer: b

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67. the lobes of ehich orbital (s) lies in the nodal plane of d_{x^2} :

A. $d_{x^2-y^2}$

B. d_{xy}

C. d_{yz}

D. none of these

Answer: d

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68. which fo the following orbitals have at least one common nodal plane ?

A. p_z and d_{xz}

B. $d_{x^2-y^2}$ and s

C. $d_{x^2-y^2}$ and d_{xy}

D. d_{z^2} and p_z

Answer: a

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C

1. What are the values of the orbital angular momentum of an electron in the orbitals $1s$, $3s$, $3d$ and $2p$:-

(a). $0, 0\sqrt{6h}, \sqrt{2h}$

(b). $1, 1\sqrt{4h}, \sqrt{2h}$

(c). $0, 1\sqrt{6h}, \sqrt{3h}$

(d). $0, 0\sqrt{20h}, \sqrt{6}$

A. $0, 0, \sqrt{6h}, \sqrt{2h}$

B. $1, 1, \sqrt{4h}, \sqrt{2h}$

C. $0, 1, \sqrt{6h}, \sqrt{3h}$

D. $0, 0, \sqrt{20h}, \sqrt{6h}$

Answer: a

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2. The orbital with zero orbital angular momentum is.

A. s

B. p

C. d

D. f

Answer: a

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3. The orbital angular momentum of an electron in $2s$-orbital is

A. $+\frac{1}{2}\frac{h}{2\pi}$

B. zero

C. $\frac{h}{2\pi}$

D. $\sqrt{2}\frac{h}{2\pi}$

Answer: b

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4. For an electron, with n=3 has only one radial node.

The orbital angular momentum of the electron will be :

A. 0

B. $\sqrt{6}\frac{h}{2\pi}$

C. $\sqrt{2}\frac{h}{2\pi}$

D. $3\left(\frac{h}{2\pi}\right)$

Answer: c

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5. The orbital angular momentum for an electron revolving in an orbit is given by $\sqrt{l(l+1)}\frac{h}{2\pi}$. What is the momentum of an s-electron?

A. $+\frac{1}{2}, \frac{h}{2\pi}$

B. zero

C. $\frac{h}{2\pi}$

D. $\sqrt{2}\frac{h}{2\pi}$

Answer: b

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6. which of the given statement(s) is /are false ?

(P) orbital angular momentum of the azimuthal quantum number as lowest for this principle quantum number si $\frac{h}{\pi}$,

(Q) if n=3 ,l=0 ,m=0 for the last valence shell electron ,them the possble atomic number may be 12 or 13 .

(R) total spain of electrons for the atom $_{}(25)$ Mn is $\pm\frac{7}{2}$.

(S) spin magnetic moment of inert gas is zero .

A. P.Q and R

B. Q and R only

C. P and S only

D. None of these

Answer: a

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D

1. what is the ground state electronic configuration of a _ (27) CO atom in the gas phase ?

A. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^7 4s^2$

B. $1s^2 2s^2 2p^6 3s^6 3d^9$

C. $1s^2 2s^2 2p^6 3s^6 3d^8 4s^1$

D. $1s^2 2s^2 2p^6 3s^6 3d^7 4s^2$

Answer: a

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2. which must represent an atom in an excited state?

A. $1s^2 2s^2 2p^1$

B. $1s^2 2s^2 2p^2$

C. $1s^2 2s^2 2p^2 3s^1$

D. $1s^2 2s^2 2p^5$

Answer: c

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3. which quantum numbers represent the orbitals being filled in the ground state for the elements Sc (21) to Zn (30)?

A. $n = 3, l = 1$

B. $n = 3, l = 2$

C. $n = 4, l = 1$

D. $n = 4, l = 2$

Answer: b

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4. the electron configurtion of cobalt (Z=27) is $1s^2 2s^2 2p^6 3p^6 3d^7 4s^2$ How manu uppairred eletrons are in a gaseous CO^{3+} ion in its strontium

atom in its ground state?

A. 0

B. 2

C. 4

D. 6

Answer: c

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5. which set of quantum numbers (n,l,m_1,m_2) is possible for the outermost electron in a strontium atom inits gound state ?

A. , $5, 0, 0, -\frac{1}{2}$

B. , $5, 0, 1, \frac{1}{2}$

C. , $5, 1, 0, \frac{1}{2}$

D. , $5, 1, 1, -\frac{1}{2}$

Answer: a

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6. which element has atoms with exaxtly four valence ekectrons in its ground state ?

A. Ca

B. Cr

C. Si

D. S

Answer: c

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7. Gas -phase atoms of which element have an occpied 5d orbital in their gound state ?

A. Ag (Z=47)

B. Ba (Z=56)

C. Eu(Z=63)

D. Ir (Z=77)

Answer: d

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8. which gas -phase atom in its ground state could have an electron with quantum number :n=3,l=2, $M_1 = 0, m_s = -\frac{1}{2}$?

A. Na

B. Mg

C. P

D. Ti

Answer: d

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9. which change(s) in eleectron structure occour when a Mn atom is converted to a Mn^{2+} ion in the gas phase ?

(P) the number of occupied enrgy levels decreases.

(Q) the number of half -filled orbitals decreases .

A. P only

B. Q only

C. Both pand Q

D. Neither p nor Q

Answer: a

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10. what is the total number of electrons in a single phosphorus atom its gound state ?

A. 3

B. 5

C. 9

D. 15

Answer: c

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11. which os the electrons confiuration for an Fe (III) ion in its ground state?

A. $[Ar]3d^5$

B. $[Ar]3d^6$

C. $[Ar]4s^23d^3$

D. $[Ar]4s^23d^6$

Answer: a

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12. which is the symbol for an element whose ground state atoms have the same total numbers of s electrons and p electrons ?

A. _ $(5)B$

B. _ $(6)C$

C. _ $(12)Mg$

D. _ $(18)Ar$

Answer: c

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13. which orbital fills completely immdiately before the 4f ?

A. 6s

B. 5p

C. 5d

D. 4d

Answer: a

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14. the possible set of quantum numbers (n,l,m,s) of the last electron of unipositive potassium ion :

A. $5, 0, 0, -\frac{1}{2}$

B. $5, 0, 1, \frac{1}{2}$

C. $5, 1, 0, \frac{1}{2}$

D. none of these

Answer: d

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15. How many orbitls contin one or more electrons in an isolated ground state iron stom (Z=26)?

A. 13

B. 14

C. 15

D. 16

Answer: c

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16. According to the aufbau principle3 which is the sequential order of filling subshells in a ground atom are completely filled ?

A. 3s 3p 3d

B. 3p 4s 3d

C. 3d 4s 4p

D. 4p 4d 4f

Answer: b

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17. How many orbitls in ground state oxygen atom are completely filled ?

A. 1

B. 2

C. 3

D. 4

Answer: c

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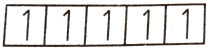
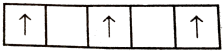
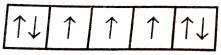
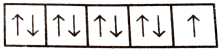
18. which electrons distribution in d- -shbshell is not observrd in any neutral elemet of 3d series ?

A. (a) 

B. (b) 

C. (c) 

D. (d) 

Answer: d

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19. Consider the ground state Cr atom $(Z = 24)$. The number of electron with the azimuthal number $l = 1$ and 2 ,respectively are

A. 16 and 4

B. 12 and 5

C. 12 and 4

D. 16 and 5

Answer: b

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20. The total number of electrons in Cr atom for which m=0:

A. 1

B. 8

C. 12

D. 16

Answer: c

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21. How many mazimum posssible set (s) of quantum no . Are possible for 6^{th} electron of Fe ?

A. 1

B. 3

C. 6

D. 10

Answer: c

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22. The maximum no . Electrons in phosphorous atom for which n+l+m =3 will be :

A. 6

B. 5

C. 4

D. 3

Answer: b

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23. If $n = 6$, the correct sequence for filling of electrons will be.

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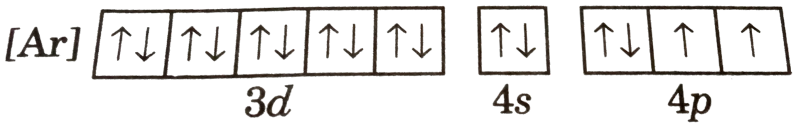
24. Which element has the following ground state electrons configuration ?



