CHEMISTRY

BOOKS - KVPY PREVIOUS YEAR

MOCK TEST 1

Exercise

1. Consider the two hypothetical reactions given below:

$aA \rightarrow$ products,$k = x mol^{-1} L \min^{-1}$

$bB \rightarrow Products, k = y \min^{-1}$ The half-lives of both the reactions are the same, equal to 1 hr when molar concentration of the reactant is 1.0 M in each case. If

these reactions are started at the same time taking 1M of the reactant in each case, the ratio [A]/[B] after 3 hr will be

A. 0.5

B. 4

C. 1

D. 2

Answer:

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2. $28gN_2$ and 6.0 g of H_2 are heated over catayst in a closed one litre flask of $450^\circ C$. The entire equilibrium

mixture required 500 mL of $1.0MH_2SO_4$ for neutralisation. The value of K_c for the reaction $N_2(g) + 3H_2(g) \Leftrightarrow 2NH_3(g)$ is

A. $0.06mol^{-2}L^{-2}$

B. $0.59mol^{-2}L^{-2}$

C. $1.69mol^2L^{-2}$

D. $0.03mol^2L^{-2}$

Answer:

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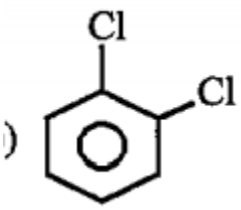
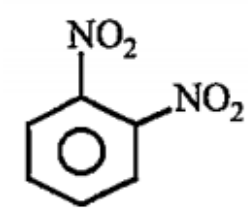
3. In which of the following molecule μ (observed) is found to be greater then μ (theoretical):

A. $CHCl_3$

B.



C.



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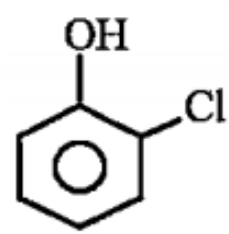

Answer:

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4. One gram of charcoal adsorbs 100 mL of 0.5 MCH_3COOH to form a mono-layer and thereby the molarity of acetic acid is reduced to 0.49 M. Calculate the surface area of the charcoal adsorbed by each molecule of acetic acid. Surface acid of charcoal $= 3.01 \times 10^2 m^2 / gm$

A. $0.5 \times 10^{-19} m^2$

B. $4 \times 10^{-20} m^2$

C. $0.5 \times 10^{-10} m^2$

D. $5 \times 10^{-19} m^2$

Answer:

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5. When $KMnO_4$ acts as an oxidising agnet and ultimetely from MnO_4^{2-}, MnO_2, Mn_2O_3, and Mn^{2+}, then the number of electrons transferred in each case, respectively, are

A. 4,3,1,5

B. 1,5,3,7

C. 1,3,4,5

D. 3,5,7,1

Answer:

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6. An organic compound whose empirical and molecular formula are same, cantains 20% carbon, 6.7% hydrogen, 46.7% nitrogen and the rest oxygen. On heating it yields ammoia, leaving a solid residue. The solid residue gives a voilet colour with dilute solution of alkaline copper sulphate. The organic compound is

A. NH_2COONH_4

B. $HCOONH_4$

C. NH_2NHCHO

D. NH_2CONH_2

Answer:

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7. An electron in the ground state of hydrogen was excited to a higher energy level using monochromatic radiations of wave length(λ) 975 Å. The longest wave length that appears in the resulting spectrum is due to transition from

A. $n_4 \rightarrow n_1$

B. $n_4 \rightarrow n_3$

C. $n_5 \rightarrow n_4$

D. $n_5 \rightarrow n_1$

Answer:

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8. 0.02 mole of $\left[Co(NH_3)_5Br\right]Cl_2$ and 0.02 mole of $\left[Co(NH_3)_5Cl\right]SO_4$ are present in 200 cc of a solution X. The number of moles of the precipitates Y and Z that are formed when the solution X is treated with excess silver nitrate and excess barium chloride are respectively

A. 0.02,0.02

B. 0.01,0.02

C. 0.02,0.04

D. 0.04,0.02

Answer:

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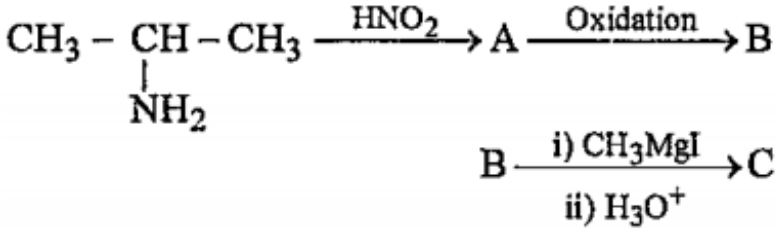
9. In the following sequence of reactions,



the compound C formed will be

A. Butanol-1

B. Butanol-2

C. 2-Methylpropanol-1

D. 2-Methyl-2-propanol

Answer:

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10. According to kinetic theory of gases, for a diatomic molecule

A. the pressure exterted by the gas is proportional to mean velocity of the molecule

B. the pressure exerted by the gas is proportional to the root mean velocity of the molecule

C. the root mean square velocity of the molecule is inversely proportional to the temperature

D. the mean translational kinetic energy of the molecule is proportional to the absolute temperature

Answer:

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11. In the given conformation, if C_2 is rotate about $C_2 - C_3$ bond anticlockwise by an angle of 120° then the conformation obtained is

A. fully eclipsed conformation

B. partially ecipsed conformation

C. gauche conformation

D. staggered conformation

Answer:

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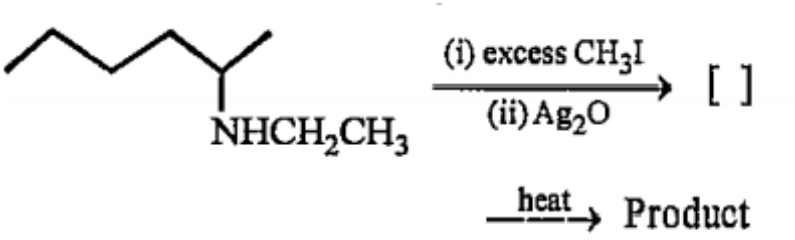
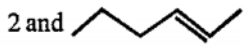
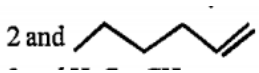
12. Predict the possible number of alkenes and the main alkene in the following reaction.



A.



B.



C. 3 and $H_2C = CH_2$

D. 2 and $H_2C = CH_2$

Answer:

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13. Work done for converson of 0.5 mole of water of $100^\circ C$ to steam at 1 atm pressure is (heat of vaporisation of water at $100^\circ C$ is $4070 J \text{mol}^{-1}$)

A. -1.54 kJ

B. 1.54 kJ

C. 1.25 kJ

D. -1.35 kJ

Answer:

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14. The nuclei of elements X,Y and Z have same number of protons, but different nembers of neutrons. According to Mendeleef periodic table, the elements X,Y and Z

A. belong to same group and same period

B. belong to different groups and different periods

C. belong to same groupand different periods

D. are isotopes, which do not have different positions

Answer:

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15. The total number possible isomers for the complex compound $\left[Cu^{II}(NH_3)_4\left[Pt^{II}CI_4\right]\right.$ are

A. 3

B. 6

C. 5

D. 4

Answer:

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16. On being placed in water , sodium peroxide not only produces an alkaline solution but also some bubbles . If

we assume that the peroxide ion picks up two protons from water to produce a compound that can be seen as the dibasic conjugate acid of peroxide ion and then this compound undergoes a redox disproportion . Using the above the information complete the following equation :

$Na_2O_2(s) + H_2O(l) \rightarrow (A)(aq) + (B)(g).$

(A) and (B) are :

A. H_2O_2 and $NaOH$

B. H_2O_2 and O_2

C. $NaOH$ and O_2

D. Na_2O and $NaOH$

Answer:

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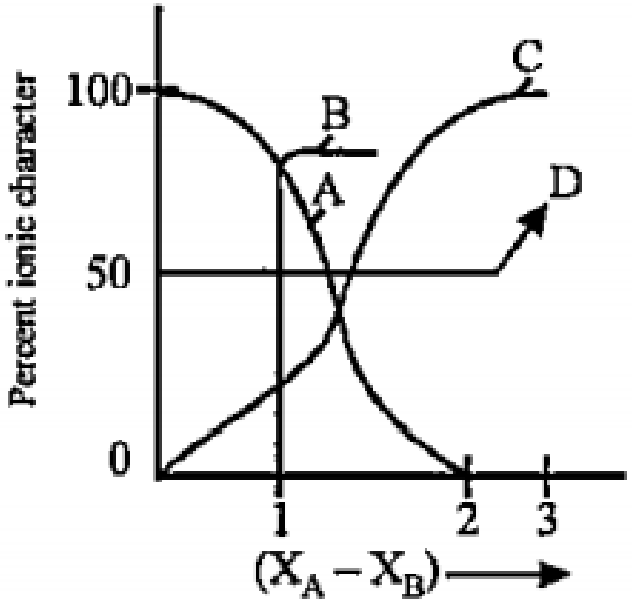
17. For AB bond if percent ionic character is plotted against electro nehativity difference $(X_A - X_B)$, the shape of the curve would look like



A. (A)

B. (B)

C. (C)

D. (D)

Answer:

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18. Which of the following reactions would give a good yield of hydrocarbon product ?

A. $RCOOH \xrightarrow[oxidation]{Electrolytic}$

B. $RCOO^{-}Ag^{+} \xrightarrow{Br_2}$

C. $CH_3CH_3 \xrightarrow[h\upsilon]{Cl_2}$

D. $(CH_3)_3CCl \xrightarrow{C_2H_5OH}$

Answer:

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19. The mole fraction of methanol in its 4.5 molal acqueous solution is

A. 0.250

B. 0.125

C. 0.100

D. 0.075

Answer:

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20. The octahedral complex of a metal ion M^{3+} with four monodentate ligands L_1, L_2, L_3 and L_4 absorb wavelengths in the region of red,green, yellow and bule, respectively The increasing order of ligand strengh of the four ligands is

A. $L_4 < L_3 < L_2 < L_1$

B. $L_1 < L_3 < L_2 < L_4$

C. $L_3 < L_2 < L_4 < L_1$

D. $L_1 < L_2 < L_4 < L_3$

Answer:

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21. Consider a class room of dimensions $5 \times 10 \times 3m^3$ at temperature $20^\circ C$ and pressure 1 atm. There are 50 peoples in the room, each losing energy at the average of 150 watt. Assuming that the walls, ceiling, floor and furniture perfectly insulated and none of them absorbing heat: The time needed for rising the temperature of air in the room to body temperature, i.e., $37^\circ C$ will be (For air C_P=7R/2 . Loss of air to the outside as the temperature rises may be neglected)

A. 420.25

B. 415.55

C. 411.35

D. 408.35

Answer:

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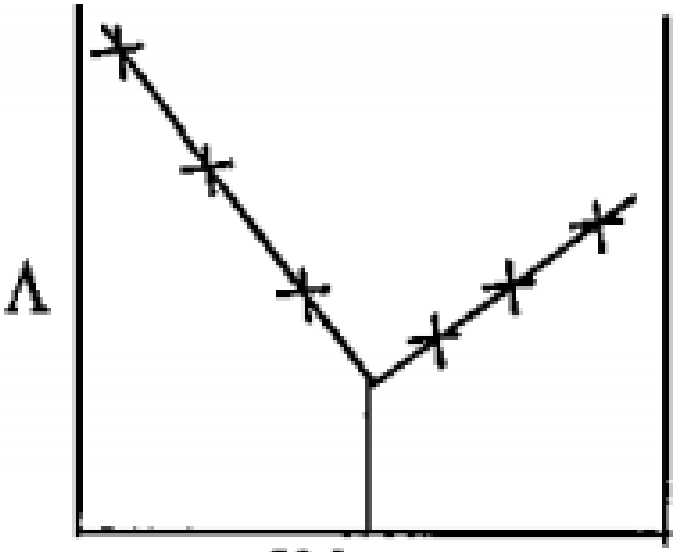
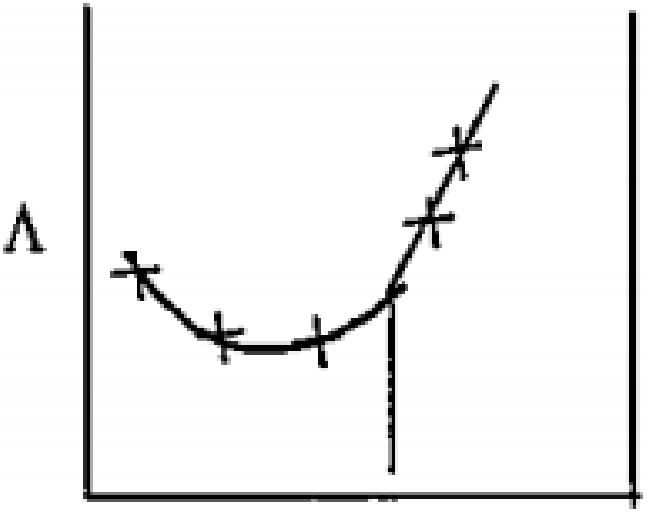
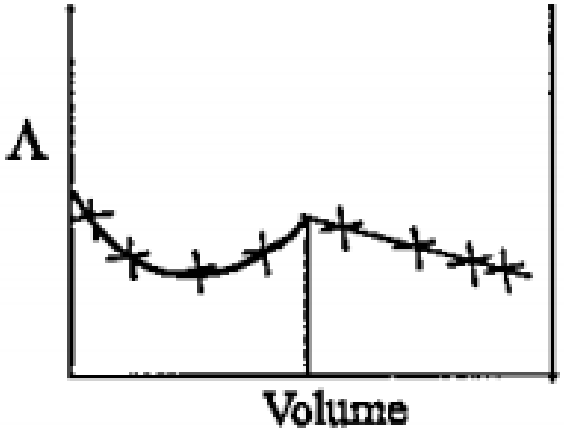
22. $AgNO_3(aq)$ was added to an aqueous KC1 solution gradually and the conductivity of the solution was measure. The plot of conductance (A) versus the volume of $AgNO_3$ is



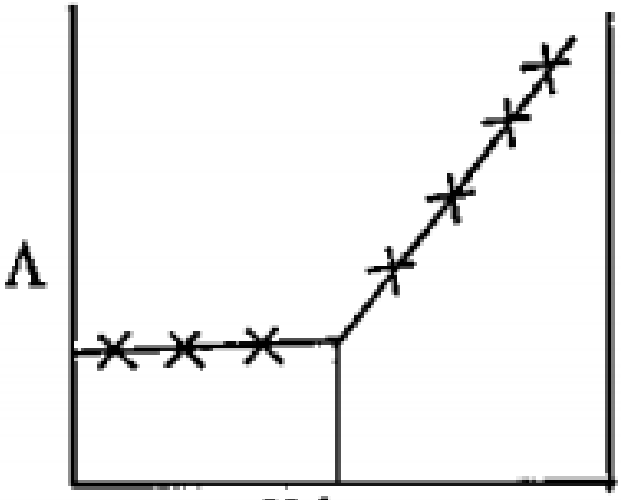
(P)



(Q)



(R)



(S)

A. (P)

B. (Q)

C. (R)

D. (S)

Answer:

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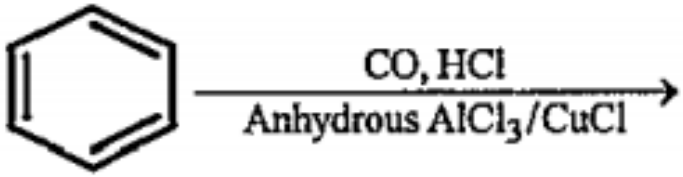
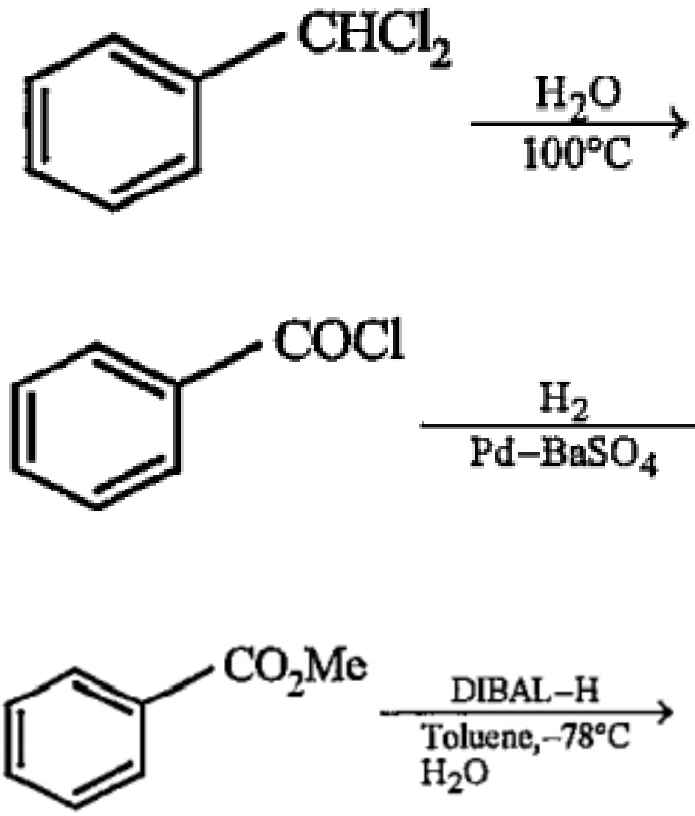
23. Among the following, the number of reaction (s) that produce(s) benzaldehyde is





A. One

B. Two

C. Three

D. Four

Answer:

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24. The uncertainty in the position of an electron $(mass = 9.1 \times 10^{-28} g)$ moving with a velocity of $3.0 \times 10^4 cms^{-1}$ accurate up to $0.001\ \%$ will be

(Use $\frac{h}{4\pi}$ in the uncertainty expression, where $h = 6.626 \times 10^{-27} erg - s$)

A. 1.93 cm

B. 3.84 cm

C. 5.76 cm

D. 7.68 cm

Answer:

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25. An orgainc compound A upon reacting with NH_3 gives B On heating B give $C. C$ in presence KOH reacts with Br_2 to yield $CH_3CH_2NH_2A$ is .

A. CH_3COOH

B. $CH_3CH_2CH_2COOH$

C.

D. CH_3CH_2COOH

Answer:

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26. In view of the signs of $\Delta_r G^0$ for the following reactions

$PbO_2 + Pb \rightarrow 2PbO, \Delta_r G^0 < 0$

$SnO_2 + Sn \rightarrow 2SnO, \Delta_r G^0 > 0$

Which oxidation state are more characteristic for lead and tin?

A. For lead +2, for tin +2

B. For lead +4, for tin +4

C. For lead +2, for tin +4

D. For lead +4, for tin +2

Answer:

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27. The thickness of a piece of paper is 0.0036 inch Suppose a certain book has an Avogadro's number of pages calculate the thickness of the book in light-years. (1 light-year equal to 5.88×10^{12} miles)

A. 2.5×10^{2}

B. 5.8×10^{3}

C. 8.5×10^{4}

D. 5.8×10^6

Answer:

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28. XmL of H_2 gas effuses through a hole in a container is 5 second. The time taken for the effusion of the same volume of the gas specified below under identical conditions is .

A. 10 seconds : He

B. 20 seconds : O_2

C. 25 seconds : CO

D. 55 seconds:CO_2

Answer:

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29. 3-menthyl-pent-2-ene on reaction with HBr in presence of peroxide forms an addition product. The number of possible stereoisomers for the product is

A. Six

B. Zero

C. Two

D. Four

Answer:

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30. Which series of reactions correctly represents chemical rections related to iron and its compounds ?

