CHEMISTRY

BOOKS - NTA MOCK TESTS

JEE MOCK TEST 2

Chemistry

1. In which of the following hybridisation of underlined atom changes

A. $\underline{C}H_3COOH$ is decarboxylated

B. $CH_3\underline{C}H_2OH$ is dehydrated

C. $CH_3\underline{C}H_3$ is chlorinated

D. $\underline{C}_6H_6$ is nitrated

Answer: B

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2. Reffering to the following reactions the missing products A,B,C and D respectively are

$NH_4Cl(aq) + NaNO_2(aq) \rightarrow [A] + H_2O(l) + NaCl(aq)$

$(NH_4)_2Cr_2O_7 \xrightarrow{\Delta} [B] + H_2O(l) + Cr_2O_3(s)$

$Cu + HNO_3(\text{dilute}) \rightarrow Cu(NO_3)_2 + [C] + H_2O(l)$

$Cu + HNO_3(\text{concentrated}) \rightarrow Cu(NO_3)_2 + [D] + H_2O(l)$

A. N_2, N_2, NO, NO_2

B. N_2, NH_3, N_2, NO

C. N_2, N_2, NO_2, NO_2

D. N_2, NH_3, NO_2, N_2O_4

Answer: A

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3. Ferrous ion changes to X ion on reacting with acidified hydrogen peroxide. The number of d-electrons present in X and its magnetic moment (in BM) are respectively .

A. 6 and 6.93

B. 5 and 5.92

C. 5 and 4.9

D. 4 and 5.92

Answer: B

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4. Combustion of hydrogen in a fuel cell at 300 K is represented as $2H_{2(g)} + O_{2(g)} \rightarrow 2H_2O_{(g)}$. If ΔH and ΔG are $-241.60kJmol^{-1}$ and $-228.40kJmol^{-1}$ of H_2O. The value of ΔS for the above process is

A. $4.4JK^{-1}$

B. $-88JK^{-1}$

C. $+88JK^{-1}$

D. $-44JK^{-1}$

Answer: B

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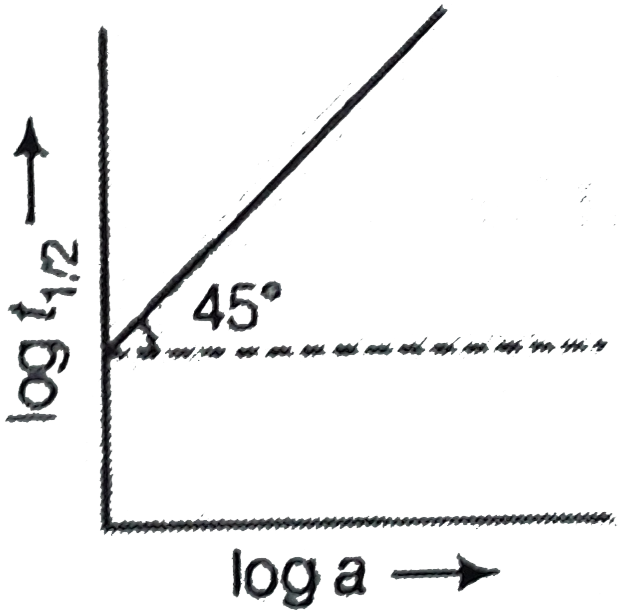
5. Following is the graph between $\log T_{\frac{1}{2}}$ and log a (a = initial concentration) for a given reaction at $27^{\circ}C$.



Hence, order is

A. 0

B. 1

C. 2

D. 3

Answer: A

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6. At $25^\circ C$, pH range of phenolphthalein is $8-10$. At $100^\circ C$, pH range of phenolphthalein would be

A. pH range remain unaffected by the temperature

B. pH range is altered to 8 -9

C. pH range is altered to 7-11

D. pH range is altered to 8-11

Answer: B

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7. How many unit cell are present in a cubic-shaped ideal crystal of $NaCl$ of mass $1.0g$?

A. 2.57×10^{21}

B. 5.14×10^{21}

C. 1.28×10^{21}

D. 1.71×10^{21}

Answer: A

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8. A : Hybridization of carbon is sp^2 in all its crystalline allotropes .

R : There are alternate double -single bonds in each allotrope of carbon .

A. Both Assertion & Reason are true and the reason is the correct explanation of the assertion .

B. Both Assertion & Reason are true but the reason is not the correct explanation of the assertion .

C. Assertion is true statement but Reason is false .

D. Both Assertion and Reason are false statement .

Answer: D

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9. Which gives nucleophilic addition reaction?

A. Hydrolysis of ethyl chloride by NaOH

B. Purification of acetaldehyde by $NaHSO_3$

C. Alkylation of anisole

D. Decarboxylation of acetic acid

Answer: B

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10. The standard reduction potential for Cu^{2+}/Cu is $+0.34V$. Calculate the reduction potential at pH=14 for the above couple. K_{SP} of $Cu(OH)_2$ is 1.0×10^{-19}

A. $-0.22V$

B. $+0.22V$

C. $-0.44V$

D. $+0.44V$

Answer: A

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11. The reduced temperature $= \theta = \frac{T}{T_C}$

The reduced pressure $= \pi = \frac{P}{P_C}$

The reduced volume $= \phi = \frac{V}{V_C}$

Hence , it can be said that the reduced equation of state may be given as

A. $\left(\frac{\pi}{3} + \frac{1}{\phi^2}\right)(3\phi - 1) = \frac{8}{3}\theta$

B. $\left(\frac{\pi}{3} + \frac{1}{\phi}\right)(\phi - 1) = \frac{8}{3}\theta$

C. $\left(\frac{\pi}{4} + \frac{1}{\phi}\right)(3\theta - 1) = \frac{8}{3}\phi$

D. $\left(\frac{\pi}{3} + \frac{1}{\phi}\right)(3\phi - 1) = \frac{8}{3}\theta$

Answer: A

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12. Which of the following will have least hindered rotation about carbon-carbon bond?