A. Se

B. As

C. S

D. Ge

Answer: a

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25. Hund's rule states that the most stable arrangement of electrons : (for a ground state electron configurtion)

A. has three electrons per orbital ,each with identical spins

B. has m_1 values greater than or equal to +1

C. has the maximum number of unpaired electrons all with same spin in degenerate orbital

D. has two electrons per orbital , each with opposing spine

Answer: c

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26. the pauli exclusion principle states that :

A. no two electrons in an atom can have the same four quantum numbers

B. electrons can have either $\pm\frac{1}{2}$ spins

C. electrons with oppossing spins are attracted towards each other

D. none of the above

Answer: A

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27. which of the following is correct set of quantum numbers for the last electron entering in Fe ?

A.

n	l	m	s
4	0	0	$+\frac{1}{2}$

B.

n	l	m	s
3	2	-1	$+\frac{1}{2}$

C.

n	l	m	s
3	2	-2	$-\frac{1}{2}$

D.

n	l	m	s
3	2	-3	$-\frac{1}{2}$

Answer: c

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28. Among the following , the configuration $1s^2 2s^2 2p^6 3s^2 3p^5 4s^1$ is vilid for the :

A. ground state of chorine

B. excited state of clorine

C. excited state of argon

D. excited state of S^{2-} ion

Answer: c

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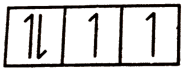
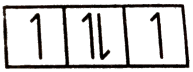
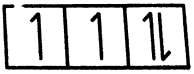
29. which of the following electrons configuraation violate Hund's rule for a p^4 syatem of an isolated gaseous species ?

A. (a) 

B. (b) 

C. (c) 

D. (d) 

Answer: c

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30. The first excited state of Cl^- will have degenergy of :

A. 1

B. 3

C. 5

D. 9

Answer: c

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31. the percentage of orbitals occupied by electrons out to total orbitals present upto the outermost shell of Fe atom :

A. 0.5

B. 0.7

C. 0.25

D. 0.35

Answer: a

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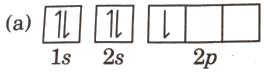
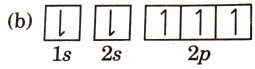
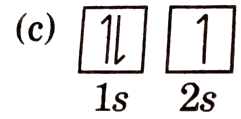
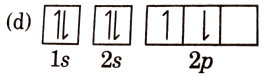
32. which of the following is vioation of (n+1) rule ?

A. 

B. 

C. 

D. 

Answer: b

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33. in which of the following change both the electrons are removed from same orbital ?

A. $Cu \rightarrow Cu^{+2} + 2e^{-}$

B. $Cr \rightarrow Cr^{+2} + 2e^{-}$

C. $Ge \rightarrow Ge^{+2} + 2e^{-}$

D. $Zn \rightarrow Zn^{+2} + 2e^{-}$

Answer: d

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34. The explanation for the presence of three unpaired electrons in the nitrogen atom can be given by -

A. Pauli's exclusion priciple

B. Hund's rule

C. Aufbau's principle

D. Uncertainty princple

Answer: b

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35. The number of d-electron retained in $Fe^2(\text{At no. of} Fe = 26)$ ion is.

A. 3

B. 4

C. 5

D. 6

Answer: d

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36. in a muti- electron atom ,which of the following orbitals described ny the three quantum numbers magnetic and electric field ?

$(P) \quad n = 1, l = 0, m = 0 \quad (q) \quad n = 2, l = 0, m = 0$
$(r) \quad n = 2, l = 1, m = 1, \quad (S) \quad n = 3, l = 2, m = 1$
$(t) \quad n = 3, l = 2, m = 0 \quad ,,$

A. (s) and (t)

B. (r) and (s)

C. (q) and (r)

D. (P) and (q)

Answer: a

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37. Which of the following set of quantum numbers represents the highest energy of an atom ?

A. $n = 3, l = 0, m = 0, s = +\frac{1}{2}$

B. $n = 3, l = 1, m = 1, s = +\frac{1}{2}$

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

D. $n = 4, l = 0, m = 0, s = +\frac{1}{2}$

Answer: c

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38. The correct set of quantum number for the unpaired electron of chlorine atom is

	n	l	m
a.	2	1	0
b.	2	1	0
c.	3	1	1
d.	3	0	0

A. $n \quad l \quad m$
$2 \quad 1 \quad 0$

B. $n \quad l \quad m$
$2 \quad 1 \quad +1$

C. $n \quad l \quad m$
$3 \quad 1 \quad +1$

D. $n \quad l \quad m$
$3 \quad 0 \quad 0$

Answer: c

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39. After np orbitals are filled, the next orbital filled will be :-

(a). $(n+1)s$

(b). $(n+2)p$

(c). $(n+1)d$

(d). $(n+2)s$

A. (n+1)s

B. (n+2)p

C. (n+1)d

D. (n+2)s

Answer: a

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40. Total number of electrons having $n + l = 3$ in $Cr(24)$ atom in its ground state is.

A. 8

B. 10

C. 12

D. 6

Answer: a

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41. The possible value of l and m for the last electron in the $Cl^{-}ion$ are :

A. 1 and 2

B. 2 and +1

C. 3 and +1

D. 1and -1

Answer: d

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42. Which of the following is electronic configuration of $Cu^{2+}(Z = 29)$?

A. $[Ar]4s^1 3d^8$

B. $[Ar]4s^1 3d^{10} 4p^1$

C. $[Ar]4s^1 3d^{10}$

D. $[Ar]3d^9$

Answer: d

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43. Given is the electronic configuration of element X

K	L	M	N
2	8	11	2

The number of electrons present with $l = 2$ in an atom of element X is.

A. 3

B. 6

C. 5

D. 4

Answer: a

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44. Which of the following elemts will have the same total number of electrons in 's' as well as 'd' subshells in the ground state electronic configuration

A. Zn

B. Ni

C. Cr

D. Cu

Answer: b

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45. Quantum numbers of same electrons are given below on the basis of it ,arrange them from lowest to highest energy order:

	n	l	m	s
(P)	4	1	0	$\frac{1}{2}$
(Q)	5	0	0	$-\frac{1}{2}$
(R)	6	2	0	$+\frac{1}{2}$
(S)	6	3	-1	$+\frac{1}{2}$

A. $P < Q < R < S$

B. $Q < R < P < S$

C. $Q < R < S < P$

D. $S < Q < R < P$

Answer: a

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46. "Electron pairing cannot occur in p,d and f-orbitals unitil each orbital of a given subshell contains one elertron " this is known as:

A. Aufbau's rule

B. Pauli's exclusion priciple

C. Hund's rule

D. Fajan's rule

Answer: c

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47. Which of the following set of quantum numbers incorrect for last electron of fluorine atom ?

A. $n = 2, l = 1, m = 0, s = \frac{1}{2}$

B. $n = 2, l = 1, m = 0, s = -\frac{1}{2}$

C. $n = 2, l = 0, m = 0, s = +\frac{1}{2}$

D. $n = 2, l = 1, m = 1, s = \frac{1}{2}$

Answer: a

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48. Hund's rule of maximum spin multiplcity is not application for :

A. d

B. p

C. f

D. s- orbital

Answer: d

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49. Aufbau priciple does not give correct arrangmen of filling up of atom orbitals in :

A. cu and Zn

B. Co and Zn

C. Mn and Cr

D. Cu and Cr

Answer: d

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50. Which of the following sequeous is correct as pe Aufbau principle ?

A. $3s > 3d < 4s < 3d$

B. $1s < 2p < 3s < 3d$

C. $2s > 5d < 4s < 5d$

D. $2s > 2p < 3d < 3p$

Answer: b

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51. Find configuraation which does not follow Hund's rule of maximum multiplicity for p- subshell .

A. $2p_x^1, 2p_y^1, 2p_z^1$

B. $2p_x^2, 2p_y^2, 2p_z^2$

C. $2p_x^1, 2p_y^2, 2p_z^0$

D. $2p_x^2, 2p_y^1, 2p_z^2$

Answer: c

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52. If spin quantum number has 4 values instead of two then identify the incorrect statemetns.

A. First period will be shortest with 4 elements

B. Fourth period can have maximum 36 elemrnts

C. Each orbital can have maximum 4 electrons.

D. For agivan value of an (principal quantum number) number of electrons will be $2n^2$

Answer: d

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53. Assuming hund's Rule is not necesssarily follwed for a d^5 configuration then what sould be the maximum and minimum multiplicity possible ?

