CHEMISTRY

BOOKS - KVPY PREVIOUS YEAR

MOCK TEST 2

Exercise

1. one gram of activated carbon has a surface are of $1000m^2$. Considering complete coverage as well as monomolecular adsorption , how much ammonia at 1 atm and 273 K would be absorbed on the surface of $\frac{44}{7}$ g carbon if radius of a ammonia molecules is $10^{-8}cm$.

A. 7.47 L

B. 0.33 L

C. 44.8 L

D. 23.5 L

Answer:

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2. A gas present in a cylinder fitted with a frictionless pistion expands against a constant pressure of $1atm$ form a volume of $2L$ to a volume of $6L$. In doing so, it absorbs $800J$ heat form the surroundings. Determine the increases in internal enegry of process.

A. 385 J

B. 395 J

C. 380 J

D. 378 J

Answer:

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3. $NH_4C1O_4 + HNO_3(dil.) \rightarrow HC1O_4 + [X][X] \xrightarrow{\Delta} Y(g)$ [X] and [Y] are respectively-

A. $NH_4NO_3 \& N_2O$

B. $NH_4NO_2 \& N_2$

C. $HNO_3 \& O_2$

D. $N_2O \& H_2O$

Answer:

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4. Which is not correctly matched ?

(A)Basic strength of oxides.	$Cs_2O < Rb_2O < K_2O < Na_2O < Li_2O$
(B)Stability of peroxides.	$Na_2O_2 < K_2O_2 < Rb_2O_2 < Cs_2O_2$
(C)Stability of bicarbonates	$LiHCO_3 < NaHCO_3 < KHCO_3 < RbHC$
(D)Melting point	$NaF < NaCl < NaBr < Nal$

A. 1 and 4

B. 1 and 3

C. 1 and 2

D. 2 and 3

Answer:

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5. $CH_3CH_2Cl \xrightarrow{NaCN} X \xrightarrow{Ni/H_2} Y$

$Y \xrightarrow[anhydride]{Acetic} Z$

Z in the above reaction sequence is

A. $CH_3CH_2CH_2NHCOCH_3$

B. $CH_3CH_2CH_2NH_2$

C. $CH_3CH_2CH_2CONHCH_3$

D. $CH_3CH_2CH_2CONHCOCH_3$

Answer:

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6. In Dumas' method of estimation of nitrogen $0.35g$ of an organic compound gave $55mL$ of nitrogen collected at $300K$ temperature and $715mm$ pressure. The percentage composition of nitrogen in the compound would be : (Aqueous tension at $300K = 15mm$)

A. 15.46

B. 16.46

C. 17.46

D. 14.46

Answer:

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7. The dipole moments of diatomic molecules AB and CD are 10.41D and 10.27 D, respectively while their bond distances are 2.82 and 2.67Å respectively. This indicates that

A. Bonding is 100% ionic in both the molecules.

B. AB has more ionic bond character than CD.

C. AB has lesser ionic bond charater than CD.

D. Bonding is nearly covalent in both the molecules.

Answer:

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8. Among NH_3, HNO_3, NaN_3 and Mg_3N_2 the numer of molecules having nitrogen in negative oxidation state is

A. 1

B. 2

C. 3

D. 4

Answer:

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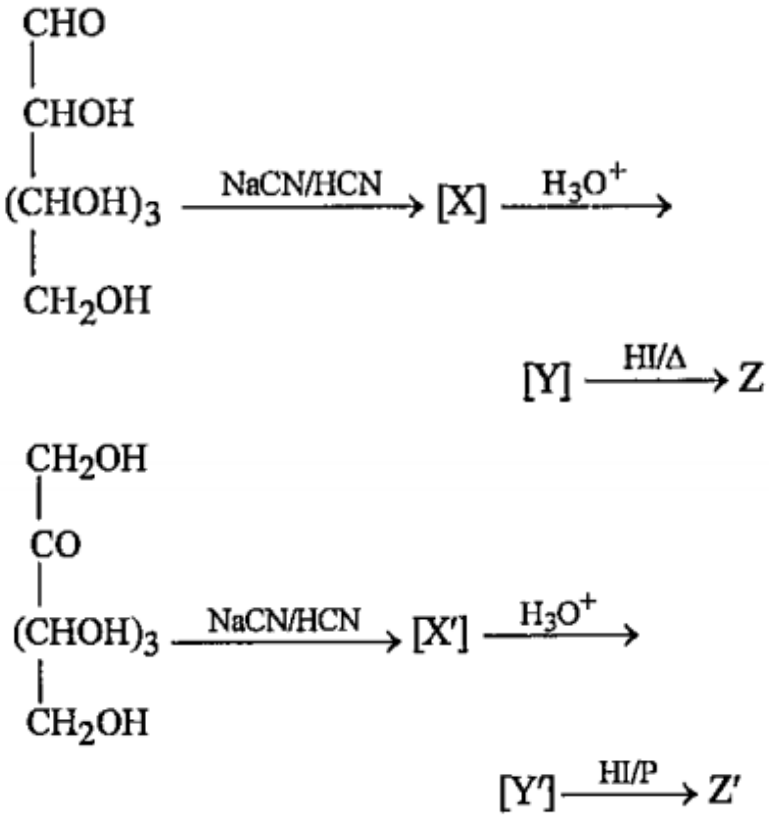
9. Predict the nature of the products Z and Z' in the following series of reactions



A. Both are n-heptane

B. Both are n-heptanoic acid

C. Both are 7-iodoheptanoic acid

D. Z is n-heptanoic acid, and Z' is a substituted hexanoic acid

Answer:

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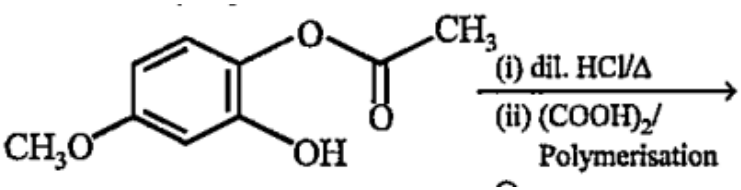
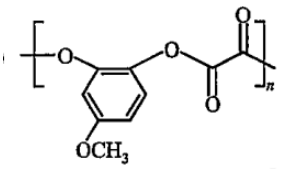
10. The major product of the following reaction is



A.



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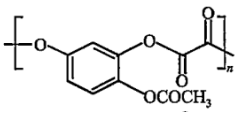
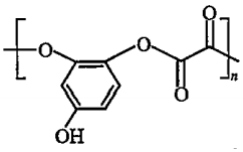


C.



D.

Answer:

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11. One mole of $N_2O_4(g)$ at 300 K is kept in a closed container under one atmosphere. It is heated to 600K when 20% by mass of N_2O_4(g) decomposes to NO_2(g). The resultant pressure is:

A. 1.2 atm

B. 2.4 atm

C. 2.0 atm

D. 1.0 atm

Answer:

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12. Anhydrous $AlCl_3$ cannot be obtained from which of the following reactions?

A. Heating $AlCl_3.6H_2O$

B. By passing HCl over hot aluminium powder

C. By passing dry Cl_2 over hot aluminium powder

D. By passing dry Cl_2 over hot mixture of alumina and coke.

Answer:

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13. Copper crystallises in fcc latticewith a unit cell edge of 361 pm. The radius of copper atom is

A. 108pm

B. 128pm

C. 157pm

D. 181pm

Answer:

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14. When a gas is bubbled through water at 298 K, a very dilute solution of the gas is obtained. Henry's law constant for the gas at 298 K is 100kbar. If the gas exerts a partial pressure of 1 bar, the number of millimoles of the gas dissolved in one litre of water is

A. 0.555

B. 5.55

C. 0.0555

D. 55.5

Answer:

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15. A small particle of mass m moves in such a way that $P.\ E = -\frac{1}{2}mkr^2$, where k is a constant and r is the distance of the particle from origin. Assuming Bohr's model of quantization of angular momentum and circular orbit, r is directly proportional to

