CHEMISTRY

RESONANCE ENGLISH

ATOMIC STRUCTURE

Physical Chemistry Atomic Equilibrium

1. The magnetic moment of $._{25}Mn$ in ionic state is $\sqrt{15}B.M$, then Mn is in:

A. 1

B. 2

C. 3

D. 4

Answer: 4

2. The spin only magnetic of Cr^{3+} in aqueous solution would be :

A. $\sqrt{3}B.\,M.$

B. $\sqrt{15}B.\,M.$

C. $\sqrt{8}B.\,M.$

D. $\sqrt{35}B.\,M.$

Answer: 3

3. $\psi^2 = 0$ represent

A. node

B. orbital

C. zero amplitude of wave

D. wave function

Answer: A

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4. Observe the following statements regarding isotones :

$a.$ $.^{39} K$ and $.^{40} Ca$ are isotones.

$b.$ Nucleides having different atomic number (Z) and mass numbers (a) but same number of neutrons (n) are called isotones.

$c.$ $.^{19} F$ and $.^{23} Na$ are isotones.

The correct answer is $-$

A. $a, b,$ and c are correct

B. Only a and b are correct

C. Only a and c are correct

D. Only b and c are correct.

Answer: 2

5. If n_1 and n_2 are the boundary value principal quantum numbers of a portion fo spectrum of emission spectrum of H atom, determine the wavelength (in metre) corresponding to last line (longest λ) . Given : $n_1 + n_2 = 7, n_2 - n_1 = 3$ and $R_H = 1.097 \times 10^7 m^{-1}$. (Give your answer in multiple of 10^{-6})

A. 0.8

B. 0.4

C. 0.1

D. 0.15

Answer: 2

6. What is the potential energy of an electron present in $N-$ shell of the Be^{3+} ion ?

A. $-3.4eV$

B. $-27.2eV$

C. $-13.6eV$

D. $-6.8eV$

Answer: 2

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7. In which of the following transition, the wavelength will be minimum :

A. $n = 6$ to $n = 4$

B. $n = 4$ to $n = 2$

C. $n = 3$ to $n = 1$

D. $n = 2$ to $n = 2$

Answer: 3

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8. The ratio of kinetic energy and potential energy of an electron in a Bohr orbit of a hydrogen $-$ like species is :

  A. $1/2$

  B. $-1/2$

  C. 1

  D. -1

Answer: 2

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9. Total Number of unpaired electrons in $d-$ orbitals of an atom element of atomic number 29 is :

A. Ten

B. One

C. Zero

D. Five

Answer: 3

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10. Photons of minimum energy $496k, J. \, mol^{-1}$ are needed to an atoms. Calculate the lowest frequency of light that will ionize a sodium atom.

A. $12.4 \times 10^{14} s^{-1}$

B. $1.24 \times 10^{15} s^{-1}$

C. $2.48 \times 10^{15} s^{-1}$

D. $2.48 \times 10^{14} s^{-1}$

Answer: 2

11. According to Bohr's model, if the kinetic energy of an electron in 2nd orbit of He^+ is x, then what should be the ionisation energy of the electron revolving in $3rd$ orbit of M^{5+} ion

A. x

B. $4x$

C. $x/4$

D. $2x$

Answer: 2

12. Last line of Lyman series for $H-$ atom has wavelength $\lambda_1 A$, 2nd line of Balmer series has wavelength $\lambda_2 A$ then

A. $\dfrac{16}{\lambda_1} = \dfrac{9}{\lambda_2}$

B. $\dfrac{16}{\lambda_2} = \dfrac{3}{\lambda_1}$

C. $\dfrac{4}{\lambda_1} = \dfrac{1}{\lambda_2}$

D. $\dfrac{16}{\lambda_1} = \dfrac{3}{\lambda_2}$

Answer: 2

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13. Which electronic level would allow the hydrogen atom to absorb a photon but not to emit a photon?

A. $3s$

B. $2p$

C. $2s$

D. $1s$

Answer: 4

14. Number of nomal planes (planes of zero electron densit) in the d_{xy}

orbital is

A. 1

B. 2

C. 0

D. 4

Answer: 2

15. The uncertainty in position and velocity of the particle are $0.2mm$ and

$10.54 \times 10^{-27} ms^{-1}$ respectively then the mass of the particle is

$: \left(h = 6.625 \times 10^{-34} Js \right)$

A. 48.86g

B. 30.86g

C. 24.86gm

D. 100g

Answer: 3

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16. A particle initially at rest having charge q coulomb, & mass mkg is accelerated by a potential difference of V volts. What would be its $K.E.$ & de broglie wavelength respectively after acceleration.