A. Acetylene

B. Hexachloroethane

C. Ethane

D. Ethylene

Answer: C

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13. Magnetic moments 2.84 B.M is given by :

(At. nos. Ni = 28, Ti = 22, Cr = 24, Co = 27).

A. Ni^{2+}

B. Ti^{3+}

C. Cr^{2+}

D. Co^{2+}

Answer: A

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14. The radioactive isotope ${}_{90}^{234}Th$ undergoes two successive $\beta-$ decay followed by one $\alpha-$ decay. The atomic number and mass number respectively of the resulting atom is:

A. 92 and 237

B. 94 and 230

C. 90 and 230

D. 92 and 230

Answer: C

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15. Alkali metals act as

A. good dehydrating agent

B. good reducing agent

C. good oxidising agent

D. none of these

Answer: B

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16. In the hydroboration-oxidation reaction of Propene with diborane, H_2O_2 and $NaOH$, the organic compound formed is

A. $CH_3CH_2CH_2OH$

B. CH_3CH_2OH

C. $(CH_3)_3COH$

D. $CH_3CHOHCH_3$

Answer: A

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17. Find the weight of H_2SO_4 in $1200mL$ of a solution of $0.4N$ strength.

A. 23.52 g

B. 2.53 g

C. 2.53 g

D. 29.52g

Answer: A

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18. The method of zone refining of metals is based on the principle of :

A. greater mobility of the pure metal than that of impurity

B. greater solubility of the impurity in the molten state than in the solid

C. higher melting point of the impurity than that of the pure metal.

D. All above the correct

Answer: B

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19. The atomic masses of Li and K are 7 and 39, respectively . According to law of triads the atomic mass of Na will be

A. 23

B. 32

C. 46

D. 64

Answer: A

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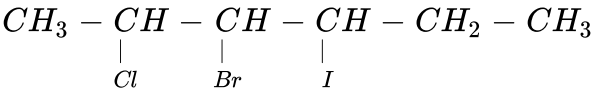
20. The correct IUPAC name of the compound is



A. 4-Bromo-5-chloro-3-iodohexane

B. 3-Bromo-2-chloro-4-iodohexane

C. 3-Bromo-4-iodo-2-chlorohexane

D. 2-Bromo-3-bromo-4-iodohexane

Answer: B

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21. PCl_5 vapour decomposes on heating according to the reaction :

$PCl_5(g) \Leftrightarrow PCl_3(g) + Cl_2(g)$

The density of a sample of a partially dissociated PCl_5 at 1.0 atm and 500 K was found 4.8 g/L . Calculate the degree of dissociation and ΔG° for the reaction at 500 K

(Given R=0.082 L atm $K^{-1}mol^{-1}$)

, R=8.314 $JK^{-1}mol^{-1}$, In x=2.3031 $\log_{10} x$)

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22. Which of the following will show optical isomers?

(I) cis-$\left[Co(NH_3)_2(en)_2\right]^{3+}$

(II) trans-$\left[IrCl_2(C_2O_4)_2\right]^{3-}$

(III) $\left[Rh(en)_3\right]^{3+}$

(IV) cis-$\left[Ir(H_2O)_3Cl_3\right]$

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23. Depression in freezing point of 0.01 molal aqueous HCOOH solution is $0.02046^{\circ}C$. 1 molal aqueous urea solution freezes at $-1.86^{\circ}C$. Assuming molality equal to molarity , calculate the pH of HCOOH solution.

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24. The volume strength of 1.5 N H_2O_2 solution is (Given molar volume at STP = 22.4 L)

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25. The number of greenhouse gases of the following is _____.

$CO_2, O_2, N_2O, CH_4, CFCs, CO, H_2O(g), O_3$

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26. Compared with the alkaline earth metals, the alkali metals exhibit

A. Greater hardness

B. Smaller ionic radii

C. Lower ionisation energies

D. Highest boiling points

Answer: C

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27. For the reaction

$N_2 + 3H_2 \rightarrow 2NH_3$ The rate of change of concentration for hydrogen is

$0.3 \times 10^{-4} Ms^{-1}$ The rate of change of concentration of ammonia is :

A. $-0.2 \times 10^{-4} Ms^{-1}$

B. $0.2 \times 10^{-4} Ms^{-1}$

C. $0.1 \times 10^{-4} Ms^{-1}$

D. $0.3 \times 10^{4} Ms^{-1}$

Answer: B

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28. The correct increasing bond angles order is :

A. $CIF_3 > PF_3 > NF_3 > BF_3$

B. $BF_3 > PF_3 > NF_3 > CIF_3$

C. $BF_3 > CIF_3 > PF_3 > NF_3$

D. $BF_3 > NF_3 > PF_3 > CIF_3$

Answer: D

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29. If the uncertainty in the position of a particle is equal to its de-Broglie wavelength, the minimum uncertainty in its velocity should be

A. $\frac{1}{4\pi}$

B. $\frac{v}{4\pi}$

C. $\frac{v}{4\pi m}$

D. $\frac{mv}{4\pi}$

Answer: B

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30. $C_5H_{10}O$ is carbonyl compound. The number of structural isomers possible for this molecular formula are

A. 5

B. 8

C. 6

D. 7

Answer: D

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31. The set representing the correct order of ionic radii is

A. $Li^+ > Be^{2+} > Na^+ > Mg^{2+}$

B. $Li^+ > Na^+ > Mg^{2+} > Be^{2+}$

C. $Mg^{2+} > Be^{2+} > Li^+ > Na^+$

D. $Na^+ > Li^+ > Mg^{2+} > Be^{2+}$

Answer: D

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32. Gem dihalides on treatment with alcoholic KOH give

A. Alkyne

B. Alkene

C. Alkane

D. All of these

Answer: A

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33. Which of the following has longest C- O bond length? (Free C - O bond length in CO is 1.128 Å).