A. n^2

B. n

C. $\sqrt{n}$

D. None of these

Answer:

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16. For the reaction $C(s) + CO_2(g) \rightarrow 2CO(g)$, $k_p = 63$ atm at 100 K. If at equilibrium $p_{CO} = 10p_{CO_2}$ then the total pressure of the gases at equilibrium is

A. 6.3 atm

B. 6.93 atm

C. 0.63 atm

D. 0.693 atm

Answer:

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17. The number of possibel enantiomeric paira that can be produced during monochlorination of 2-methyl butane is :

A. 3

B. 4

C. 1

D. 2

Answer:

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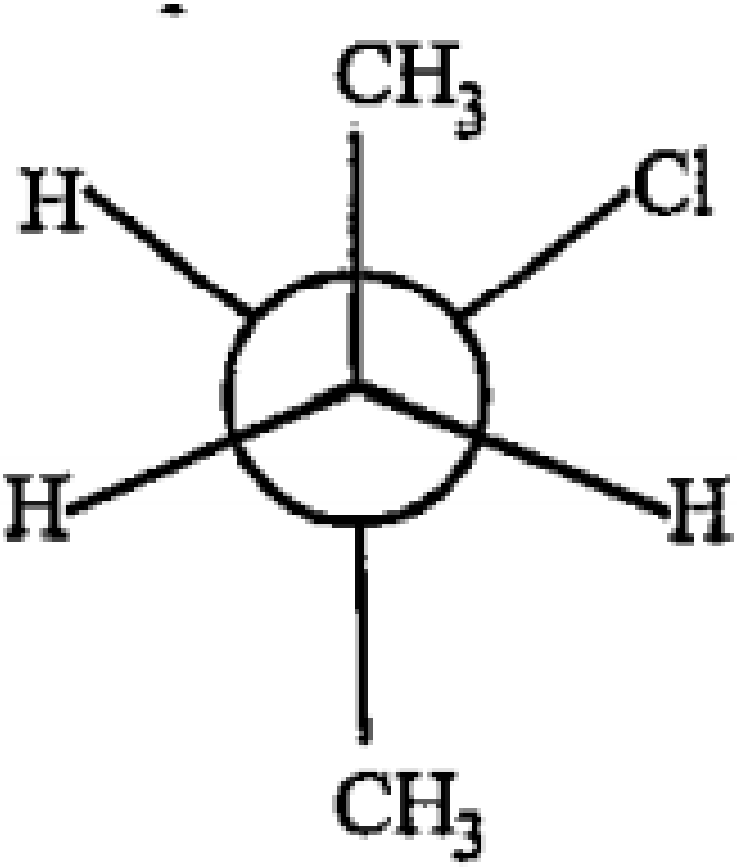
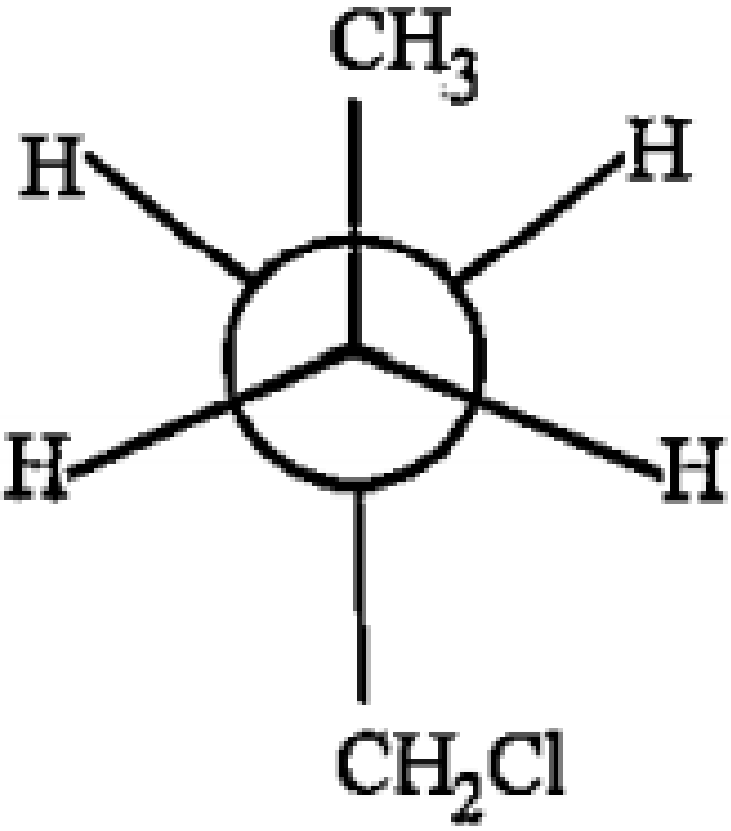
18. The pair of structures given below represent