A. $qV, \dfrac{h}{\sqrt{2qVm}}$

B. $\dfrac{h}{\sqrt{2qVm}}, qV$

C. $qV, \dfrac{h}{mV}$

D. $\dfrac{h}{mV}, qV$

Answer: 1

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17. The number of possible lines of Paschenc series when electron jumps from 7th excited state to ground state (in hydrogen like atom) is :

A. 2

B. 5

C. 4

D. 3

Answer: 2

---

18. AIR service on Vividh Bharati is transmitted on $219m$ band. What is its transmission frequency in Hertz ?

A. $1.37 \times 10^6 Hz$

B. $1.37 \times 10^5 Hz$

C. $1.37 \times 10^7 Hz$

D. $2.74 \times 10^5 Hz$

Answer: 1

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19. Calculate the minimum and maximum number of electrons which may

have magnetic quantum number $m = +1$ and spin quantum number

$s = +\dfrac{1}{2}$ in chromium (Cr)

(a)0,1

(b)1,2

(c)4,6

(d)2,3

A. 3, 2

B. 6, 4

C. 4, 2

D. 2, 1

Answer: 1

20. In the emission spectrum of $H-$ atom from energy level $'n'$ to ground state in one more step, no line belonging to the Brackett series is observed. The wave number of lines belonging to Balmer series may be

A. $\dfrac{8R}{9}, \dfrac{5R}{36}$

B. $\dfrac{3R}{16}, \dfrac{8R}{9}$

C. $\dfrac{5R}{36}, \dfrac{3R}{16}$

D. $\dfrac{3R}{4}, \dfrac{3R}{16}$

Answer: 3

21. The ionisation energy of H is $13.6eV$. Calculate the ionization energy of Li^{2+} ions.

    A. $54.4eV$

    B. $122.4eV$

    C. $244.8eV$

    D. $108.8eV$

Answer: B

22. If Photon having wavelength $6.2nm$ was allowed to strike a metal plate having work function $50eV$ then calculate wavelength associated with emitted electron :

A. $1 \times 10^{-10} m$

B. $2 \times 10^{-10} m$

C. $3 \times 10^{-18} m$

D. $4 \times 10^{-34} m$

Answer: 1

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23. The number of nodal planes in a p_x orbital is :

A. one

B. two

C. three

D. four

Answer: 1

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24. The wave number of electromagnetic radiation emitted during the transition of electron in between two levels of Li^{2+} ion whose principal quantum number is 4 and difference is 2 is :

A. $3.5R$

B. $4R$

C. $8R$

D. $\dfrac{8}{9}R$

Answer: 2

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25. The correct order of wavelength of Hydrogen $(_{.1}H^1)$, Deuterium $(_{.1}H^2)$ and Tritium $(_{.1}H^3)$ moving with same kinetic energy is

A. $\lambda_H > \lambda_D > \lambda_r$

B. $\lambda_H = \lambda_D = \lambda_r$

C. $\lambda_H < \lambda_D < \lambda_r$

D. $\lambda_H < \lambda_D > \lambda_r$

Answer: 1

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26. Spin angular momentum for unpaired electron in sodium (Atomic No.

$= 11)$ is

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

B. $0.866h / 2\pi$

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

D. None of these

Answer: B

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27. The distance between 4th and 3rd Bohr orbits of He^+ is :

A. $2.645 \times 10^{-10} m$

B. $1.322 \times 10^{-10} m$

C. $1.851 \times 10^{-18} m$

D. None

Answer: 3

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28. What is the frequency of revolution of electron present in 2nd Bohr's orbit of H-atom?

A. $1.016 \times 10^{16} s^{-1}$

B. $4.065 \times 10^{16} s^{-1}$

C. $1.626 \times 10^{15} s^{-1}$

D. $8.13 \times 10^{16} s^{-1}$

Answer: 4

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29. According to Bohr's atomic theory, which of the following is correct ?

(a)Potential energy of electron $\propto \dfrac{Z^2}{n^2}$

(b)The product of velocity of electron and principal quantum number (n)

$\propto -Z^2$

(c)Frequency for revolution of electron in an orbit $\propto \dfrac{Z^2}{n^3}$

(d)Coulombic force of attraction on the electron $\propto \dfrac{Z^2}{n^2}$

   A. Potential energy of electron $\propto \dfrac{Z^2}{n^2}$

   B. The product of velocity of electron and principle quantum number

   $(n) \propto Z^2$

   C. Frequency of revolution of electron in an orbit $\propto \dfrac{Z^2}{n^3}$

   D. Coulombic force of attraction on the electron $\propto \dfrac{Z^2}{n^2}$

Answer: 3

30. If in Bohr's model, for unielectronic atom, time period of revolution is represented as $T_{n,z}$ where n represents shell no. and Z represents atomic number then the value of $T_{1,2} : T_{2,1}$ will be :

A. $8 : 1$

B. $1 : 8$

C. $1 : 1$

D. $1 : 32$

Answer: 4

31. Be^{3+} and a proton are accelerated by the same potential. Their de-Broglie wavelengths have the ratio (assume mass of proton=mass of neutron):

A. $1:2$

B. $1:4$

C. $1:1$

D. $1:3\sqrt{3}$

Answer: 4

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32. If the ionization energy of He^+ is 19.6×10^{-18}J per atom then the energy of Be^{3+} ion in the second stationary state is:

A. $-4.9 \times 10^{-18}J$

B. $-44.1 \times 10^{-18}J$

C. $-11.025 \times 10^{-18} J$

D. $-19.4 \times 10^{-18} J$

Answer: 4

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33. The mass a particle is 10^{-10} g and its radius is 2×10^{-4} cm. If its velocity is 10^{-6} cm sec^{-1} with 0.0001% uncertainty in measurement, the uncertainty in its position is :

A. $5.2 \times 10^{-8} m$

B. $5.2 \times 10^{-7} m$

C. $5.2 \times 10^{-6} m$

D. $5.2 \times 10^{-9} J$

Answer: 1

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34. What is the shortest wavelength line in the Paschen series of Li^{2+} ion?