A. $Ni(CO)_4$

B. $\left[Co(CO)_4\right]^-$

C. $\left[Fe(CO)_5\right]^{2-}$

D. $\left[Mn(CO)_6\right]^+$

Answer: C

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34. $MF + XeF_4 \rightarrow M^+A^-\left(M^+ - \right.$ alkali metal cation) The state of hybridisation of the central atom in A and sphere of the species are:

A. sp^3d, TBP

B. sp^3d^3, distorted octahedral

C. sp^3d^3, pentagonal planar

D. No compound formed at all

Answer: C

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35. Polystyrene , dacron and orlon are classified respectively as

A. Chain growth, step growth , step growth

B. Chain growth , step - growth , step growth

C. Chain growth, step - growth , chain growth

D. Step growth, step growth , chain growth

Answer: C

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36. Which of the acids cannot be prepared by Grignard reagent?

A. Acetic acid

B. Succinic acid

C. Formic acid

D. All of these

Answer: C

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37. pH of a 100 cc solution is 2. It will not change if

A. 100 cc of water is added to it

B. 100 cc of 0.1 M HCl is added to it

C. 100 cc (N/100) HCl is added to it

D. 1 cc of 0.1 M HCl is added to it

Answer: C

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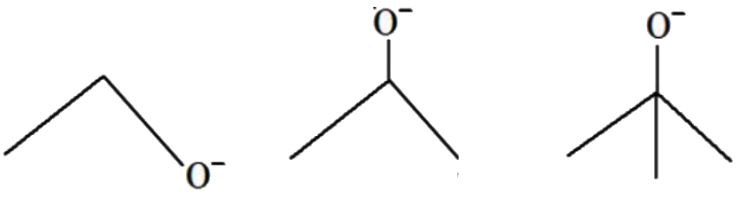
38. Determine the order of basic stregth of the given molecules



i. ii. iii.

A. $i > iii > ii$

B. $ii > i > iii$

C. $iii > i > i$

D. $i > ii > iii$

Answer: C

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39. Four successive members of the first row transition elements are listed below with their atomic number. Which one of them is expected to have the highest third ionisation enthalpy ?

A. Vanadium (Z = 23)

B. Chromium (Z = 24)

C. Manganese (Z = 25)

D. Iron (Z = 26)

Answer: C

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40. The concentration in g/L of a solution of cane sugar (Molecular weight = 342) which is isotonic with a solution containing 6 g of urea (Molecular weight = 60) per litre is

A. $3.42g/L$

B. $34.2g/L$

C. $5.7g/L$

D. $19g/L$

Answer: B

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41. CsCl crystallises in body centred cubic lattice. If 'a' its edge length then which of the following expressions is correct ?

A. $r_{Cs^+} + r_{Cl^-} = 3a$

B. $r_{Cs^+} + r_{Cl^-} = \frac{3a}{2}$

C. $r_{Cs^+} + r_{Cl^-} = \frac{\sqrt{3}}{2}a$

D. $r_{Cs^+} + r_{Cl^-} = \sqrt{3a}$

Answer: C

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42. Phenol can be distinguished from ethanol by the following reagents except

A. Sodium

B. Neutral $FeCl_3$

C. Phthalic anhydride/conc. H_2SO_4 and $NaOH$

D. Br_2 / H_2O

Answer: A

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43. Which of the following is an intensive property?

A. Volume

B. Enthalpy

C. Surface tension

D. Free energy

Answer: C

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44. For the following three reaction 1, 2 and 3, equilibrium constants are given:

(1) $CO_{(g)} + H_2O_{(g)} \Leftrightarrow CO_{2(g)} + H_{2(g)}, K_1$

(2) $CH_{4(g)} + H_2O_{(g)} \Leftrightarrow CO_{(g)} + 3H_{2(g)}, K_2$

(3) $CH_{4(g)} + 2H_2O_{(g)} \Leftrightarrow CO_{2(g)} + 4H_{2(g)}, K_3$

Which of the following relations is correct ?

A. $K_1\sqrt{K_2} = K_3$

B. $K_2K_3 = K_1$

C. $K_3 = K_1K_2$

D. $K_3K_2^3 = K_1^2$

Answer: C

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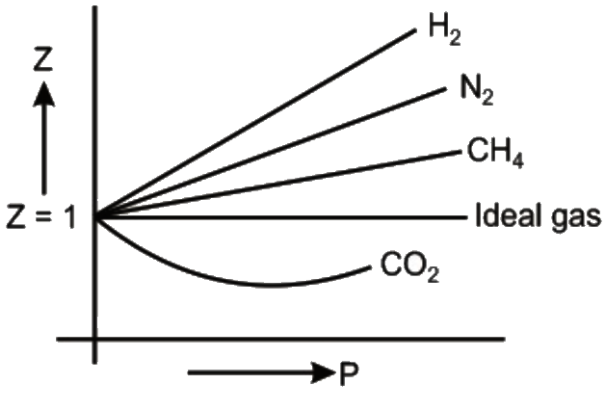
45. Consider the graph between compressibility factor Z and pressure P,



The correct increaing order of ease of liquefaction of the gases shown in the above graph is

A. $H_2 < N_2 < CH_4 < CO_2$

B. $CO_2 < CH_4 < N_2 < H_2$

C. $H_2 < CH_4 < N_2 < CO_2$

D. $CH_4 < H_2 < N_2 < CO_2$

Answer: A

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46. How many of the following species are related to Hall's process of purification of bauxite? White bauxite , Na_2CO_3, CO_2, cryolite, red bauxite , NaOH

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47. The dipole moment of HBr is $1.6 \times 10^{-30} cm$ and interatomic spacing is $1Å$. The $\%$ ionic character of HBr is