A. 6,2

B. 5,1

C. $\frac{5}{2}, \frac{1}{2}$

D. 6,1

Answer: a

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54. In ground state of phoosphorous atom (Z=15) , the numbers occupied sub- shells and occupied orbitals are respectilty :

A. 3,3

B. 5,9

C. 5,5

D. 3,6

Answer: b

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55. which among th efollowing species has the same number o felectrons in its outermost as well as penultmate shell ?

A. Mg^{2+}

B. O^{2-}

C. F^{-}

D. Ca^{2+}

Answer: d

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56. which of the following is worng outer electonic configuration ?

A. $Sc^{21} = 3d^1 4s^2$

B. $Ti^{22} = 3d^2 4s^2$

C. $Cr^{24} = 3d^5 4s^1$

D. $V^{23} = 3d^2 4d^2$

Answer: d

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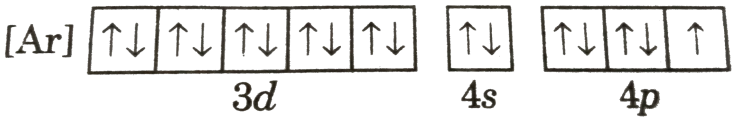
57. What is a possible set of quantum numbers for the unpired eletron in the orbital box digarm below ?



A. $n = 1, l = 1, m_1 = -1, m_s = +\frac{1}{2}$

B. $n = 4, l = 1, m_1 = -1, m_s = +\frac{1}{2}$

C. $n = 4, l = 2, m_1 = -2, m_s = +\frac{1}{2}$

D. $n = 4, l = 0, m_1 = 0, m_s = +\frac{1}{2}$

Answer: b

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58. The quantum number of four electrons (el to e4) are given below :-

	n	l	m	s
$e1$	3	0	0	$+1/2$
$e2$	4	0	0	$1/2$
$e3$	3	2	2	$-1/2$
$e4$	3	1	-1	$1/2$

The correct order of decreasing energy of these electrons is :

A. $e4 > e3 > e2 > e1$

B. $e2 > e3 > e4 > e1$

C. $e3 > e2 > e4 > e1$

D. none fo these

Answer: c

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59. If nitrogen atoms had el,ectonic configuration is ? It would have energy lower than that of the nornal ground state configuration

$1s^2 2s^2 2p^3$ because the electrons would be clear to the nucleus yet $1s^2$ is not oberved because it violates ?

A. Heisenberg uncertainty priciple

B. Hund's rule

C. pauli's exclusion priiniple

D. Bohr postulate of stationary orbits

Answer: c

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60. The quantum number , n=1,l=1,$m_1 = 0$ could represent a valence electron in which atom in its ground state ?

A. Fe

B. In

C. Pd

D. Se

Answer: d

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61. A gas phase atom with the electronic configyartin

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

loses three electrons ,what is the electron configuration of the resulting gas phase ion ?

A. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^5$

B. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1 3d^4$

C. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^3$

D. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1 3d^5$

Answer: a

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62. A sulphur atom in its ground state has the electrons confiuration

$1s^2 2s^2 2p^6 3s^4$

How many orbitals are occpied by at least one electron ?\

A. 3

B. 5

C. 8

D. 9

Answer: d

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63. whcih of the following does NOT repesent the arrangement of electrons in the p Subshell in the ground state of any gas -phase phase atom ?

A. (a) $\underline{\uparrow\downarrow}\ \underline{\uparrow}\ \underline{\ }$

B. (b) 

C. (c) 

D. (d)

Answer: a

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64. A M^{+2} ion derved fromn a metal in the first transition metal series has four electrons in 3d subshell , what element may m be:

A. S

B. Cr

C. Mn

D. Se

Answer: b

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65. Total number of electrons in Cu atom havijng $m_1 = 0$:

A. 9

B. 13

C. 10

D. 6

Answer: b

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66. which of the following stateement is coorect ?

A. Lanthanum is the first element of Lanthanide

B. Actinium violates the Aufbau's principle

C. Chromium viotates the pauli's exclusion priinciple

D. Total 10 exchange pairs are possible for d- electrons in Zn

Answer: b

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67. which of the following cation has only two eclctrons In its last shell ?

A. Sn^{+4}

B. Bi^{+5}

C. Pb^{+2}

D. Hg^{+2}

Answer: c

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E

1. Aground state gasous atom fo which elemrnt has the greatest number of unipaired electrons ?

A. As

B. Br

C. Ge

D. Se

Answer: a

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2. How many unpaired electrons are present in a ground state?

A. 6

B. 4

C. 2

D. 0

Answer: b

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3. How many unpaired electrons are there in Ni^{2+}?

A. 0

B. 2

C. 4

D. 6

Answer: b

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4. Identify the cation having maximum magnetic moment :

A. Zn^{+2}

B. Ni^{+2}

C. Cr^{+3}

D. Mn^{+3}

Answer: d

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5. Which of the following have maximum number of unpaired electrons ?

A. Na^{+}

B. N^{3-}

C. Fe^{+2}

D. Cr^{3+}

Answer: c

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6. Ions which have maximum total spin muliplicity ?

A. Fe^{+2}

B. Cu^{+2}

C. Cr^{+2}

D. Mn^{+2}

Answer: d

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7. In which of the following ,the two species have different value of spin magnetic moment ?

A. Mn^{+2}, Fe^{+3}

B. Cr^{+3}, Mn^{+4}

C. Zn^{+2}, Pd

D. Co^{+2}, Cr^{+2}

Answer: d

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8. In which of the following set of species have same magnetic nature and some magnetc moment ?

A. Fe^{+3}, Cu^{+}, Ag^{+}

B. $Co^{+3}, Cr^{+3}, Ni^{+2}$

C. Cu^{+}, Zn^{+2}, Cd^{+2}

D. $Mn^{+2}, Fe^{+2}, As^{+3}$

Answer: c

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9. Which of the following has maximum number of unpaired electron (atomic number of $Fe26$)

A. Fe

B. Fe(II)

C. Fe (III)

D. FE(IV)

Answer: c

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10. An ion $\left(Mn^{a+}\right)$ has the magnetic moment equal to 4.9 B.M` What is the value of (a) :

A. 3

B. 4

C. 2

D. 5

Answer: a

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11. The spin-only magnetic moment [in units of Bohr magneton, $(\mu_B$ of $Ni^{2+})$ in aqueous solution would be (atomic number of $Ni = 28)$

A. 2.83

B. 4.9

C. 0

D. 1.73

Answer: a

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12. which of the following ions has the maximum magnetic moment ?

A. Mn^{+2}

B. Fe^{+2}

C. Ti^{+2}

D. Cr^{+2}

Answer: a

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13. The value of the magnetic moment of a particular ion is 2.83 Bohr magneton. The ion is :-

(a). Fe^{2+}

(b). Ni^{2+}

(c). Mn^{2+}

(d). Co^{3+}

A. Fe^{2+}

B. Ni^{2+}

C. Mn^{2+}

D. Co^{3+}

Answer: b

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14. What is the total spin value in case of $_{}(26)Fe^{3+}$ ion ?

A. $+1$ or -1

B. $+2$ or -2

C. $+2.5$ or -2.5

D. $+3$ or -3

Answer: c

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15. Magnetic moment of $Fe^{a+}(Z=26)$ is $\sqrt{24}BM$. Hence number of unpaired electron and value of 'a' respectively are :

A. 4,2

B. 2,4

C. 3,1

D. 0,2

Answer: a

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16. Which of the following ions has the maximum number of unpaired d-electrons ?

A. Zn^{2+}

B. Fe^{2+}

C. Ni^{3+}

D. Cu^{+}

Answer: b

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17. The total spin resulting from a d^7 configuration is :

A. 1

B. 2

C. $\frac{5}{2}$

D. $\frac{3}{2}$

Answer: d

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18. Which of the following having same value of magnetic moment?

A. Mn^{2+} and Na^{+}

B. Fe^{3+} and Fe^{2+}

C. Zn^{2+} and Cl

D. Zn^{2+} and Na^{+}

Answer: d

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19. which of the following species are paramagnetic I nature ?

A. Sc^{3+}

B. Mn^{2+}

C. Cu^{+}

D. Zn^{2+}

Answer: b

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20. Calcualate the spin multiplicity for H-atom .

A. 10

B. 2

C. $\frac{5}{2}$

D. 11

Answer: b

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21. Magnetic moment of $_{}(30)Zn^{2+}$ ion is same as :

A. $_{}(29)Cu^{1+}$

B. $_{}(21)Sc^{3+}$

C. $_{}(28)Ni^{4+}$

D. (a) and (b) both

Answer: d

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22. Find the species having highest value of magnetic moment in their ground state.