A. $\dfrac{R}{9}$

B. $\dfrac{9}{R}$

C. $\dfrac{1}{R}$

D. $\dfrac{9R}{4}$

Answer: 3

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35. A dye absorbs a photon of wavelength λ and re-emits the same energy into two photons of wavelengths λ_1 and λ_2 respectively. The wavelength λ is related with λ_1 and λ_2 as :

A. $\lambda = \dfrac{\lambda_1 + \lambda_2}{\lambda_1 \lambda_2}$

B. $\lambda = \dfrac{\lambda_1 \lambda_2}{\lambda_1 + \lambda_2}$

C. $\lambda = \dfrac{\lambda_1^2 \lambda_2^2}{\lambda_1 + \lambda_2}$

D. $\lambda = \dfrac{\lambda_1 \lambda_2}{(\lambda_1 + \lambda_2)^2}$

Answer: B

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36. A hydrogen atom in the ground state is excited by monochromatic radiation of wavelength λÅ. The resulting spectrum consists of maximum 15 different lines. What is the wavelength λ?

$\left(R_H = 109737 cm^{-1} \right)$

A. 937.3Å

B. 1025Å

C. 1236Å

D. None of these

Answer: 1

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37. The ratio of magnetic of Fe (III) and Co (II) is :

A. $\sqrt{5} : \sqrt{7}$

B. $\sqrt{35} : \sqrt{15}$

C. $7 : 3$

D. $\sqrt{24} : \sqrt{15}$

Answer: 2

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38. A compound of vanadium has a magneitc moment (μ) of $1.73 BM$. If the vanadium ion in the compound is present as V^{x+}, then, the value of x is ?

A. 1

B. 2

C. 3

D. 4

Answer: 4

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39. According to Bohr's theory, the ratio of electrostatic force of attraction acting on electron 3rd orbit of He^+ ion and 2nd orbit of Li^{2+} ion is $\left(\dfrac{3}{2}\right)^x$. Then, the value of x is :

A. 7

B. -6

C. 6

D. -7

Answer: 4

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40. In a sample of $H-$ atom electrons make transition from 5th excited state to ground state, producing all possible types of photons, then number of lines in infrared region are

A. 4

B. 5

C. 6

D. 3

Answer: 3

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41. Number of electron having $l+m$ value equal to zero in $._{26}Fe$ may be

A. 13

B. 20

C. 7

D. 12

Answer: 1

42. 1st excitation Potential of a hydrogen like sample is 15 volt. If all the atoms of the sample are in 2nd excited state then find the $K.E.$ in eV of the electron ejected if a photon of energy $\dfrac{65}{9}eV$ is supplied to this sample.

A. 5

B. 2

C. 6

D. 4

Answer: 1

43. The ratio of the wave number corresponding to the 1st line of Lyman series of $H-$ atom and 3rd line of Pashcan series of a hydrogen like sample is $9:16$. Then find the third excitation potential in terms of volt for this $H-$ like samples.

A. 210

B. 204

C. 100

D. 300

Answer: 2

44. A particle X moving with a certain velocity has a debragile wave length of 1.72Å, If particle Y has a mass of 50% that of X and velocity 50% that of X, debroglies wave length of Y will be $-$

A. 3Å

B. 5.33Å

C. 6.88Å

D. 48Å

Answer: 3

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45. Photon having wavelength $310nm$ is used to break the bond of A_2 molecule having bond energy $28kgmol^{-1}$ then $\%$ of energy of photon converted to the $K.E.$ is $\left[hc = 12400ev\text{Å}, 1ev = 96kJ/mol\right]$

A. 25

B. 50

C. 75

D. 80

Answer: A

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46. If the wavelength of photon emitted from an electron jump $n = 4$ to $n = 2$ in a $H-$ like species is 1216Å then the species is :

A. $H-$ atom

B. He^+ ion

C. Li^{2+} ion

D. Be^{3+} ion

Answer: 2

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47. Electron in a sample of $H-$ atoms make transitions from state $n = x$ to some lower excited state. The emission spectrum from the sample is found to contain only the lines belonging to a particular series. If one of the photons had an energy of $0.6375eV$. Then find the value of x. $\left[\text{ Take } 0.6375eV = \dfrac{3}{4} \times 0.85eV\right]$.