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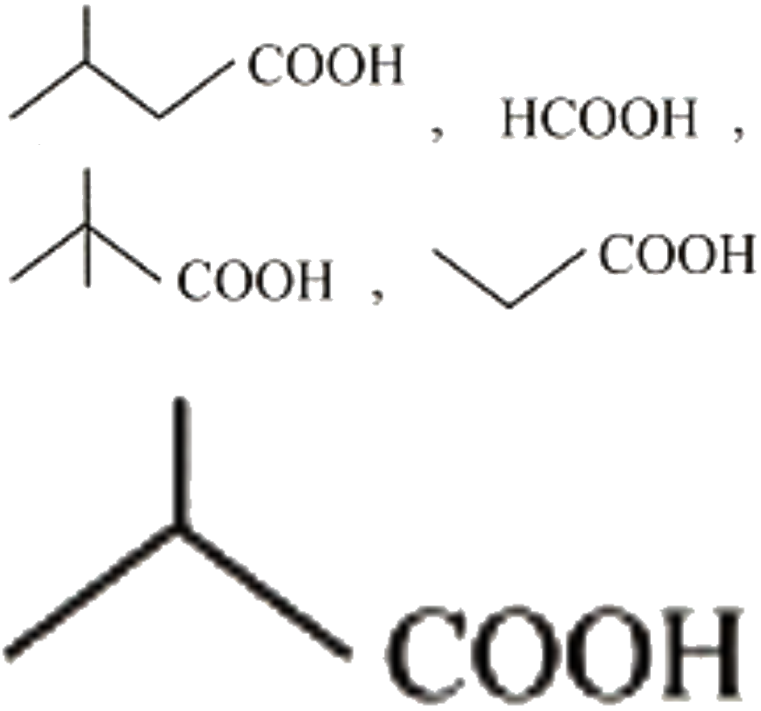
48. How many of the following acids will show higher reactivity towards esterification reaction as compared to acetic acid?



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49. Consider an electrochemical cell :

$A(s)\left|A^{n+}(aq.\ 2M)\right|\left|B^{2n+}(aq.\ 1M)\right|B(s)$. The value of ΔH° for the cell reaction is twice that of ΔG° at 300 K. If the amf of the cell is zero, the $\Delta S^{\circ}\left(\text{in } JK^{-1}mol^{-1}\right)$ of the cell reaction per mole of B formed at 300 K is _____ .

(Given : In (2) = 0.7, R (universal gas constant) = 8.3 J $K^{-1}mol^{-1}$. H, S and G are enthalpy, entropy and Gibbs energy, respectively.)

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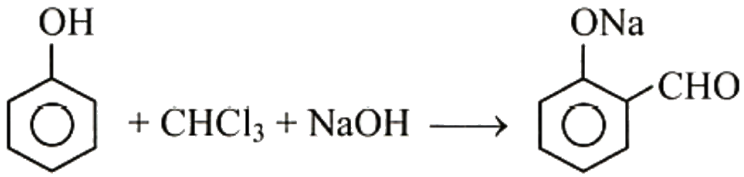
50.



The electrophile involved in above reaction has _____lone pair of electrons on central carbon atom.

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51. When $10ml$ of $0.1M$ acetic acid $(pK_a = 5.0)$ is titrated against $10ml$ of $0.1M$ ammonia solution $(pK_b = 5.0)$, the equivalence point occurs at pH

A. 5

B. 6

C. 7

D. 9

Answer: C

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52. Choose the incorrect statements.

A. $BeCO_3$ is preserved in an atmosphere of CO_2 as it is thermaly least stable.

B. BeF_2 forms a complex compound with excess NaF, in which the complex entity containing Be, is a cation.

C. Beryllium dissolves in an alkali to form $\left[Be(OH)_4\right]^{2-}$ ion.

D. Beryllium exhibits no diagonal relationship with sodium.

Answer: B

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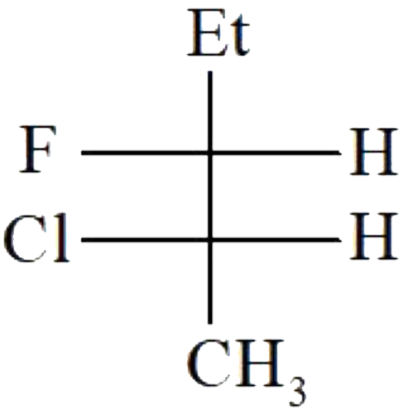
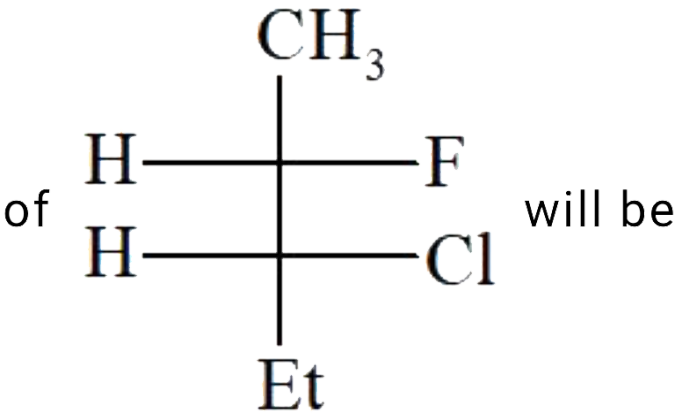


has optical

53.

rotation -45°, so optical rotation of



of will be

A. $+45^\circ$

B. 0°

C. -45°

D. can not be predicted

Answer: D

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54. HF is not stored in glass bottles because