A. enantiomers

B. diastereomers

C. structural isomers

D. two molecules of the same compound

Answer:

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19. $Sn^{4+} + 2e^- \rightarrow Sn^{2+} E^\circ = 0.13V$

$Br_2 + 2e^- \rightarrow 2Br^- E^\circ = 1.08V$ Calculate K_{aq} for the cell formed by two electrodes.

A. 10^{41}

B. 10^{32}

C. 10^{-32}

D. 10^{-42}

Answer:

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20. The electronegativity of four atoms labeled as D,E,F and G are as follows. D=3.8, E=3.3, F=2.8 and G=1.3. If the atoms form the molecules

DE,DG,EG and DF, the order of arrangements of these molecules in the increasing order of covalent bond character is

A. DG $<$ EG $<$ DF $<$ DE

B. DF $<$ DG $<$ DE $<$ EG

C. DG $<$ DF $<$ EG $<$ DE

D. DE $<$ EG $<$ DG $<$ DF

Answer:

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21. A decimolar solution of pottassium ferrocyanide is 50% dissociated at 300 K. The osmotic pressure of the solution is (Given $R = 8.314 JK^{-1} mol^{-1}$)

A. 1.87×10^5

B. 1.82×10^4

C. 6.24×10^4

D. 7.48×10^5

Answer:

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22. The number of moles of $KMnO_4$ that will be needed to react completely with one mole of ferrous oxalate in acidic solution is:

A. 44318

B. 44319

C. 44320

D. 1

Answer:

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23. If the unit cell of a mineral has cubic close packed (ccp) array of oxygen atoms with m fraction of octahedral holes occupied by aluminium ions and n fraction of tetrahedral holes occupied by magnesiums ions, m and n respectively, are

A. $\frac{1}{2}, \frac{1}{8}$

B. $1, \frac{1}{4}$

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

D. $\frac{1}{4}, \frac{1}{8}$

Answer:

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24. 100 mL of tap water containing $Ca(HCO_3)_2$ was titrated with N/50 HCl with methyl orange as indicator. If 30 mL of HCl were required, calculate the temporary hardness as parts of $CaCO_3$ per 10^6 parts of water.

A. 150 ppm

B. 300 ppm

C. 450 ppm

D. 600 ppm

Answer:

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25. On treatment of 100 mL of 0.1 M solution of $COCl_3.6H_2O$ with excess of $AgNO_3$, 1.2×10^{22} ions are precipitated. The complex is

A. $\left[Co(H_2O)_4C1_2\right]C1.2H_2O$

B. $\left[Co(H_2O)_3C1_3\right]3H_2O$

C. $\left[Co(H_2O)_6\right]C1_3$

D. $\left[Co(H_2O)_5C1\right]C1_2.\ H_2O$

Answer:

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26. Consider the following compounds :

$(i)IF_5$ $(ii)ClI_4^-$ $(iii)XeO_2F_2$ $(iv)NH_2^-$

$(v)BCl_3$ $(vi)BeCl_2$ $(vii)AsCl_4^+$ $(viii)B(OH)_3$

(ix) NO_2^- $(x)ClO_2^+$

Then calculate value of "x+y-z", here, x,y and z are total number of compounds in given compounds in which central atom used their all three p-orbitals, only two p-orbitals and only one p-orbital in hybridisation respectively .