A. 16

B. 24

C. 8

D. 20

Answer: 3

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48. Infrared lamps are used in restaurants to keep the food warm. The infrared radiation is strongly absorbed by water, raising its temperature

and that of the food. If the wavelength of infrared radiation is assumed to be 1500 nm, and the number of quanta of infrared radiation produced per second by an infrared lamp (that consumes enregy at the rate of 100 W and is 12 % effcient only) is $(x \times 10^{19}$, then the value of x is :

$(Given : h = 6.665 \times 10^{-34} J - s)$

A. 6

B. 7

C. 8

D. 9

Answer: 4

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Inorganic Chemistry Chemistry Bonding

1. According to Bohr's model, if the kinetic energy of an electron in 2nd orbit of He^+ is x, then what should be the ionisation energy of the

electron revolving in $3rd$ orbit of M^{5+} ion

A. $HF > HCl > HBr > Hl$

B. $CH_3 - F > CD_3 - F$

C. $SO_3 > SO_2$

D. $CH_3 - CH = CHCl(\text{cis}) > CH_3 - CH = CHCI(\text{trans})$
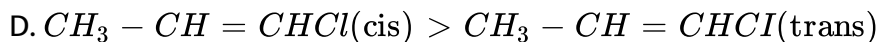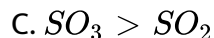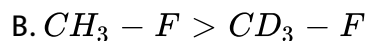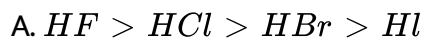
Answer: 1

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2. Last line of Lyman series for $H -$ atom has wavelength $\lambda_1 A$, 2nd line of Balmer series has wavelength $\lambda_2 A$ then

A. Carbon $-$ carbon bond length in CaC_2 will be more than that in CH_2CCH_2

B. $O - O$ bond length in Na_2O_2 will be more than that in KO_2.

C. $O - O$ bond length in $O_2[PtF_5]$ will be less than in KO_2

D. $N - O$ bond length in NO gaseous molecule will be smaller than that bond length in $NOCl$ gaseous molecule.

Answer: 1

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3. Which electronic level would allow the hydrogen atom to absorb a photon but not to emit a photon?

A. $SO_3^{2-} > SO_4^{2-} > SO_3$

B. $SO_4^{2-} > SO_3^{2-} > SO_3$

C. $SO_3 > SO_3^{2-} > SO_4^{2-}$
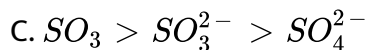
D. None of these

Answer: 1

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4. Number of nomal planes (planes of zero electron densit) in the d_{xy} orbital is

A. O_2^-

B. CN^-

C. CO

D. NO^+

Answer: 1

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5. The uncertainty in position and velocity of the particle are $0.2mm$ and $10.54 \times 10^{-27} ms^{-1}$ respectively then the mass of the particle is : $\left(h = 6.625 \times 10^{-34} Js \right)$

A. is planner triangular in shape with three $\sigma -$ bonds from $sp^2 - p$ overlap and three $\pi -$ bonds formed by two $p\pi - p\pi$ overlap and

one $p\pi - d\pi$ overlap.

B. is planner triangular in shape with three $\sigma -$ bonds from $sp^2 - p$

overlap and three $\pi -$ bonds formed by one $p\pi - p\pi$ overlap and

two $p\pi - d\pi$ overlap.

C. is a pyramidal molecule with one double bond and two single

bonds

D. planner triangular in shape with two double with two double bonds

between S and O and one single bond

Answer: 2

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6. A particle initially at rest having charge q coulomb, & mass $m\,kg$ is

accelerated by a potential difference of V volts. What would be its

$K.E.$ & de broglie wavelength respectively after acceleration.

A. IO_3^- and XeO_3

B. AlH_4^- and PH_4^+

C. AsF_6^- and SF_6

D. SiF_4 and SeF_4
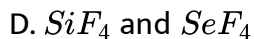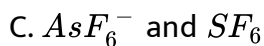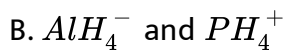
Answer: 4

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7. The number of possible lines of Paschenc series when electron jumps from 7th excited state to ground state (in hydrogen like atom) is :

A. $P > Q > R$

B. $P = Q = R$

C. $R > Q > P$

D. $R > P > Q$

Answer: 3

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8. AIR service on Vividh Bharati is transmitted on $219m$ band. What is its transmission frequency in Hertz ?

    A. $II < III < IV < I < V$

    B. $II < IV < III < V < I$

    C. $III < II < I < V < IV$

    D. $II < IV < III < I < V$

Answer: A

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9. Calculate the minimum and maximum number of electrons which may have magnetic quantum number $m = +1$ and spin quantum number $s = +\dfrac{1}{2}$ in chromium (Cr)

(a) 0,1

(b) 1,2

(c)4,6

(d)2,3

A. diamond

B. graphite

C. C_{60}

D. benzene

Answer: C

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10. In the emission spectrum of $H-$ atom from energy level $'n'$ to ground state in one more step, no line belonging to the Brackett series is observed. The wave number of lines belonging to Balmer series may be

A. All

B. $(i)(ii)(iii)$

C. $(i)(iii)(v)$

D. (ii) only

Answer: 2

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11. The ionisation energy of H is $13.6eV$. Calculate the ionization energy of Li^{2+} ions.