A. It reacts with the aluminium oxide of the glass

B. it reacts with SiO_2 of the glass

C. It reacts with the visible part of the light

D. It reacts with sodium oxide of the glass

Answer: B

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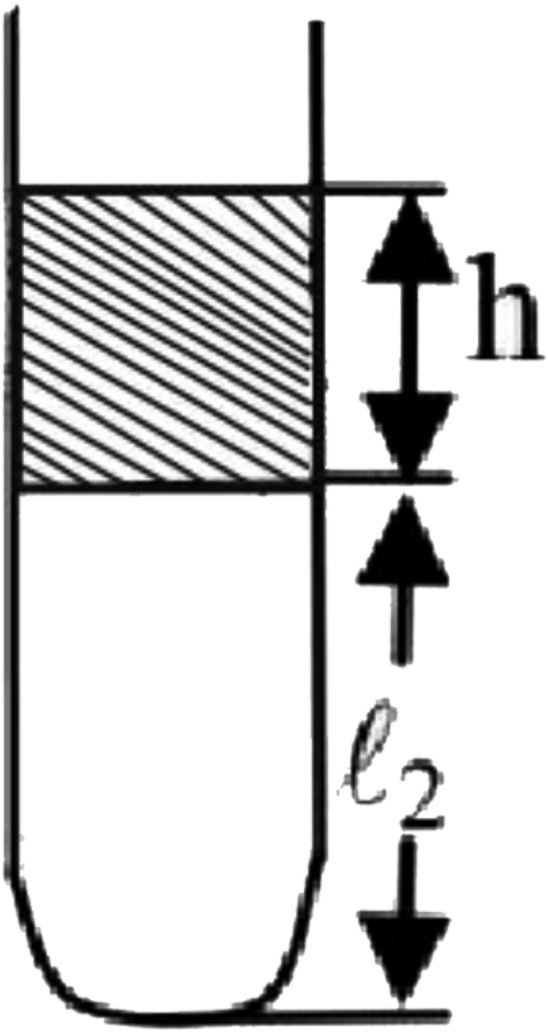
55. An air column closed in a tube sealed at one end by a Hg column having height h. When the tube is placed with open end down, the height of the air column Iis l_1. If the tube is turned so that its open end is at the top, the height of the air column is l_2. What is the atmospheric pressure

(P_0).



A. $P_0 = \dfrac{h(l_1 + l_2)}{(l_2 - l_1)} cm$ of Hg

B. $P_0 = \dfrac{h(l_1 - l_2)}{(l_2 + l_1)} cm$ of Hg

C. 76 cm of Hg

D. $P_0 = \frac{h(l_2 + l_1)}{(l_2 - l_1)} cm$ of Hg

Answer: D

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56. 2-Methylbutan-2-ol can be obtained by the acid catalyzed hydration of

A. $CH_3CH_2CH = CH_2$

B. $CH_3CH = CHCH_3$

C. $(CH_3)_2C = CHCH_3$

D. Either of the three

Answer: C

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57. The pyrimidine bases present in DNA are

A. Cytosin and Uracil

B. Cytosine and Thymine

C. Cytosin and Guanine

D. Cytosine and Adenine

Answer: B

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58. Which of the following is not isostructural with $SiCl_4$?

A. SO_4^{2-}

B. PO_4^{3-}

C. NH_4^+

D. SCl_4

Answer: D

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59. For the reaction, $2A + B \rightarrow C + D$, the order of reaction is

A. One with respect [B]

B. Two with respect to [A]

C. Three

D. Cannot be predicted

Answer: D

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60. In the reaction

$CH_3COOH \xrightarrow{LiAlH_4} (A) \xrightarrow{I_2 + NaOH} (B) \xrightarrow{Ag\,(\text{Dust})} (C)$, the final product C is:-

A. C_2H_5I

B. C_2H_5OH

C. C_2H_2

D. CH_3COCH_3

Answer: C

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61. Equilibrium constant K_p for the reaction $CaCO_3(s) \Leftrightarrow CaO(s) + CO_2(g)$ is 0.82 atm at $727^\circ C$.

If 1 mole of $CaCO_3$ is placed in a closed container of 20 L and heated to this temperature, what amount of $CaCO_3$ would dissociate at equilibrium?

A. 0.2 g

B. 80 g

C. 20 g

D. 50 g

Answer: C

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62. $TiAl(SO_4)_2.xH_2O$ is bcc with 'a' =1.22 nm. If the density of the solid is $2.32g/cc$, then the value of x is (Given :$N_A = 6 \times 10^{23}$) , at . Mass : $Ti = 204, Al = 27, S = 32$).

A. 2

B. 4

C. 47

D. 70

Answer: C

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63. In compound $O_2SC(NH_2)_2$, the geometry around S and N are respectively.

A. trigonal planar, trigonal pyramidal

B. tetrahedral,pyramidal

C. trigonal planar, tetrahedral

D. linear, pyramidal

Answer: A

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64. Geometrical shapes of the complex formed by the reaction of Ni^{2+} with Cl^{Θ}, CN^{Θ} and H_2O are :

A. Octahedral, tetrahedral and square planar

B. Tetrahedral , square planer and octahedral

C. Square planer, tetrahedral and octahedral

D. Octahedral, square planer and octahedral

Answer: B

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65. Slope of V_0 vs v curve is (where V_0= Stopping potential, v=subjected freqency)

A. e

B. $\frac{h}{e}$

C. ϕ

D. h

Answer: B

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66. The value of $\log_{10} K$ for a reaction $A \Leftrightarrow B$ is (Given: $\Delta_f H^{\Theta}_{298K} = -54.07 kJ mol^{-1}$, $\Delta_r S^{\Theta}_{298K} = 10 JK^{-1} mol^{-1}$, and $R = 8.314 JK^{-1} mol^{-1}$

A. 5

B. 10

C. 95

D. 100

Answer: B

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67. Aldehyde with NH_2NH_2 forms

A. Hydrazone

B. Aniline

C. Nitrobenzene

D. none of these

Answer: A

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68. Gallium arsenide is purified by _____.

A. van-Arkel method

B. Zone-refining method

C. Electrolytic method

D. Liquation

Answer: B

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69. In the nucleophilic substitution reactions (S_N2 or S_N1) , the reactivity of alkyl halids follows the sequence

A. $R-I>R-Br>R-Cl>R-F$

B. $R-Cl>R-F>R-Br>R-I$

C. $R-F>R-Cl>R-Br>R-I$

D. $R-I>R-F>R-Cl>R-Br$

Answer: A

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70. At a constant temperature, which of the following aqueous solutions will have the maximum vapour pressure?

$\left(MolwtNaCl=58.5,\ H_2SO_4=98.0gmol^{-1}\right)$

A. 1 molal $NaCl$(aq)

B. 1 molar $NaCl$ (aq)

C. 1 molal H_2SO_4 (aq)

D. 1 molar H_2SO_4 (aq)

Answer: A

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71. First and second ionization energies of magnesium are 7.646 and 15.035 eV respectively. The amount of energy in kJ/mol needed to convert all the atoms of Magnesium into Mg^{2+} ions present in 12 mg of magnesium vapours is: (Report your answer by multiplying with 10 and round it upto nearest integer)

(Given $1eV = 96.5kJmol^{-1}$)

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72. Molar conductivity of aqueous solution of HA is $200Scm^2mol^{-1}$, pH of this solution is 4

Calculate the value of $pK_a(HA)$ at $25^\circ C$.