A. Cu^+

B. Cr^{3+}

C. Mn^{2+}

D. Ni^{2+}

Answer: c

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23. Magnetic moment of $V(Z=23), Cr(Z=24),$ and $Mn(Z=25)$ are x, y, zrepectively hence

A. $x = y = z$

B. $x < y < z$

C. $x < z < y$

D. $z < y < x$

Answer: c

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24. Gaseous atoms of which of these elements contain one or more unpiared electrons ?

$Ge(Z = 32), As(Z = 33), Se(Z = 34)$

A. As only

B. Ge and As only

C. Ge and Se only

D. Ge ,As and Se

Answer: d

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25. Which gas phase ion in its ground state has the greastest number of unpaired electrons ?

A. Cr^{3+}

B. Mn^{3+}

C. Fe^{3+}

D. Co^{3+}

Answer: c

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26. which gas phase atom in its grouns state has exactly three unpaired electrons ?

A. Sc

B. Fe(II)

C. Co

D. Se

Answer: c

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27. Which gaseous ion has exactly three unpaired electrons?

A. Fe^{3+}

B. Ni^{2+}

C. Ti^{+}

D. V^{2+}

Answer: d

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28. For the transition metal with the electron configuration $1s^2 2s^2 2p^6 4s^2 3d^6$,How many unpaired electrons are present in tis +2 ion in the ground state ?

A. 0

B. 2

C. 4

D. 6

Answer: c

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29. Which gas phase atom has no unpeied electrons in its ground state ?

A. Li

B. Be

C. B

D. C

Answer: b

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30. Find the species from the following option (s) having lowest magetic moment value .

A. Ni^{2+}

B. Ti^{2+}

C. Zn^{+}

D. Cu^{+}

Answer: d

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31. Chloro compound of vanadium has only spin magnetic moment of 1.73 BM. This vanadium chloride has the formula :- (at no. of V=23)

A. VCl_2

B. VCl_3

C. VCl_4

D. VCl_5

Answer: c

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32. Ratio of magnetic moment of the ions Co^{2+} and Cr^{3+} is :

A. $\sqrt{15}$

B. 1

C. 3

D. 2

Answer: b

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F

1. the energies of the 3s ,3p 3p and 3d orbitals in a muti -electron atom increase in that order ,to which facter (s) can this order eb attributed ?

(P) the relative pentrations of these orbitals near the nucleus .

(Q) the relative average distance of the electromn from the nucleus.

A. P only

B. Q only

C. Both pand Q

D. Neither p nor Q

Answer: c

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2. the secreenning constant of last electron of which element will ne maximum :

A. 24

B. 18

C. 23

D. 22

Answer: b

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3. Shielding constant of last electron fo which element will be maximum :

A. H

B. H^-

C. He

D. Li

Answer: d

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4. Which of the following pair has the same value of screening constant for 3s electron ?

A. Cl and Mg

B. mg and Ca

C. N and Na

D. K and Ca

Answer: d

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5. Screening effect is not observed in :

A. He^+

B. Li^{2+}

C. Be^{3+}

D. in all cases

Answer: d

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6. The order of screeing effect of electrons of s, p, d and f orbitals of a given shell of an atom on its outer shell electrons is:

A. $s > p > d > f$

B. $f > d > p > s$

C. $p > d > s > f$

D. $f > p > s > d$

Answer: a

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7. Z_{eff} for 4s electron in $_{}(30)Zn$ I s:

A. 1.65

B. 4

C. 12.85

D. 4.35

Answer: d

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8. the value of Z_{eff} for Li^{+} is x and the value of z_{eff} for H-ataom is y then value of (x+y) is s:

A. 3.4

B. 3.7

C. 2.3

D. none of these

Answer: b

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9. Select the incorrect statement:

A. $Z_{eff}\left(Na^{+}\right) < Z_{eff}\left(Mg^{+2}\right)$

B. $Z_{eff}(He) < Z_{eff}\left(Be^{+2}\right)$

C. $Z_{eff}(Mg) = Z_{eff}(Ca)$

D. $Z_{eff}\left(Al^{+3}\right) < Z_{eff}\left(Na^{+}\right)$

Answer: d

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10. For an element , with the electrons configuration $1s^2 2s^2 2p^6 3s^2$ one of the 3s electrons will be shielded from nucleas change most effectively by A ,

A. 1s electron

B. 2s electron

C. 2p electron

D. 3s electron

Answer: a

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11. Find the shielding constant (a) for the first electron entering into H :

A. 0.7

B. 1

C. 0.35

D. 0.3

Answer: d

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12. Select the coorect statement regarding Slater rules .

A. Z_{eff} on 4s electron is more than 3d electron bacause it is filled completelty before 3d

B. In P atom ,1s electrons are more shielded than 2p electros

C. In Zn atom ,3d electrons provide effective shielding to 3s electrons

D. In Zn ,Z_{eff} on 3s and 3p electron is equal

Answer: d

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13. Z_{eff} for 4s electron in $_{}(30)Zn$ I s:

A. 11.25

B. 18.75

C. 25.65

D. 4.35

Answer: b

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14. The $Z_{\text{effective}}$ of 3^{rd} period element according to Slater's rule is :

(where n is the number of outermost shell electron)

A. $1.55 + 0.65n$

B. $1.35 + 0.65n$

C. $1.55 + 0.35n$

D. $1.45 + 0.30n$

Answer: a

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15. Opition in which shielding constant (According to Slater's rule) is 0.85 by each electron in alll inner shell (s) :

A. For outer most electron of Li

B. For outer most electron of Na

C. Both (a) and (b)

D. None of these

Answer: a

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Reasoning Type

1. Statement : Specific charge of α-particles is twice to that of proton .

Explanation : Specific charge is given by e/m

A. sattement -1 si true statement -2 is ture statement =-2 si correct explantion for statement -1

B. statement -1 si true statement -2 si true statement -2 is not a correct explation for statement -1

C. statement -1 si true statemention -1

D. statement -1 and statement -2 both are false .

Answer: d

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2. Assertion (A) : For $n = 3, l1$ may be $0, 1$ and 2 and m may be $0, \pm 1$ and $0, \pm 1$, and ± 2

Reason (R) : For each value of n, there are 0 to $(n-1)$ possible value of l for eachvalue of l , there are $0 \rightarrow \pm l$ valie of m

A. sattement -1 si true statement -2 is ture statement =-2 si correct explantion for statement -1

B. statement -1 si true statement -2 si true statement -2 is not a correct explation for statement -1

C. statement -1 si true statemention -1

D. statement -1 and statement -2 both are false .

Answer: a

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3. Statement : The possible number of electrons in a subshell is (4l + 2)`.

Explanation : The possible number of orientaions of a subshell are (2 l+ 1).

A. sattement -1 si true statement -2 is ture statement =-2 si correct explantion for statement -1

B. statement -1 si true statement -2 si true statement -2 is not a correct explation for statement -1

C. statement -1 si true statemention -1

D. statement -1 and statement -2 both are false .

Answer: a

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4. Statement-1 : The groundstate configuration of Cr is [Ar] $3d^5 4s^1$

Statement-2 : The energy of atom is lesser in $3d^5 4s^1$ configuration compared to $3d^4 4s^2$ configuration.

A. sattement -1 si true statement -2 is ture statement =-2 si correct explantion for statement -1

B. statement -1 si true statement -2 si true statement -2 is not a correct explation for statement -1

C. statement -1 si true statemention -1

D. statement -1 and statement -2 both are false .

Answer: a

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5. statement -1:- Minmum principal quantum number of an orbital belonging to g sub - shell is 5

Statement -2:- For a given value of principal auantum number (n) ,l may have values 0 to (n-1) only .

A. statement -1 is true statement -2 is true statement 2 is correct explanation for statement -1

B. statement -1 si true statement -2 si true statement -2 is not a correct explation for statement -1

C. statement -1 si true statemention -1

D. statement -1 and statement -2 both are false .

Answer: a

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6. Statement -1:- For n=2 the values of l may be 0,1 and m may be $0, \pm 1$.

Statement -2 :- for each value of n, there are 0 to (n-1) possible values of l for each value of la there are 0 to $\pm$ l values of m.

A. sattement -1 si true statement -2 is ture statement =-2 si correct explantion for statement -1

B. statement -1 si true statement -2 si true statement -2 is not a correct explation for statement -1

C. statement -1 si true statemention -1

D. statement -1 and statement -2 both are false .

Answer: a

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Multiple Objective Type

1. which of the following statement (s) is (are) correct ?