A. CH_4

B. BF_3

C. IF_7

D. PCl_3

Answer: 4

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12. If Photon having wavelength $6.2nm$ was allowed to strike a metal plate having work function $50eV$ then calculate wavelength associated with emitted electron :

A. s orbital of A and p_z orbital of B

B. p_x orbital of A and p_y orbital of B

C. p_z orbital of A and P_x orbital of B

D. p_x orbital of A and s orbital of B

Answer: 4

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13. The number of nodal planes in a p_x orbital is :

A. $LUMO$ level for C_2 molecule is a $\sigma 2p$ orbital

B. In C_2 molecule both the bonds are π bonds

C. In C_2^{2-} ion there is one σ and two π bonds

D. all the above are correct.

Answer: 4

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14. The wave number of electromagnetic radiation emitted during the transition of electron in between two levels of Li^{2+} ion whose principal quantum number is 4 and difference is 2 is :

A. $XeF_6(s)$

B. $PBr_5(s)$

C. $CaC_2(s)$
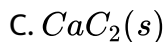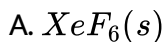
D. All of these

Answer: 4

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15. The correct order of wavelength of Hydrogen $(._1H^1)$, Deuterium $(._1H^2)$ and Tritium $(._1H^3)$ moving with same kinetic energy is

A. is a non- crystalline substance.

B. is an allotropic form of diamond

C. has molecules of variable molecular masses like polymers

D. has carbon atoms arranged in large plates of rings of strongly bound carbon atoms with weak interplate bonds.

Answer: 4

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16. Spin angular momentum for unpaired electron in sodium (Atomic No. $= 11$) is

A. $H_2O > H_2S > H_2Se > H_2Te$

B. $C_2H_2 > C_2H_4 > CH_4 > NH_3$
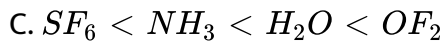
C. $SF_6 < NH_3 < H_2O < OF_2$

D. $ClO_2 > H_2O > H_2S > SF_6$

Answer: 3

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17. The distance between 4th and 3rd Bohr orbits of He^+ is :

A. $Si^{4+} > Al^{3+} > Mg^{2+} > Na^+$

B. $Al^{3+} > Si^{4+} > Mg^{2+} > Na^+$

C. $Na^+ > Si^{4+} > Mg^{2+} > Al^{3+}$

D. $Na^+ > Mg^{2+} > Al^{3+} > Si^{4+}$
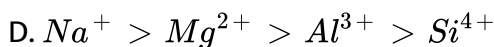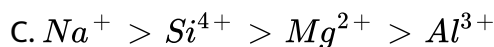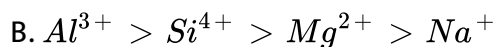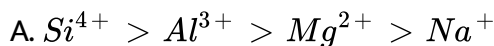
Answer: 4

18. What is the frequency of revolution of electron present in 2nd Bohr's orbit of H-atom?

A. sp^2, sp^3, sp^3d^2, sp^3d

B. sp^3, sp^2, sp^3d, sp^3d^2

C. sp^2, sp^3, sp^3d, sp^3d^2

D. sp^3, $sp^2sp^3d^2$, sp^3d^3

Answer: 2

19. According to Bohr's atomic theory, which of the following is correct ?

(a)Potential energy of electron $\propto \dfrac{Z^2}{n^2}$

(b)The product of velocity of electron and principal quantum number (n)
$\propto -Z^2$

(c)Frequency for revolution of electron in an orbit $\propto \dfrac{Z^2}{n^3}$

(d)Coulombic force of attraction on the electron $\propto \dfrac{Z^2}{n^2}$

A. $I > III > II$

B. $II > I > III$

C. $I > II > III$

D. $III > I > II$

Answer: A

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20. If in Bohr's model, for unielectronic atom, time period of revolution is represented as $T_{n,z}$ where n represents shell no. and Z represents atomic number then the value of $T_{1,2}:T_{2,1}$ will be :

A. (I) and (IV)

B. (II) and (V)

C. (III) and (IV)

D. (IV) and (V)

Answer: A

---

21. Be^{3+} and a proton are accelerated by the same potential. Their de-Broglie wavelengths have the ratio (assume mass of proton=mass of neutron):

A. XeO_2F_2

B. $XeOF_3$

C. XeF_4

D. XeF_6

Answer: 3

22. If the ionization energy of He^+ is 19.6×10^{-18}J per atom then the energy of Be^{3+} ion in the second stationary state is:

A. $CO_2 > BF_3 > CH_4 > H_2O$

B. $NO_2^+ > NO_2 > NO_2^-$

C. $BCl_3 > PCl_3 > AsCl_3 > BiCl_3$

D. $IO_3^- > BrO_3^- > ClO_3^-$
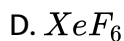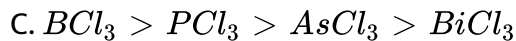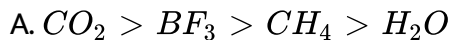
Answer: 4

23. The mass a particle is 10^{-10} g and its radius is 2×10^{-4} cm. If its velocity is 10^{-6} cm sec^{-1} with 0.0001% uncertainty in measurement, the uncertainty in its position is :

A. zero

B. two

C. three

D. four

Answer: 3

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24. What is the shortest wavelength line in the Paschen series of Li^{2+} ion?