Given $\wedge_M^\infty (NaA) = 100 Scm^2 mol^{-1}$,

$\wedge_M^\infty (HCl) = 425 Scm^2 mol^{-1}$,

$\wedge_M^\infty (NaCl) = 125 Scm^2 mol^{-1}$

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73. How many of the following ethers CANNOT be prepared by Williamson's synthesis?

$CH_3OCH_2CH_3, C_6H_5OCH_3, (C_6H_5)_2O, (CH_3)_3COCH_3, (C_2H_5)_2O, (CH$

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74. How many of the following groups if substituted at o- and /or p- postions of chlorobenzene, increase its reactivity towards nucleophilic substitution?

$-CN, -CH_3, -NH(CH_3), -COOH, -NO_2, -OCH_3.$

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75. How many of the following are lanthanides?

Uranium, praseodymium, erbium, gadolinium, cerium, hafnium, osmium, iridium

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76. The pH of pure water at $25^\circ C$ and $35^\circ C$ are 7 and 6, respectively. Calculate the heat of formation of water from $H^{\oplus}$ and $\overset{\Theta}{O}H$.

A. $\Delta H = 84.551 \quad \text{kcal/mol}$

B. $\Delta H = -84.551 \quad \text{kcal/mol}$

C. $\Delta H = 44.981 \quad \text{kcal/mol}$

D. $\Delta H = -44.981 \quad \text{kcal/mol}$

Answer: B

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77. Which reaction does not occur in reduction process.

A. $HgS + 2HgO \xrightarrow{\Delta} 3Hg + SO_2$

B. $PbS + 2PbO \xrightarrow{\Delta} 3Pb + SO_2$

C. $ZnS + 2ZnO \xrightarrow{\Delta} 3Zn + SO_2$

D. None of these

Answer: C

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78. Percentage loss in mass, when $NaHCO_3(s)$ is heated in open vessel

$2NaHCO_3(s) \rightarrow Na_2CO_3(s) + CO_2(g) + H_2O(g)$

A. $21.12\ \%$

B. $36.9\ \%$

C. $30\ \%$

D. $32.23\ \%$

Answer: B

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79. A fire work gave bright crimson light. It probably contain an element of

A. Ca

B. Sr

C. Ba

D. Mg

Answer: B

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80. The gas produced by the passage of air over hot coke is

A. Carbon monoxide

B. Carbon dioxide

C. Producer gas

D. Water gas

Answer: C

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81. Which amongst the following has zero magnetic moment ?

A. $\left[Ni(NH_3)_6\right]Cl_2$

B. $Na_3[FeF_6]$

C. $\left[Cr(H_2O)_6\right]SO_4$

D. $K_4\left[Fe(CN)_6\right]$

Answer:

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82. The correct statement is

A. Potassium dichromate is more soluble than sodium dichromate

B. All $Cr - O$ bond lengths in dichromate ion are equal.

C. Potassium dichromate is used as a primary standard in volumetric titrations

D. All are correct

Answer: C

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83. Incorrect matches is

A. $COCl_2$ -phosgene

B. SO_2Cl_2- Thionyl chloride

C. $ClCH_2CH_2SCH_2CH_2Cl$ - mustard gas

D. H_2SO_5 - Caro's acid

Answer: B

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84. The $p\pi - p\pi$ bond is present in

A. XeO_3

B. SO_4^{2-}

C. SO_2

D. All of these

Answer: C

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85. The decreasing order of rate of reaction for the following compounds towards S_N2Th (bimolecular nucleophilic substitution with tetrahedral intermediate) reaction is

(i) $CH_3 - CH_2 - \overset{O}{\overset{||}{C}} - NH_2$

(ii) $CH_3 - CH_2 - \overset{O}{\overset{||}{C}} - Br$

(iii) $CH_3 - CH_2 - \overset{O}{\overset{||}{C}} - O - \overset{O}{\overset{||}{C}} - CH_2 - CH_3$

(iv) $CH_3 - CH_2 - \overset{O}{\overset{||}{C}} - O - C_2H_5$

A. $I > II > III > IV$

B. $II > III > I > IV$

C. $III > II > IV > I$

D. $II > III > IV > I$

Answer: D

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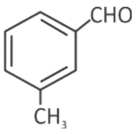
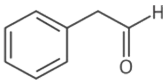
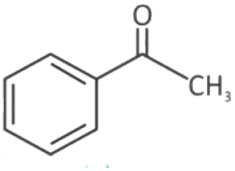
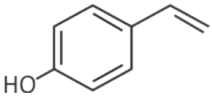
86. A benzenoid organic compound $A(C_8H_8O)$ gives B and white crystalline solid C with Cl_2 and $NaOH$. On heating compound B gives a compound with unpleasant smell with $CH_3 - CH_2 - NH_2$ and alcoholic KOH. Compound A is

A. 

B. 

C. 

D. 

Answer: C

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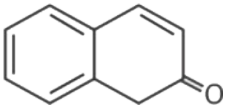
87. Find the last product [D] in reaction sequence

$$C_6H_5CHO + CH_3 - \overset{\overset{O}{||}}{C} - CH_2 - COOC_2H_5 \xrightarrow{\text{pyridine}}$$

$$A \xrightarrow{H_3O^+} \xrightarrow{\Delta} C \xrightarrow[OH^- / \Delta]{NH_2 - NH_2} D$$

A. $C_6H_5 - CH = CH\overset{\overset{OH}{|}}{C}H - CH_3$

B. $C_6H_5 - CH = CH - CH_2 - CH_3$

C. 