A. 5

B. 3

C. 4

D. 2

Answer:

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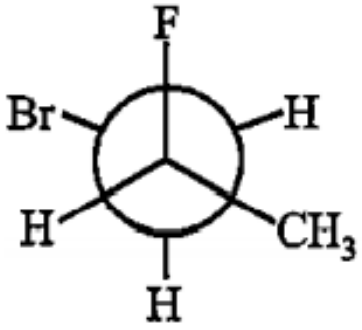
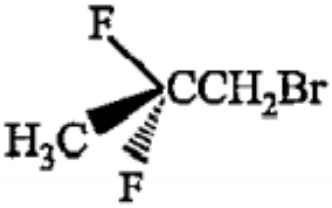
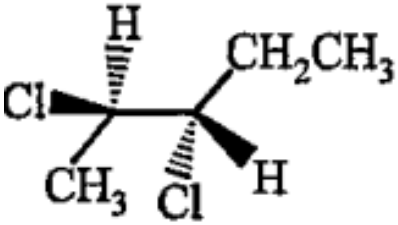
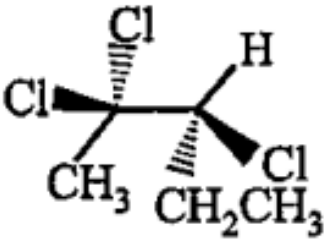
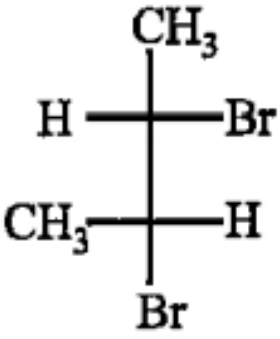
27. Which one is the correct combination for the given the sets of the compounds?

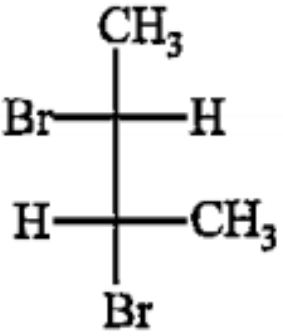












A. I-enantiomers, II-diastereomers, III-enantiomers

B. I-identical, II-enantiomers, III-enentiomers

C. I-enantiomers, II-diastereomers, III-identical

D. I-enantiomers, II-identical, III-identical

Answer:

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28. The sodium salt of a carboxylic acid (A) was produced by passing a gas (B) into an aqueous solution of caustic alkali at an envolved temperature and pressure (A) on heating in the presence of sodium hydroxide followed by the treatment with sulphuric acid gave a dibasic acid (C). A sample of $0.4gm$ of acid (C) on combustion gave $0.08gm$ of water,.$39gm$ of CO_2 and weighting $1.0gm$ on ignition yielded $0.71gm$ of silver as residue. Identify (A), (B), and (C)`.

A. HCOOH

B. $(COOH)_2$

C. CH_3COOH

D. NH_3

Answer:

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29. The following reaction is performed at 298 K ?

$2NO(g) + O_2(g) \Leftrightarrow 2NO_2(g)$

The standard free energy of formation of NO(g) is 86.6 kJ/mol at 298 K.

What is the standard free energy of formation of $NO_2(g)$ at 298 K ?

$\left(K_p = 1.6 \times 10^{12}\right)$

A. $86600 - \dfrac{\ln\left(1.6 \times 10^{12}\right)}{R(298)}$

B. $0.5\left[2 \times 86,600 - R(298)\ln\left(1.6 \times 10^{12}\right)\right]$

C. $R(298)\ln\left(1.6 \times 10^{12}\right) - 86600$

D. $86600 + R(298)\ln\left(1.6 \times 10^{12}\right)$

Answer:

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