A. SiF_4

B. IF_7

C. CIF_3

D. PCl_5

Answer: 1

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25. A dye absorbs a photon of wavelength λ and re-emits the same energy into two photons of wavelengths λ_1 and λ_2 respectively. The wavelength λ is related with λ_1 and λ_2 as :

A. $NO < C_2 < O_2^- < B_2$

B. $C_2 < NO < B_2 < O_2^-$

C. $B_2 < O_2^- < NO < C_2$

D. $B_2 < O_2^- < C_2 < NO$

Answer: D

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26. A hydrogen atom in the ground state is excited by monochromatic radiation of wavelength λÅ. The resulting spectrum consists of maximum 15 different lines. What is the wavelength λ?

$\left(R_H = 109737 cm^{-1}\right)$

A. the dipole moment of CCl_4 is greater than that of $CHCl_3$

B. $CHCl_3$ forms hydrogen bonds.

C. CCl_4 has more number of polarisable electrons resulting in the strong vander Waal's force of attraction than that of $CHCl_3$.

D. CCl_4 is more ionic than $CHCl_3$.

Answer: 3

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27. The ratio of magnetic of Fe (III) and Co (II) is :

A. Only $(I)\&(III)$

B. (II)

C. Only $(I)\&(II)$

D. (I), $(II)\&(III)$

Answer: 4

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28. A compound of vanadium has a magneitc moment (μ) of $1.73 BM$. If the vanadium ion in the compound is present as V^{x+}, then, the value of x is ?

A. $CH_3NI_2^-$

B. HF

C. $O_2N\langle\bigcirc\rangle OH$

D. $CCl_3CH(OH)_2$
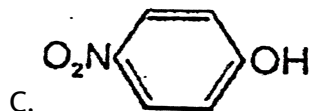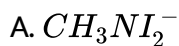
Answer: D

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29. According to Bohr's theory, the ratio of electrostatic force of attraction acting on electron 3rd orbit of He^+ ion and 2nd orbit of Li^{2+} ion is $\left(\dfrac{3}{2}\right)^x$. Then, the value of x is :

A. It will remain covalent in aqueous solution

B. The solution will consist of $Al^{3+} \& Cl^-$

C. The solution will consist of hydrated $Al^{3+} \& Cl^-$

D. None of these

Answer: 3

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30. In a sample of $H-$ atom electrons make transition from 5th excited state to ground state, producing all possible types of photons, then number of lines in infrared region are

A. CN

B. NO

C. O_2^{2+}

D. N_2

Answer: 1

---

31. Number of electron having $l + m$ value equal to zero in $._{26} Fe$ may be

A. Only $(I) \& (III)$

B. only (II)

C. Only $(I) \& (II)$

D. $(I), (II) \& (III)$

Answer: D

---

32. 1st excitation Potential of a hydrogen like sample is 15 volt. If all the atoms of the sample are in 2nd excited state then find the $K. E.$ in eV of

the electron ejected if a photon of energy $\frac{65}{9}eV$ is supplied to this sample.

A. Basac on VSEPR theory, the number of 90 degree $F - Br$ angles in BrF_5 is four.

B. Molecular geometries of both $(CH_3)_3N$ and $(SiH_3)_3$ are trigonal planar.

C. The $C - C$ bond length in C_2 is bigger than $O - O$ bond length O_2.

D. For ozone molecule, one oxygen $-$ oxygen bond is stronger than the other oxygen $-$ oxygen bond.

Answer: 3

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33. The ratio of the wave number corresponding to the 1st line of Lyman series of $H -$ atom and 3rd line of Pashcan series of a hydrogen like

sample is $9:16$. Then find the third excitation potential in terms of volt for this $H-$ like samples.

A. 5

B. 6

C. 4

D. 8

Answer: 2

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34. A particle X moving with a certain velocity has a debragile wave length of 1.72Å, If particle Y has a mass of 50% that of X and velocity 50% that of X, debroglies wave length of Y will be $-$

A. $SnF_2 < SnCl_2 < SnF_4 < SnCl_4, SiCl_4$

B. $SnF_2 < SnCl_2 < SnF_4 < SiCl_4 < SnCl_4$

C. $SiCl_4 < SnCl_4 < SnF_4 < SnCl_2 < SnF_2$

D. $SnCl_4 < SnF_4 < SnCl_2 < SnF_2 < SiCl_4$
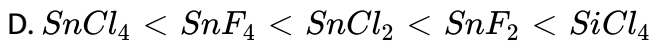
Answer: 3

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35. Photon having wavelength $310nm$ is used to break the bond of A_2 molecule having bond energy $28kgmol^{-1}$ then $\%$ of energy of photon converted to the $K.E.$ is $\left[hc = 12400ev\text{Å}, 1ev = 96kJ/mol\right]$

A. I only

B. I and II only

C. IV only

D. $I, II, \& III$

Answer: 4

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36. If the wavelength of photon emitted from an electron jump $n = 4$ to $n = 2$ in a $H-$ like species is 1216Å then the species is :