A. the eletronic configation of Cr ois [Ar]3d $4s^{-1}$ (Atomic number of Cr=24)

B. The magnetirc quantum number may have nagative values .

C. In silver atom ,23 electrons ,have a spin of one type and 24 of opposite type (atomic number of Ag=47).

D. d_{z^2} orbital has total 6 lobes .2 large lobes along Z-axis , while 4 very small lobes in Xy plane . Along X and Y axis

Answer: a,b,c

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2. Which of the following statement is//are correct for an electron of quantum numbers $n = 4$ and $m = 2$?

A. the value of l may be 2

B. the value of l may be $+\frac{1}{2}$

C. the value of s may be 0,1,2

D. the values of l may be 0,1,2

Answer: abc

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3. Which is true about an electron-

(a). rest mass of electron is $9.1 \times 10^{-28} g$

(b). mass of electron increases with the increase in velocity

(c). molar mass of electron is $5.48 \times 10^{-4} g / \text{mole}$

(d). e / m of electron is $1.7 \times 10^{8} \text{coulomb} / g$

A. Rest mass of electron is 9.1×10^{-28}g

B. Mass of electron increases with the increase in velocity

C. Molar mass of electron is 5.48×10^{-4} g/mole

D. e/m of electron is 1.7×10^{8} coulomb/g

Answer: a,b,c

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4. if element ${}_{,25} X + y$ has spain magnetric moment 1.732 B.M then:

A. number of unpaired electrons =1

B. unmber of unpaired electrons =2

C. Y=4

D. Y=6

Answer: a,b,c,d

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5. An isotope of $Ge\,{}^{76}_{32}$ is

A. $.^{77}_{32}Ge$

B. $.^{77}_{33}As$

C. $.^{77}_{34}Se$

D. $.^{78}_{34}Se$

Answer: a,d,

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6. When alpha particle are sent through a thin metal foil ,most of them go straight through the foil because

A. alpha particles are much heavier than electrons

B. alpha paritcles are positively charged

C. most part of the atom is an empty space

D. alpha particles move with high speed

Answer: a,c

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7. Choose the correct configuration among the following :

A. $Cr(Z=24)[Ar]3d^5 4s^1$

B. $Cu(Z=29)[Ar]3d^{10}4s^1$

C. $Pd(Z=46)[Kr]4d^{10}5s^0$

D. $Pt(Z=78)[Xe]4f^{14}5d^9 6s^1$

Answer: a,b,c,d

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8. the configuration $[Ar]3d^{10}4s^24p^4$ is simmilar to that of :

A. Boron

B. oxygen

C. sulphur

D. aluminium

Answer: c

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9. In which of these options do both consituents of the pair have the same magnetic moment-

A. Mn^{2+} and Cu^{+}

B. Co^{2+} and Ni^{2+}

C. Mn^{4+} and Co^{2+}

D. Mg^{2+} and Sc^{+}

Answer: (a,c)

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10. Many elements have non-integral atomic masses because

A. they have isotopes

B. they isotopes have non-intergral masses

C. their isotopes have different masses

D. the consitiuents neutrons ,protein and combine to give fractional masses

Answer: c

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11. Which of the following is iso-electronic with neon-

A. O^{2-}

B. F^{-}

C. Mg

D. Na

Answer: a,b

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12. the number of d- electrons in Mn^{2+} is equal to that of :

A. p- electrons in N

B. s- electrons ion Na

C. d- electrons in Fe^{+3}

D. p- electrons in O_{-2}

Answer: b,c

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13. which of the following pair(s) represents (s) the isoeleronts species ?

A. S^{2-} and Sc^{3+}

B. SO_2 and NO_3^-

C. N_2 and CN^-

D. NH_3 and H_3O^+

Answer: ab,c,d,

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14. which of the following elements have equal value of $l \times m$, where l $\Rightarrow$ maximum possible value of azimuthal quantum number ,m $\Rightarrow$

maximum quantum number [consider values of 'l' and 'm' for filled orbitals only]?

A. Na

B. Ca

C. Al

D. Ga

Answer: a,b,c,

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15. Which of the following order is /are incorrect ?

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16. in which of the following orbitals , there si non- zero probaility of finding the eleectron in the xy plane ?

A. p_x

B. d_{yz}

C. $d_{x^2-y^2}$

D. p_z

Answer: a,c,

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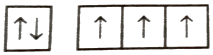
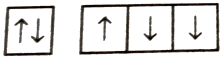
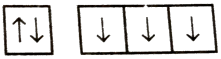
17. the ground state valence shell electrons configuration of nitrogen atom can be represnted as :

A. (a) 

B. (b) 

C. (c) 

D. (d) 

Answer: a,d,

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18. Number of nodal planes in $3d_{xy}$ orbital is same as that in :

A. $3p_y$ orbital

B. $4d_{xy}$ orbital

C. $3d_{x^2-y^2}$ orbital

D. $3d_{yz}$ orbital

Answer: b,c,d,

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19. Select the correct match of species against its property

	species	Property
(a)	Fe	spain multiplicity=5
(b)	Cr	spain only magnetic moment =6.93BM
(c)	Cu	Paramagnetic
(d)	Co	spain only magnetic moment =3.87BM

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20. select the inmpossible set of quantum numbers

A. $\begin{array}{cccc} & n & l & m & s \\ (a) & 4 & 0 & -1 & +\frac{1}{2} \end{array}$

B. $\begin{array}{cccc} & n & l & m & s \\ (b) & 3 & 3 & +2 & -\frac{1}{2} \end{array}$

C. $\begin{array}{cccc} & n & l & m & s \\ (c) & 3 & 1 & 0 & -\frac{1}{2} \end{array}$

D. $\begin{array}{cccc} & n & l & m & s \\ (d) & 2 & 1 & -1 & +\frac{1}{2} \end{array}$

Answer: a,b

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21. Species X with mass number 37 contains 11.1 % more neutrons as compared to electrons , then what is the incorrect repesentation of element x?

A. ${}_{17}^{37}Cl^{-}$

B. ${}_{17}^{37}Cl$

C. $_{17}^{35}Cl^{-}$

D. $_{17}^{35}Cl$

Answer: b,c,d,

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22. Ozone is isoeletronic with :

A. NOF

B. NO_2^-

C. $NOCl$

D. N_3^-

Answer: a,b,c,

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23. Identify those which are isoosteric with each other :

A. Na^{+}

B. Mg^{2+}

C. Al^{+3}

D. O^{2-}

Answer: a,b,c,d

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24. identify the element which are isotones of of $._{8}O^{16}$:

A. $._{7}N^{14}$

B. $._{7}N^{15}$

C. $._{6}C^{14}$

D. $._{9}N^{17}$

Answer: b,c,d,

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25. N_2 is isoelectronic with :

A. CO

B. NO^+

C. C_2H_2

D. CH_4

Answer: a,b

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26. what is the degeneracy of :

1st excited state of CL=X

2nd excited state of Cl=y

1st excited state of H=z

Find the value of y+z-x=t

t is the degeneracy of :

A. 2nd excited state of H^-

B. 1st excited state of Li

C. 1st excited state of Li^+

D. 2nd excited state of He

Answer: a,b,d

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27. which of the following statement are correct about orbitals ?

A. A large number of orbitals are possible in an atom

B. Orbitals can be distguished by their size shape and orientation

C. An orbital of smaller size means their is more chance of finding it near the nucleus

D. shape and orientation means that there is more probability of finding the electrons along certain direction than along others

Answer: a,d,

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28. Select correct option(s) for ${}_{16}^{32}S^{-2}$:

A. atomic number =16

B. number of neutrons =16

C. mass number =32

D. total number of electrons =18

Answer: a,b,c,d

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29. Which of the following species having same value of σ^* (Screening constant) for 2s electrons?

A. F

B. Na

C. Cl

D. Zn

Answer: a,b,c,d

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Comprehension Type

1. Azimuthal quantum number (l): it desiibes the shape of electron cloud and the number of sub- shells in a shell .

it can have values from 0 to (n-1)

value of l	subshell	
0	s	
1	p	Number of obitals in a subsjhell = 2l +1
2	d	
3	f	

Orbital angular momentum $L = \frac{h}{2\pi}\sqrt{l(l+1)}$

$h\sqrt{l(l+1)}$ $\left[h = \frac{h}{2\pi}\right]$ magb=netic quantum number (m) :

it desicribes the orientations of the orbitals .It can have values from -l to + l including zerop i.e total (2l+1) values . Each value corresponds to an ot=rbital s- subshell has one orbital ,p - subshell three orbitals $\left(P_x, P_y \text{ and } P_z\right)$ d- subshell five orbitals $\left(D_{yz}, d_{yz}, d_{zx}, d_{x^2-y^2}, d_{z^2}\right.$ and f- subshelll has seven orbtials .