D. $C_6H_5 - CH = CH - \overset{\overset{O}{||}}{C} - CH_3$

Answer: B

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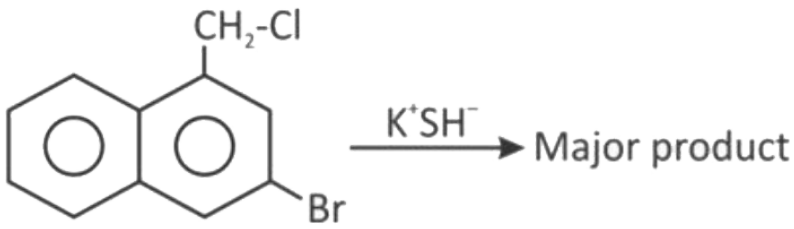
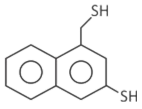
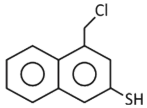
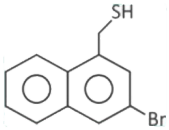
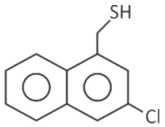
88. 

Major product

A. 

B. 

C. 

D. 

Answer: C

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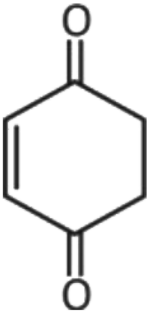
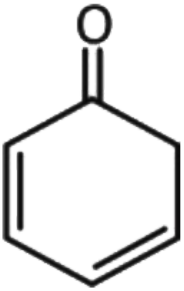
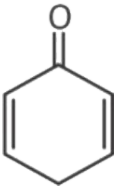
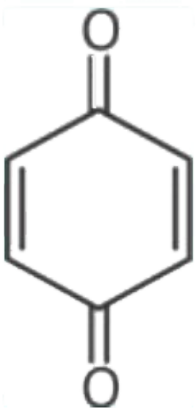
89. Which of the following compound do not undergo enolisation?

A. 

B. 

C. 



D.

Answer: D

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90. Arrange the following resonating structures in order of increasing stability

$$\underset{(I)}{CH_2 = \overset{+}{N} = \overset{-}{N}} \qquad \underset{(II)}{H_2\overset{+}{C} = N = \overset{-}{N}} \qquad \underset{(III)}{H_2\overset{-}{C} - \overset{+}{N} \equiv N} \qquad \underset{(IV)}{H_2\overset{-}{C} - N = \overset{+}{N}}$$

A. $II > I > IV > III$

B. $I > II > IV > III$

C. $III > II > IV > I$

D. $IV > II > III > I$

Answer: A

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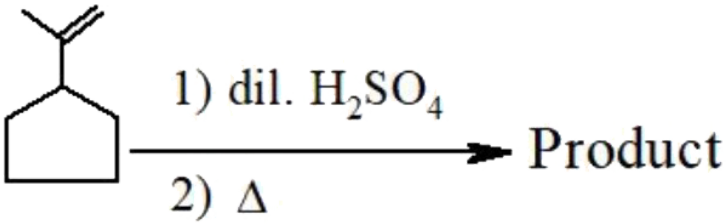
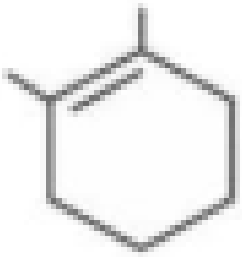
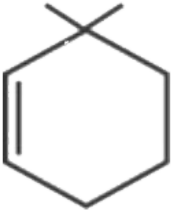


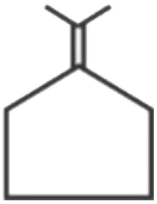
91.

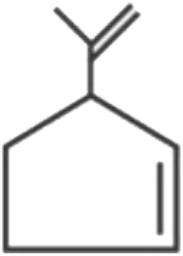
Major product of the reaction is



A.

B. 

C. 

D. 

Answer: A

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92. Calculate ΔH when 2 moles of solid benzoic acid undergo complete combustion at 300 K if

$C_6H_5COOH(s) + \frac{15}{2}O_2(g) \rightarrow 7CO_2(g) + 3H_2O(l)$

$\Delta U_{reaction} = -750kJ/\text{mole}$

A. $-1.247kJ$

B. $-2.494kJ$

C. $+2.494kJ$

D. $+1.247kJ$

Answer: B

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93. For the reaction, $A + 2B \rightarrow C$, the differential from of the rate law is:

A. $R = k[A]^2[B]^1$

B. $R = k[A][B]$

C. $R = k[A]^1[B]^0$

D. $R = k[A][B]^{-1}$

Answer: B

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94. A $5.25\ \%$ solution of a substance is isotonic with a $1.5\ \%$ solution of urea (molar mass $= 60 gmol^{-1}$) in the same solvent. If the densities of both the solutions are assumed to be equal to $1.0 gcm^{-3}$, molar mass of the substance will be:

A. $105.0\ \text{g mol}^{-1}$

B. $210.0\ \text{g mol}^{-1}$

C. $90.0\ \text{g mol}^{-1}$

D. $15.0\ \text{g mol}^{-1}$

Answer: B

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95. The ionization constant of a weak electrolyte is 25×10^{-6} while the equivalent conductance of its 0.01 M solution is 19.6 s cm^2eq^{-1}. The equivalent conductance of the electrolyte at infinite dilution (in S cm^2eq^{-1}) will be

A. 250

B. 196

C. 392

D. 384

Answer: C

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96. $0.5g$ of an organic compound on $Kjeldahl's$ analysis gave enough ammonia to just neutralize $10cm^3$ of $1MH_2SO_4$. The percentage of nitrogen in the compound is

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97. Number of crystal systems having only 2 types of bravais lattices = x, number of crystal system having at least two interfacial angles equal = y and number of crystal systems having all the three edge lengths equal = z. Then find the value of $x \times y \times z$.

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98. The pK_a values of ionisable groups in lysine are 2.18, 8.95 and 10.79 respectively. Find isoelectric point of lysine.