A. $Fe \xrightarrow{dil\,,H_2SO_4} FeSO_4 \xrightarrow{H_2SO_4\,,O_2} Fe_2(SO_4)_3 \xrightarrow{heat} Fe$

B. $Fe \xrightarrow{O_2\,,heat} FeO \xrightarrow{dil\,,H_2SO_4} FeSO_4 \xrightarrow{heat} Fe$

C. $Fe \xrightarrow{Cl_2\,,heat} FeCl_3 \xrightarrow{heat\,,air} FeCl_2 \xrightarrow{Zn} Fe$

D. $Fe \xrightarrow{O_2\,,heat} Fe_3O_4 \xrightarrow{CO\,,600^\circ C} FeO \xrightarrow{CO\,,700^\circ C} Fe$

Answer:

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31. The coordination number, EAN of the central metal atom and geometry of the complex ion obtained by adding $CuSO_4$ to excess of aqueous KCN respectively, are

A. 4,35,sp^2 d

B. 6, 36, sp^3d^2

C. 4, 36, sp^2d

D. 4, 35, sp^3

Answer:

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32. A lead storage battery containing 5.0 L of 1N H_2SO_4 solution is operated for 9.65×10^5 s with a steady current of 100 mA. Assuming volume of the solution remaining constant, normality of H_2SO_4 will

A. remain unchanged

B. increases by 0.20

C. increase by unity

D. decrease by 0.40

Answer:

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33. Chloroethene is treated with sodium amide in liquid ammonia. The major product is

A. o-Nitroaniline

B. p-Nitroaniline

C. m - Nitroaniline

D. All of these

Answer:

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34. A solution contains Fe^{2+}, Fe^{3+} and T^{-} ions. This solution was treated with iodine at $35^{\circ}C$. E° for

Fe^{3+}, Fe^{2+} is $0.77V$ and E° for $I_2/2I^-$ = 0.536 V. The favourable redox reaction is:

A. I_2 will be reduced to I^-

B. There will be no redox reaction

C. I^- will be oxidised to I_2

D. Fe^{2+} will be oxidised to Fe^{3+}

Answer:

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35. A metal has an fcc latticed.The edge length of the unit cell is 404 pm .The density of the metal is

$2.72g/cm^{-3}$ .The molar mass of the metal is

(N_A Avogadro's constant $= 6.2 \times 10^{23} mol^{-1}$)

A. 30 g mol^{-1}

B. 27g mol^{-1}

C. 20 g mol^{-1}

D. 40g mol^{-1}

Answer:

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36. The volume of a colloidal particle V_C as compared to the volume of a solute particle in a true solution V_S could be

A. $\frac{V_C}{V_S} \simeq 10^3$

B. $\frac{V_C}{V_S} \simeq 10^{-3}$

C. $\frac{V_C}{V_S} \simeq 10^{23}$

D. $\frac{V_C}{V_S} \simeq 1$

Answer:

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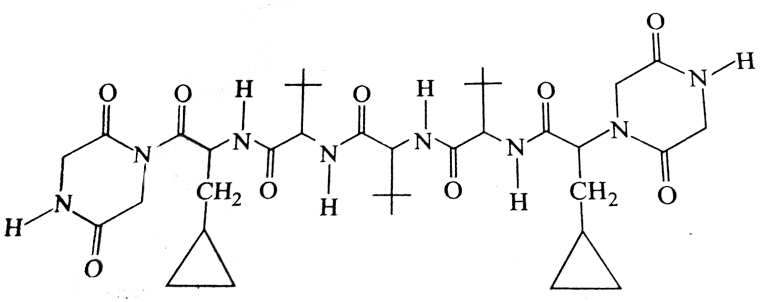
37. The total number of distinct naturally occuring amino acids obtained by complete acidic hydrolysis of the

peptide shown below is



A. Two

B. Three

C. One

D. Four

Answer:

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38. At temperature $327^{\circ}C$ and concentration C, the osmotic pressure of a solution is P. The same solution at concentration C/2 and a temperature $427^{\circ}C$ of shows osmotic pressure of 2 atm. The value of P will be :

A. $\frac{12}{7}$

B. $\frac{24}{7}$

C. $\frac{6}{5}$

D. $\frac{5}{6}$

Answer:

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39. If Cl_2 gas is passed into aqueous solution of KI containing some CCl_4 and the mixture is shaken:

A. upper layer becomes violet

B. lower layer becomes violet

C. homogenous violet layer is formed

D. None of these

Answer:

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40. Which of the following is not correct

A. P_4S_{10} exist like P_4O_{10} and P_4S_6 exist like P_4O_6.

B. In P_4S_3, there exist 3P-S-P bond whereas in P_4S_5, there exist four P-S-P bonds.

C. Both P_4S_{10} and P_4O_{10} have same structure

D. P_4S_3 is most stable sulphide of phosphorus.

Answer:

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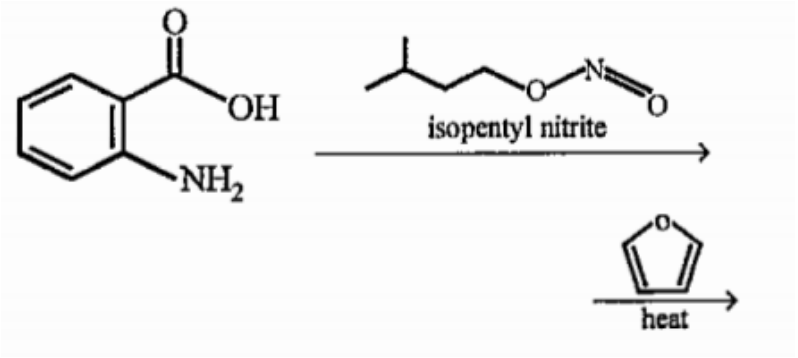
41. The compound isopentylnitrite is a source of NO^+ ions and will react with an amine to generate a diazonium cation. Predict the product of the following

reaction sequence.

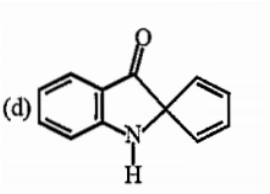


A.

B.

C.

D.



Answer:

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42. On complete hydrogenation, natural rubber produces

A. ethylene-propylene copolymer

B. vulcanised rubber

C. polypropylene

D. polybutylene

Answer:

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43. The solublity of hydroides, fluorides of oxalates of the metals of Group IIA

A. increases down the group

B. decreases down the group

C. varies randomly

D. is constant

Answer:

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44. When nitrobenzene is treated with Br_2 in presence of $FeBr_3$, the major product formed is $m-$ bromo $-$ nitrobenzene. Statement which is related to obtain the $m-$ isomer is

A. the electron density on meta carbon is increased than that on ortho and para positions.

B. the intermediatecarbonium ion formed after initial attack of Br^+ at the meta position is least destabilised.

C. loss of aromaticity when Br^+ attacks at the ortho and para positions and not at meta position.

D. easier loss of H^+ to regain aromaticity from the meta position than from ortho and para positions.

Answer:

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45. The straight chain polymer (silicones) is formed by

A. hydrolysis of CH_3SiCl_3 followed by condensation polymerisation

B. hydrolysis of $(CH_3)_4Si$ by addition polymerisation

C. hydrolysis of $(CH_3)_2SiCl_2$ followed by condensation polymerisation

D. hydrolysis of $(CH_3)_3SiCl$ followed by condensation polymerisation

Answer:

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46. 1.30 cm^3 of N_2 gas at STP is adsorbed per gram of silica gel. The area occupied by nitrogen molecule is 0.16 nm^2. What is the surface area per gram of silica gel ? $\left(N_A = 6.023 \times 10^{23}\right)$

A. $1.6m^2g^{-1}$

B. $5.568m^2g^{-1}$

C. $3.48m^2g^{-1}$

D. $4.42m^2g^{-1}$

Answer:

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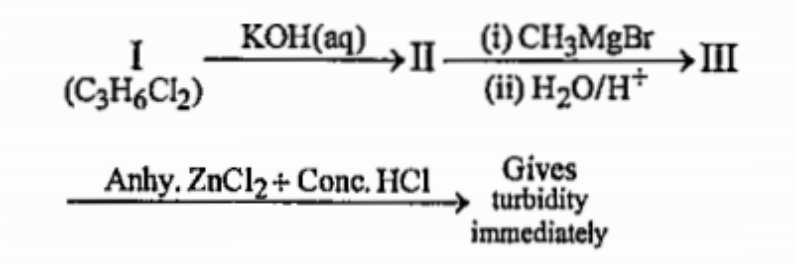
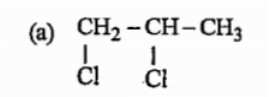
47. In the following reaction sequence:

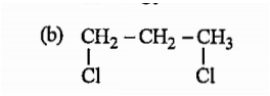


The compound I is:

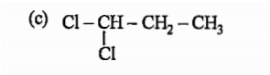
A.



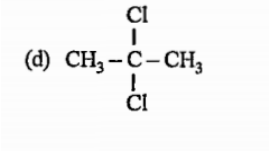
B.



C.



D.



Answer:

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48. There are two radioactive substance A and B. Decay consant of B is two times that of A. Initially, both have equal number of nuceli. After n half-lives of A,rates of disintegaration of both are equal. The value of n is .

A. 4

B. 2

C. 1

D. 5

Answer:

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49. You are given an electron with a de-Broglie wavelength of $\lambda = 76.3nm$. What is the Kelvin temperature of this electron?

A. 1.50

B. 2.00

C. 2.50

D. 3.00

Answer:

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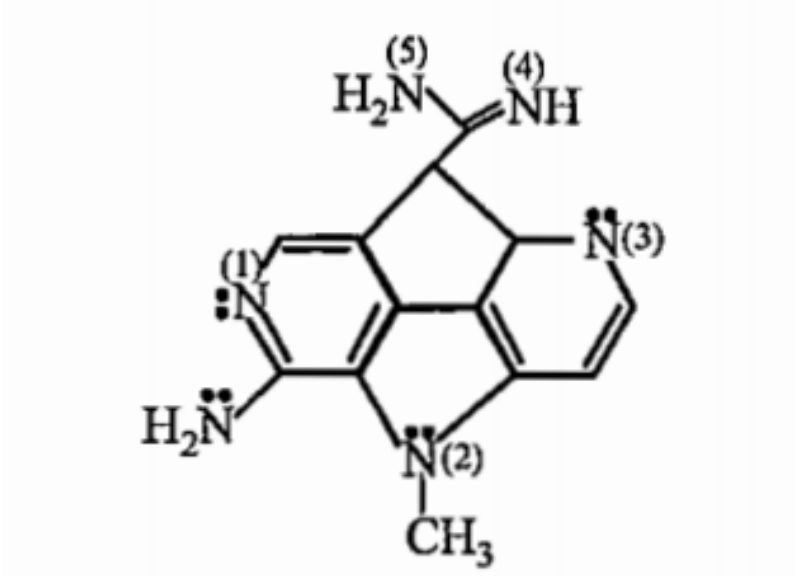
50. The decreasing order of basic strength is



A. igt vgtiiigtivgtii

B. ivgtigtvgtiiigtii

C. vgt ivgtigt iigtiii

D. ivgtvgtiiigtigtii

Answer:

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51. A tetrapeptide has $-COOH$ group on alanine. This produces glycine (Gly), valine (Val), phenyl alanine (Phe) and alanine (Ala), on complete hydrolyses. For this tetrapeptide, the number of possible sequences (primary structures) with $-NH_2$ group attached to a chiral centre is

A. 8

B. 4

C. 5

D. 6

Answer:

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52. Which one of the following arrangements represents the correct order of electron gain enthalpy of the given atomic species?

A. NO^+ lt NO lt NO lt O_2^-

B. O_2^- lt NO^- lt NO lt NO^+

C. NO^- lt O_2^- ltNO lt NO^+

D. $NO < NO^+ < O_2^- < NO^-$

Answer:

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53. The standard heat of formation values of $SF_6(g)$, $S(g)$, and $F(g)$ are -1100, 275, and $80kJmol^{-1}$, respectively. Then the average $S-F$ bond enegry in SF_6

A. 309kJ

B. 315kJ

C. 320kJ

D. 300kJ

Answer:

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