Spin quantum number (s) :

It desiibes the spin of the electron , it has values $+\frac{1}{2}$ and $-\frac{1}{2}$ Signifies clock wise spining and anticlock wise rotion of electron about its Own axis . Spin of the electron produes spin angluar momentum equal to

$S = \sqrt{s(s+1)}\frac{h}{2\pi}$, where$s = +\frac{1}{2}$

total of the an atom $= +\frac{n}{2}$ or $-\frac{n}{2}$

WHere n is the number of unpaired electron s .

the magnetic moment of an atom

$\mu_s = \sqrt{n(n+2)}B.M$

n- number of unpaired electron s

B.M (Bohr magenton)

A d- block element has total spin value of `+3 or -3 then the magnetic moment of the element is approxmately:

A. 2.83 B.M

B. 3.87 B.M.

C. 5.9 B.M

D. 6.93 B.M

Answer: d

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2. Azimuthal quantum number (l): it desiibes the shape of electron cloud and the number of sub- shells in a shell .

it can have values from 0 to (n-1)

value of l	subshell	
0	s	
1	p	Number of obitals in a subsjhell = 2l +1
2	d	
3	f	

Orbital angular momentum $L = \frac{h}{2\pi}\sqrt{l(l+1)}$

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WHere n is the number of unpaired electron s .

the magnetic moment of an atom

$\mu_s = \sqrt{n(n+2)}B.M$

n- number of unpaired electron s

B.M (Bohr magenton)

Magnetic moment of $_{25}Mn^{x+}$ is $\sqrt{15}$ then the value of x is :

A. 1

B. 2

C. 3

D. 4

Answer: d

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3. Azimuthal quantum number (l): it desiibes the shape of electron cloud and the number of sub- shells in a shell .

it can have values from 0 to (n-1)

value of l	subshell	
0	s	
1	p	Number of obitals in a subsjhell = 2l +1
2	d	
3	f	

Orbital angular momentum $L = \frac{h}{2\pi}\sqrt{l(l+1)}$

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total of the an atom $= +\frac{n}{2}$ or $-\frac{n}{2}$

WHere n is the number of unpaired electron s .

the magnetic moment of an atom

$\mu_s = \sqrt{n(n+2)}B.M$

n- number of unpaired electron s

B.M (Bohr magenton)

Magnetic moment of $_{26}Fe^{2+}$ ion is same as :

A. ${}_{26}Fe$

B. ${}_{24}Cr^{2+}$

C. ${}_{28}NI^{4+}$

D. All of these

Answer: d

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4. Azimuthal quantum number (l): it desiibes the shape of electron cloud and the number of sub- shells in a shell .

it can have values from 0 to (n-1)

value of l	subshell	
0	s	
1	p	Number of obitals in a subsjhell = 2l +1
2	d	
3	f	

Orbital angular momentum $L = \frac{h}{2\pi}\sqrt{l(l+1)}$

$h\sqrt{l(l+1)}$ $\left[h = \frac{h}{2\pi}\right]$ magb=netic quantum number (m) :

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$S=\sqrt{s(s+1)} \frac{h}{2 \pi}$, where $s=+\frac{1}{2}$

total of the an atom $=+\frac{n}{2}$ or $-\frac{n}{2}$

WHere n is the number of unpaired electron s .

the magnetic moment of an atom

$\mu_s=\sqrt{n(n+2)} B . M$

n- number of unpaired electron s

B.M (Bohr magenton)

orbit angulaar momentum of an electron is $\sqrt{3} \frac{h}{\pi}$ then , the number of different orientations of this orbital in space are:

A. 3

B. 5

C. 7

D. 9

Answer: c

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5. Azimuthal quantum number (l): it desiibes the shape of electron cloud and the number of sub- shells in a shell .

it can have values from 0 to (n-1)

value of l	subshell	
0	s	
1	p	Number of obitals in a subsjhell = 2l +1
2	d	
3	f	

Orbital angular momentum $L = \frac{h}{2\pi}\sqrt{l(l+1)}$

$h\sqrt{l(l+1)}$ $\left[h = \frac{h}{2\pi}\right]$ magb=netic quantum number (m) :

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$S=\sqrt{s(s+1)} \frac{h}{2 \pi}$, where$s=+\frac{1}{2}$

total of the an atom $=+\frac{n}{2}$ or $-\frac{n}{2}$

WHere n is the number of unpaired electron s .

the magnetic moment of an atom

$\mu_s=\sqrt{n(n+2)} B . M$

n- number of unpaired electron s

B.M (Bohr magenton)

the correct order of the magnetic moment is :

$\left[{ }_{25} Mn,{ }_{26} Cr,{ }_{26} Fe\right]$

A. $Fe^{3+}>Cr^{3+}=Mn^{4+}$

B. $Fe^{3+}>Cr^{3+}>Mn^{4+}$

C. $Fe^{3+} = Cr^{3+} > Mn^{4+}$

D. $Fe^{3+} > Mn^{4+} > Cr^{3+}$

Answer: a

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Comprehension Type 2

1. Quantum number is address of an electron in amy atom . They are of four types :

(A) Principal quantum number (n)

(b) Azimuthal quantum number (l)

(c) Magnetic quantum number (m)

(d) spin quantum number (s)

prinicial quantum tells us the number of shells . Azimuthal quantum number tells is the name o f sub - shell ./ FOr s,p,f:l = 0,1,2,3 respectively .Magnetic quantum number represents the orientation of sub shell and

spn wuantum number repesents the quantum spin states .

Elemetn A has principal quantum number 2 for last electron and it has 3 electrons in valence shell and element B has prinvipal quantum number 3 for last electron and it has 7 electrons in avalence shell . the single central atom) will be :

A. 120°

B. 90°

C. 180°

D. 60°

Answer: a

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Comprehension Type 3

1. Quantum number is address of an electron in amy atom . They are of four types :

(A) Principal quantum number (n)

(b) Azimuthal quantum number (l)

(c) Magnetic quantum number (m)

(d) spin quantum number (s)

prinicial quantum tells us the number of shells . Azimuthal quantum number tells is the name o f sub - shell ./ FOr s,p,f:l = 0,1,2,3 respectively .Magnetic quantum number represents the orientation of sub shell and spn wuantum number repesents the quantum spin states .

which opition is not correct accoding to quantam number ?

A. $n = 2, l = 0, m = 0, s = -\frac{1}{2}$

B. $n = 1, l = 1, m = 0, s = -\frac{1}{2}$

C. $n = 2, l = 1, m = 0, s = +\frac{1}{2}$

D. $n = 3, l = 2, m = 0, s = -\frac{1}{2}$

Answer: b

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2. Quantum number is address of an electron in amy atom . They are of four types :

Principal quantum number (n)

Azimuthal quantum number (l)

(c) Magnetic quantum number (m)

(d) spin quantum number (s)

prinicial quantum (n) :

(a) Denoted by n.

(b) it can have any positive interger values like 1,2,3,.....

Azimuthal quantum number or angulart momentum quantum number or subsidiary quantum number (l)

(a) Denoted by l.

(B) l can have any value from 0,1,2,... to (n-1) for each value of n

value of l	0	1	2	3	4	5
Notation of subshell	s	p	d	f	g	h

MAgnetic quantum number (m or M_l): (a) Denoted by m or m_1

(B) it can have any value from -l to +l inckluding 0, for each value of l.

Spin quantum number (s or m_s) :

The value of s is $+\frac{1}{2}$ and $-\frac{1}{2}$ which two quantum spin states .

Maximum electrons in n= 3 in Fe atom are :

A. 6

B. 12

C. 14

D. 8

Answer: c

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Comprehension Type 4

1. Quantum number is address of an electron in amy atom . They are of four types :

Principal quantum number (n)

Azimuthal quantum number (l)

(c) Magnetic quantum number (m)

(d) spin quantum number (s)

prinicial quantum (n) :

(a) Denoted by n.

(b) it can have any positive interger values like 1,2,3,.....

Azimuthal quantum number or angulart momentum quantum number or subsidiary quantum number (l)

(a) Denoted by l.

(B) l can have any value from 0,1,2,... to (n-1) for each value of n

value of l	0	1	2	3	4	5
$\text{Notation of subshell}$	s	p	d	f	g	h

MAgnetic quantum number (m or M_l): (a) Denoted by m or m_1

(B) it can have any value from -l to +l inckluding 0, for each value of l.