A. $NH_3 < H_2O < HF < H_2S$

B. $H_2S < NH_3 < H_2O < HF$

C. $H_2O < NH_3 < H_2S < HF$

D. $HF < H_2O < NH_3 < H_2S$

Answer: B

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37. Electron in a sample of $H-$ atoms make transitions from state $n = x$ to some lower excited state. The emission spectrum from the sample is found to contain only the lines belonging to a particular series. If one of the photons had an energy of $0.6375eV$. Then find the value of $x.$ $\left[\text{ Take } 0.6375eV = \dfrac{3}{4} \times 0.85eV\right].$

A. $1.22\text{Å}, 1.48\text{Å}$

B. 1.48Å, 1.22Å

C. 1.22Å, 1.22Å

D. 1.48Å, 11.48Å

Answer: B

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38. Infrared lamps are used in restaurants to keep the food warm. The infrared radiation is strongly absorbed by water, raising its temperature and that of the food. If the wavelength of infrared radiationis assumed to be 1500 nm, and the number of quanta of infrared radiation produced per second by an infrared lamp (that consumes enregy at the rate of 100 W and is 12 % effcient only) is $(x \times 10^{19}$, then the value of x is :

$(Given : h = 6.665 \times 10^{-34} J - s)$

A. sp^2, sp^2

B. sp^3, sp^2

C. sp^3, sp^3

D. sp^2, sp^3
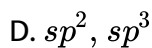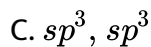
Answer: B

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Organic Chemistry Fundamental Concept

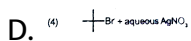**1.** The magnetic moment of $._{25}Mn$ in ionic state is $\sqrt{15}B.M$, then Mn is in:

A. CH_3O^-

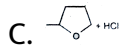B. $C_6H_5O^-$

C. $(CH_3)_2CHO^-$

D. $(CH_3)_3CO^-$
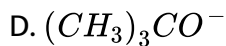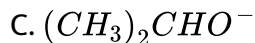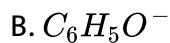
Answer: A

2. The spin only magnetic of Cr^{3+} in aqueous solution would be :

A. (1) $-CH=CH_2 \xrightarrow{Br_2/Fe}$

B. (2) $-CH_3 \xrightarrow{Cl_2/Fe}$

C. (3) $-CH=CH_2 \xrightarrow{HBr/R_2O_2}$

D. (4) $-CH=CH_2 \xrightarrow[\Delta]{CH_3NH_2}$

Answer: D

3. $\psi^2 = 0$ represent

A. (1)

B.

C. + HCl

D. (4) Br + aqueous AgNO₃
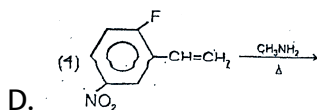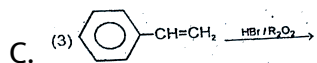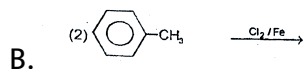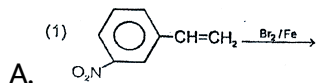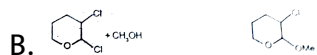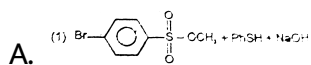
Answer: 4

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4. Observe the following statements regarding isotones :

$a.$ $.^{39}K$ and $.^{40}Ca$ are isotones.

$b.$ Nucleides having different atomic number (Z) and mass numbers (a) but same number of neutrons (n) are called isotones.

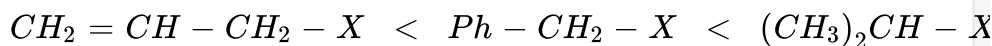$c.$ $.^{19}F$ and $.^{23}Na$ are isotones.

The correct answer is $-$

A.

$$CH_3 - CH_2 - X \;\; < \;\; (CH_3)_2CH - X \;\; < \;\; CH_2 = CH - CH_2 - $$

B.

$$(CH_3)_2CH - X \;\; < \;\; CH_3 - CH_2 - X \;\; < \;\; CH_2 \;\; < \;\; PhCH_2 - X$$

C.

$$PhCH_2 - X \; < \; (CH_3)_2CH - X \; < \; CH_2 - CH_2 - X \; < \; CH_2$$

D.

$$CH_2 = CH - CH_2 - X \; < \; Ph - CH_2 - X \; < \; (CH_3)_2CH - X$$
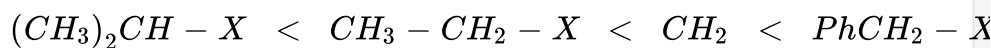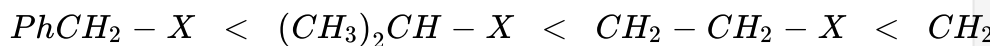
Answer: 1

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5. If n_1 and n_2 are the boundary value principal quantum numbers of a portion fo spectrum of emission spectrum of H atom, determine the wavelength (in metre) corresponding to last line (longest λ) . Given $: n_1 + n_2 = 7, n_2 - n_1 = 3$ and $R_H = 1.097 \times 10^7 m^{-1}$. (Give your answer in multiple of 10^{-6})