Spin quantum number (s or m_s) :

The value of s is $+\frac{1}{2}$ and $-\frac{1}{2}$ which two quantum spin states .

Maximum number of electrons in Ne atom with $s = -\frac{1}{2} is$:

A. 4

B. 5

C. 6

D. 7

Answer: b

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Comprehension Type 5

1. Quantum number is address of an electron in amy atom . They are of four types :

Principal quantum number (n)

Azimuthal quantum number (l)

(c) Magnetic quantum number (m)

(d) spin quantum number (s)

prinicial quantum (n) :

(a) Denoted by n.

(b) it can have any positive interger values like 1,2,3,.....

Azimuthal quantum number or angulart momentum quantum number or subsidiary quantum number (l)

(a) Denoted by l.

(B) l can have any value from 0,1,2,... to (n-1) for each value of n

value of l	0	1	2	3	4	5
Notation of subshell	s	p	d	f	g	h

MAgnetic quantum number (m or M_l): (a) Denoted by m or m_1

(B) it can have any value from -l to +l inckluding 0, for each value of l.

Spin quantum number (s or m_s) :

The value of s is $+\frac{1}{2}$ and $-\frac{1}{2}$ which two quantum spin states .

Maximum number of electrons in Na with l=0:

A. 5

B. 6

C. 7

D. 8

Answer: a

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2. Wave function of electrons I natoms arae called atomic orbitals Atoms orbital s are labelled as three quantum number n,l,m.

which orbitals have two directional lobes , which can point in three possiable directions ?

A. All orbitals which have n=2

B. All orbitals which have l=2

C. All orbitals which m=- 1/0 +1

D. All orbitals which have l=1

Answer: d

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Comprehension Type 4

1. Quantum number area assigned to get complete inforamtion of electrons regarding their energy engular momentum ,spectral lines etc. Four quantum number are known i.e pricipal quantum numbers which tell the diatence shell and its angular momentum .Azimuthal and of courase shape of orbital , Magnetic qunatum number deals with syudy of

orientations or deganeracy of a subshell . spin quantum number defines te spin of electrons designaated as $+\frac{1}{2}$ or $-\frac{1}{2}$ respresented by 123 and 123 respectively .

Electrons are filled in oritals and Hun's rule of maximum multicity .

Two unpaired electrons present in carbon atom are different with respect to their :

A. pricipal quantum number

B. azimuthal quantum number

C. Magnetic quantum number

D. spin quantum number

Answer: c

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Comprehension Type 5

1. Quantum number area assigned to get complete inforamtion of electrons regarding their energy engular momentum ,spectral lines etc. Four quantum number are known i.e pricipal quantum numbers which tell the diatence shell and its angular momentum .Azimuthal and of courase shape of orbital , Magnetic qunatum number deals with syudy of orientations or deganeracy of a subshell . spin quantum number defines te spin of electrons designaated as $+\frac{1}{2}$ or $-\frac{1}{2}$ respresented by 123 and 123 respectively .

Electrons are filled in oritals and Hun's rule of maximum multicity .

Number of electrons having the quantum numbers n=4, l=0, $s = -\frac{1}{2} \in Zn^{+2}$ ion is /are :

A. 1

B. 0

C. 2

D. 5

Answer: b

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Comprehension Type 6

1. Quantum number area assigned to get complete inforamtion of electrons regarding their energy engular momentum ,spectral lines etc. Four quantum number are known i.e pricipal quantum numbers which tell the diatence shell and its angular momentum .Azimuthal and of courase shape of orbital , Magnetic qunatum number deals with syudy of orientations or deganeracy of a subshell . spin quantum number defines te spin of electrons designaated as $+\frac{1}{2}$ or $-\frac{1}{2}$ respresented by 123 and 123 respectively .

Electrons are filled in oritals and Hun's rule of maximum multicity .

spin angular momentum for unpaires electron in sodium (Atomic No =11) is :

A. $\frac{\sqrt{3}}{2}$

B. $0.866\frac{h}{2\pi}$

C. $-\frac{\sqrt{3}}{2}\frac{h}{2\pi}$

D. none of these

Answer: b

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Comprehension Type 6

1. Wave function of electrons I natoms arae called atomic orbitals Atoms orbital s are labelled as three quantum number n,l,m.

Select invalid set of quantum number for any electrons in ground state electromns configuration of potassium :

A. $n=4, l=0, m=0, s=+\frac{1}{2}$

B. $n=3, l=1, m=0, s=+\frac{1}{2}$

C. $n=3, l=2, m=0, s=+\frac{1}{2}$

D. $n=2, l=1, m=-1, s=-\frac{1}{2}$

Answer: c

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Match The Coulumn

1. Match column -I with column -II and select the correct answer using the codes given below in the listes (n,l and m are respectively the principla azimuthal and magnetic quantum no .)

	column$-I$		column-II
(a)	number of values of l for the an energy level(n)	(p)	$0.1.2.\ldots..(n-1$
(b)	values of l for a particular type of orbit	(q)	$+l$to -l therpou
(c)	Number of values of m for l=2	(r)	5
(d)	values of m	(s)	n

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2.

	column$-I$		column-II
(a)	Same number of unpaired electrons are present in	(p)	$Na^+.Mg^{2+}$
(b)	same number of electrions in s and p subhshells.	(q)	$F^-.Mg.O$
(c)	Same number of electrons with l=1	(r)	Mg,Ne,O^{2-}

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3. (l and m are resecctively the azimuthal and megentic quantum numbers)

	column$-I$		column-II
(a)	total number of values of (l) for a shell	(p)	$0,1,\ldots. (n-1)$
(b)	values of (l) for a shell	(q)	$+l\ldots. , +2, +$
(c)	total number of values of (m) for a subshell	(r)	$(2l+1)$
(d)	values of (m) for a subshell	(s)	n

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4.

	column$-I$
(a)	No. of electrons in Na (11)having m=0
(b)	No. of electrons in s (16)having (n+l)=3
(c)	No . of maximum possible electrons having $s=+\frac{1}{2}$spin inCr(24)

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5.

	column$-I$		column-II
(a)	Fe^{2+}	(p)	Set of quantum no . for laste^- is$n=2, l=1,$
(b)	Mn^{+4}	(q)	magnetic moment (μ) = zero
(c)	Zn^{+2}	(r)	Spin muliplicaity (SM)=4
(d)	Na^+	(s)	total no. of exchange pairs in 3d - subshell =10
		(t)	paramagnetic species

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6.

	column$-I$		column-II
(a)	change on electrons (magnitude)	(p)	$1.6022 \times 10^{-19} C$
(b)	ed/m_e	(q)	$1.758820 \times 10^{11} CKg^1$
(c)	mass of prton . m_p	(r)	$1.00867u$
(d)	Mass of nueutronm_n	(s)	$1.00727u$
		(t)	4.8×10^{-10}esu

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7.

	column$-I$
(a)	the peoperty of metal that allows it tio be drawn into wire
(b)	A single particle composed of two or more identical atoms
(c)	A Property that can be observed without changing the chemical forı
(d)	A subshell that cannot be broken down into simple substances

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8.

	column$-I$		column-II
(a)	31.4 % more neutrons as compared to protons	(p)	${}^{14}_{7}N$
(b)	11.1 % more neutrons than electrons	(q)	${}^{56}_{26}Fe^{3+}$
(c)	30.4 % more neutrons than electrons	(r)	${}^{37}_{17}Cl^{-}$
(d)	Same number of neutrons and protons	(s)	${}^{81}_{35}Br$

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Subjective Type

1. find out the maximumm value of n+l+ m for 5d electron .

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2. An electrons resdes in a subshell which has 7 number associated with this subshell has minimum possible value find the sum of n and l for this electron.

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3. Calculate the total number of electrons for Mn having n+l+m=2

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4. Find the number of electrons are there in NI^{2+} ion which are having the (+1) value of magnetic quantum number (m) ?

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5. How many unpaired electrons are there in Ni^{2+}?

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6. the maximum number of electrons that can be accommodarted in all the ortbitals for which l=3 is .....

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7. in species X^{2+} , the mass number is 20 and number of neutrons are 10 , then calculate the number of electrons in species X^{2+}.

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8. the magnetic moment value of species X is 4.48 B.M fnd out the number of unpaired electrons In X .

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9. Find the difference between Z_{eff} of 4s and 3d electrons of Sc.

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10. Calculate the total number of p-orbitals electrons present in Ag (47) atoms.

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11. The mass number of element 'X' is 'A' . If X^{4-} contains 10 electrons and 6 neutrons , then the value of $\frac{A}{3}$ is

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12. Calcualate the value of Z_{eff} on 3d electrons of Sc .

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13. calculate the difference between th Z_{eff} exerenced by ouutermost electrons in Na and K.

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14. for a hydrothertical atom find out the total number of electrons that arae filled in between 9s and 9p subshell if spin qunatum have $\left(-\frac{1}{2}, 0, +\frac{1}{2}\right)$ there values .

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15. Find the number of electrons in Pd having $n \times l = 0$and $|m| > 1$

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16. (p) if azimythal quantum number value is 3, the maximum value of spin multiplicity is x.

(Q) if values of priecipal quntum number azimuthal quantum number ,magnetic of unpared electrons present in copper will be :

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17. n+l +m for the valence electrons of rb will be (where n,l,m, are prinicipal quantum number azimuthal qunatum number magnetic quantum number respectivley):

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18. If aufbau's rule is not followed and electrons foilling if done shell after shell ,then number of unpaired electrons present in copper will be ,

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19. Maximum number of electrons having quantum numbers

$n = 5, |m_1| = 2, m_s = -\frac{1}{2}$

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20. The first excited state of Cl^- will have the energy of :

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21. the number of species which are dimagnetic amongest the following :

$Fe^{2+}, Fe^{4+}, Mn^{2+}, Cr^{3+}$

$Ni^{2+}, Cr^{+6}, Mn^{+7}, V^{3+}, Sc^{3+}$

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22. H -atom have infinite shells , write total number fo shells which does not contain f- subshell .

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23. Calculate z_{eff} for last valece shell electrons in fluroine (f) Give answer after multiphying by 10.

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24. in multielectric atom , maximum number of degeneratye orbitals present in 3rd shell :

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25. How many maximum electromns are present in a d- orbital ?

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26. A certain anion carries -9.6×10^{-10} coulombs fo static electric charge calcualate the number of electrons charges present on it

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27. An element has same number od neutrons as total number of protions or electros , what will be the neutron excess ?

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28. Am elements si respesented by (A,Z) e.g NI_{28}^{60} can be written as (60,28) Among the following find the total number of possible isotpic pairs formed by the given atoms (232,84),(228,90),(228,90),(214,82),9218,88_, (216,84),9210,84),(213,84) .

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29. find the number of elements which are iosfiapher of ${}_{92}U^{238}$ ${}_{93}Th^{234}$, ${}_{90}TH^{232}$, ${}_{93}Np^{237}$, ${}_{96}Cm^{247}$

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30. Find the number of isobaric pairs for the elements repesented by (A,z)

(232,90),(228,88),(228,89),(214,82),(218,84),(210,81),(216,85),(207,82),(211,83):

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31. find the number of elements which arae iosfiaphers of $_{89}A^{227}$ An element is respresented as (A.Z)

(231,91),(223,87),(227,90),(223,88_),(219,85),(215,83),(215,84),(207,82),(211,83),

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32. not considering the electronic spin the deggenercy of the degeneracy of the second excited state of H^- is :

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33. Find the maximum number fo electrons which can have $m_9 s) > 0$, but $m_l < o$ for n=4

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34. Find the number of sets of isosters

$(N_2, CO), (N_2O, CO_2), (HF, OH), (B_3N_3H_6, C_6H_6)$

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Others

1. Slater's rule is used to calculare the shielding constant (σ) in multielectron systemnm and the electronic configuration the element in the following order and groupings :

$(1s), (2s, 2p), (3s, 3p), (4s, 4p), (4d), (4f), (5s, 5p), etc.$

in which of the following element outer shell s electrons and penultimate shell d electron does not experience same Z effective value ?

A. La

B. Y

C. Sc

D. Zn

Answer: d

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2. the effective nuclear cvhange (Z_{eff}) takes into account the interelectronic repulsisons in mutielectrons atoms Slaer's rules help us in evaluting z_{eff} fopr various species Apply Slter's Rules to answer the following questions :

Z_{eff} for 3d valence of Zn =x

Z_{eff} for 3dvalence of $Zn^{2+} = y$Z_("eff") for valrce of $Zn = z$

choose the correct option (s) :

A. a $>$ c

B. a $>$ b

C. b $>$ c

D. Both (A)and (b)

Answer: d

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3. Isoeletronic species have same number of valence electrons or same number of total electrons as well as same number of artoms ideentfiy the pair of isooters among the following :

A. N_2O, CO_2

B. N_2, CO

C. $O_3, NOLi_3$

D. Both (a)s and (b)

Answer: d

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4. imagnine a universe in which :

(A) Prinicipal quantum n can have values from 1,2,3,.....∞.

(b) Azimuthal quantum no. l can have values from 1 to n+1 correspoding to A,B,C,D,E,F,.....

(c) magntriic quantum no m can have interal values from $-\frac{l}{2}$to $+\frac{l}{2}$ (including zero if possible).

(d) spin quantum no s can have 6 possible values .

All rules of filling remains intact .

what will be the atomic no of the element in which lst e^- fills 2 nd shell commpletlty ?

A. 38

B. 57

C. 76

D. 96

Answer: d

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5. imagnine a universe in which :

(A) Prinicipal quantum n can have values from 1,2,3,.....∞.

(b) Azimuthal quantum no. l can have values from 1 to n+1 correspoding to A,B,C,D,E,F,.....

(c) magntriic quantum no m can have interal values from $-\frac{l}{2}$to $+\frac{l}{2}$ (including zero if possible).

(d) spin quantum no s can have 6 possible values .

All rules of filling remains intact .

what is the maximum e^- capcity of a shell for which $n = 4$?

A. 32

B. 96

C. 114

D. 64

Answer: c

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6. imagnine a universe in which :

(A) Prinicipal quantum n can have values from 1,2,3,.....∞.

(b) Azimuthal quantum no. l can have values from 1 to n+1 correspoding to A,B,C,D,E,F,.....

(c) magntriic quantum no m can have interal values from $-\frac{l}{2}$to $+\frac{l}{2}$ (including zero if possible).

(d) spin quantum no s can have 6 possible values .

All rules of filling remains intact .

what will be the last shell for an elemets having Z=117 ?

A. n=3

B. n=4

C. n=5

D. n=6

Answer: b

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7. information :

(a) prinicipal qunatum no n is defined as 1,2,3,.....

(b) Azimuthal quantum no .l hdefind as 1 to n +2 in integral steps .

(c) magntic quantum no m is defind as $-\frac{1}{2}\text{to}\ \ +\frac{1}{2}$ (including zero oif any , in in intergral steps).

(d) spin quntum no s has six possible values $\left(-2,\ -1,\ -\frac{1}{2},\ +\frac{1}{2},\ +1,\ +2\right)$.

(e) the subshell corresponding to l=1,2,3,4,5..... designeted as F,GltH,I,J,K.... respectively ,

(f) the values of m for given values of l give the number of orbitals in a sub-shell .

(g) the prionciple for filling of E^{-} in the shells remins unchanged .

for the elelment having atomic no 43 last e^{-} emters in:

A. 1G

B. 2G

C. 2F

D. 1H

Answer: d

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8. information :

(a) prinicipal qunatum no n is defined as 1,2,3,.....

(b) Azimuthal quantum no .l hdefind as 1 to n +2 in integral steps .

(c) magntic quantum no m is defind as $-\frac{1}{2}\text{to}\ \ +\frac{1}{2}$ (including zero oif any , in in intergral steps).

(d) spin quntum no s has six possible values $\left(-2,\ -1,\ -\frac{1}{2},\ +\frac{1}{2},\ +1,\ +2\right)$.

(e) the subshell corresponding to l=1,2,3,4,5..... designeted as F,GltH,I,J,K.... respectively ,

(f) the values of m for given values of l give the number of orbitals in a sub-shell .

(g) the prionciple for filling of E^- in the shells remins unchanged .

the no fo orbital and maximum no of e^- that can be filled in a J- subshell respectively will be :

A. 6,36

B. 5,30

C. 4,24

D. 7,24

Answer: a

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9. if values of quantum number can be considered as follow : n=1,2,3,.....∞

l=- to (n+1)

m=- l to +l (interfral values incleuding zero)

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

According to above consideration the maximum number of electrons that can be accomodated in g -orbital of the foruth shell is :

A. 18

B. 9

C. 2

D. 22

Answer: c

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