A. 0.8

B. 0.4

C. 0.1

D. 0.15

6. What is the potential energy of an electron present in $N-$ shell of the Be^{3+} ion ?

A. Formation of dechlorocarbene from $CHCl_3$ is an elmination reaction.

B. Carbocations and free radicals are planar chemical species.

C. In the rearrangement of carbocation , $1° -$ carbocation may convert into $2° -$ carbocation.

D. CCl_3 group is $o, p -$ directing becausing it exhibit hyperconjugation with benzene ring.

Answer: 4

7. In which of the following transition, the wavelength will be minimum :

A. CN^-

B. H^+

C. Br^+

D. $AlCl_3$

Answer: 1

8. The ratio of kinetic energy and potential energy of an electron in a Bohr orbit of a hydrogen $-$ like species is :

A. Halogens are deactivating groups but have ortho-para directing nature.

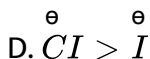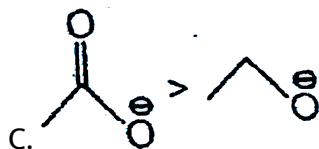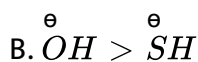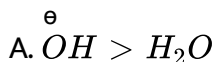B. Nitrobenzene, gives metanitrotoluence on reaction with

$CH_3Cl / AlCl_3$.
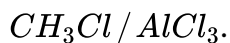
C. Nitro group is meta directing.

D. Aniline does not give Friedal Craft reaction directly.

Answer: 2

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9. Total Number of unpaired electrons in $d-$ orbitals of an atom

element of atomic number 29 is :

A. $\overset{\ominus}{O}H > H_2O$

B. $\overset{\ominus}{O}H > \overset{\ominus}{S}H$

C.

D. $\overset{\ominus}{C}I > \overset{\ominus}{I}$

Answer: 3

10. Photons of minimum energy $496k, J. mol^{-1}$ are needed to an atoms. Calculate the lowest frequency of light that will ionize a sodium atom.

A. $12.4 \times 10^{14} s^{-1}$

B. Reasonance stabilised carbonium ion is formed in the above reaction.

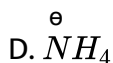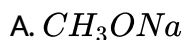C. Product of the reaction is diethyl ether

D. Reaction is proceed through S_N2 mechanism.

Answer: 2

11. According to Bohr's model, if the kinetic energy of an electron in 2nd orbit of He^+ is x, then what should be the ionisation energy of the electron revolving in $3rd$ orbit of M^{5+} ion

A. CH_3ONa

B. $PhLi$

C. PH_3

D. $\overset{\ominus}{N}H_4$

Answer: 4

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12. Last line of Lyman series for $H-$ atom has wavelength $\lambda_1 A$, 2nd line of Balmer series has wavelength $\lambda_2 A$ then

A. All are correct

B. Only S_1, $S_2 \& S_3$ are correct.

C. Only S_1 and S_2 are correct

D. Only S_1 and S_3 are correct.

Answer: 2

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13. Which electronic level would allow the hydrogen atom to absorb a photon but not to emit a photon?
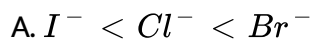
A. Dehalogenation

B. Dehydrohalogenation

C. Decarboxylation

D. Dehydration

Answer: 2

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14. Number of nomal planes (planes of zero electron densit) in the d_{xy} orbital is

    A. $I^- < Cl^- < Br^-$

    B. $Br^- < Cl^- < I^-$

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

    D. $Cl^- < Br^- < I^-$

Answer: 4

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15. The uncertainty in position and velocity of the particle are $0.2mm$ and $10.54 \times 10^{-27} ms^{-1}$ respectively then the mass of the particle is : $\left(h = 6.625 \times 10^{-34} Js\right)$
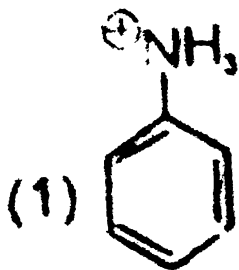
    A. Hyperconjugation effect

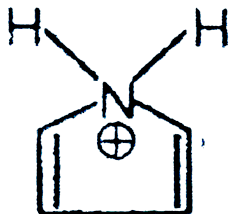   B. Inductive effect

C. Steric effect

D. Dipole-dipole interactions
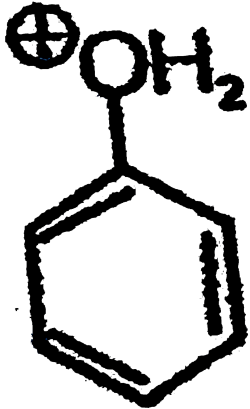
Answer: 1

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16. A particle initially at rest having charge q coulomb, $\&$ mass mkg is accelerated by a potential difference of V volts. What would be its $K.E.\ \&$ de broglie wavelength respectively after acceleration.
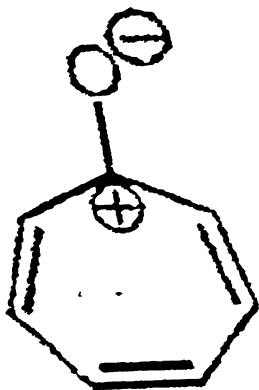

A.

B.

C.

D.

Answer: 4

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