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99. Among the following, total number of radioactive elements are In, Ac, At, Ba, Tc, Pm, Ta, Xe

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100. In sample of excited hydrogen atoms, electron make transition from n = 2 to n = 1. Emitted quanta strike on a metal of work functio $[\phi]4.2ev$. Calculate the wavelength (in $\mathring{A}$) associated with ejected electrons having maximum kinetic energy.

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101. $A + B \Leftrightarrow C + D$. If finally the concentrations of A an d B are both equal but at equilibrium concentration of D will be twice of that of A then what will be the equilibrium constant of reaction.

A. $\frac{9}{4}$

B. $\frac{9}{4}$

C. $\frac{1}{4}$

D. 4

Answer: C

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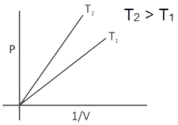
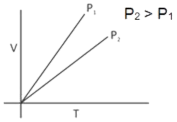
102. Which of the following graphs is inconsistent with ideal gas behaviour ? (Assume n = constant)

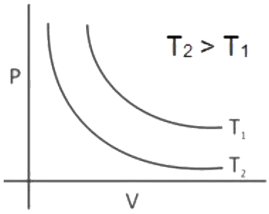
A.



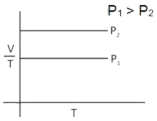
B.



C.



D.



Answer: C

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103. The ratio of minimum to maximum wavelength in Balmer series is

A. $5:9$

B. $5:36$

C. $1:4$

D. $3:4$

Answer: A

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104. A substance X is a compound of an element of group $1A$ the substance X gives a violet colour in flame test, X is

A. NaCl

B. CsCl

C. KCl

D. none of these

Answer: B

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105. Compare the stability of following carbocations .

(I) (II) (III)

A. $III > II > I$

B. $II > III > I$

C. $III > I > II$

D. $II > I > III$

Answer: C

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106. How many structural isomeric alkene possible for molecule formula C_5H_{10} which can show geometrical isomerism ?

A. 1

B. 2

C. 0

D. 3

Answer: A

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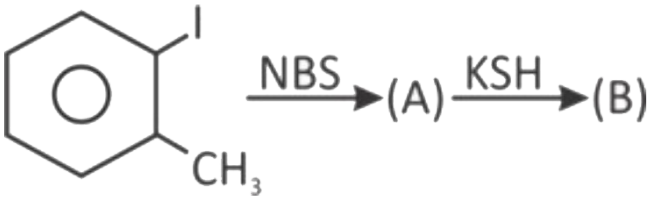
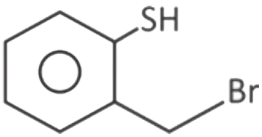
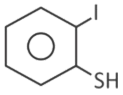
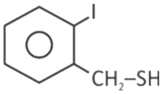
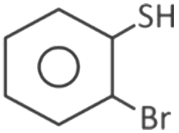
107. Choose the correct product for the following reaction :



A. 

B. 

C. 

D. 

Answer: C

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108. The molecule which contains maximum number of lone Pair is

A. IF_7

B. XeF_6

C. XeF_4

D. XeF_2

Answer: D

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109. The set containing only transition metals is

A. Ti, Nb, Ra

B. Pd,Ir, Ta

C. Ag,Au,In

D. W,Pt,Po

Answer: B

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110. The atomic numbers of elements A,B,C and D are Z - 1, Z, Z + 1 and Z + 2 respectively. If B is a noble gas, choose the correct statement among the following statements :

I. A has higher electron affinity.

II. C exists in +2 oxidation state.

III. D is an alkaline earth metal.

A. (i) and (iii)

B. (ii) and (iii)

C. (i) and (iii)

D. (i),(ii) and (iii)

Answer: C

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111. Dinitrogen is used

A. In manufacture of calcium cyanamide

B. In cryosurgery

C. As a refrigerant

D. All of these

Answer: D

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112. Regarding the oxidation states of elements of transition element the incorrect statement is

A. Mo^{+6} is more stable than Cr^{+6}

B. W^{+6} is more stable than Cr^{+6}

C. Oxoanion of Cr^{+6} in acidic medium is better oxidizing agent than oxides of Mo and W in + 6 oxidation state .

D. Higher oxidation states are shown by metals when they are attached to π - acceptor ligands .

Answer: D

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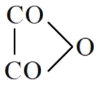
113. $\begin{matrix} COOH \\ | \\ COOH \end{matrix} \xrightarrow[(ii)\,2NH_3]{(i)\,2C_2H_5OH} [X] \xrightarrow{P_2O_5}$ what is Y ?

A. $\begin{matrix} CN \\ | \\ CN \end{matrix}$

B. $\begin{matrix} COOC_2H_5 \\ | \\ COOC_2H_5 \end{matrix}$

C. 

CH_2NH_2

D. |

CH_2NH_2

Answer: A

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114. Gabriel phthalimide synthesis can be used to prepare:

A. Only primary aromatic amine

B. Only primary aliphatic amine

C. Only primary and secondary amine

D. All types of amine

Answer: B

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115. Glucose is

A. Fructose

B. Galactose

C. Talose

D. Ribose

Answer: B

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116. The temperatuer coefficient, of the emf, i.e., $\frac{dE}{dt} = -0.00065$ Volt deg^{-} for the cell, $Cd|CdCl_2(1M)||AgCl(s)|Ag$ at 25°.

Calcualte the entropy changes ΔS_{298K} for the cell reaction,

$Cd + 2AgCl \rightarrow Cd^{2+} + 2Cl^{-} + 2Ag$

A. $-105.5JK^{-1}$

B. $-105.2JK^{-1}$

C. $-75.7JK^{-1}$

D. $-125.5JK^{-1}$

Answer: D

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117. Among the following the surfactant that will from micelles in aqueous solution at the lowest molar concentration at ambident condition is :

A. $CH_3(CH_2)_{15}N^+(CH_3)_3Br^-$

B. $CH_3(CH_2)_{11}OSO_3^-Na^+$

C. $CH_3(CH_2)_6COO^-Na^+$

D. $CH_3(CH_2)_{11}N^+(CH_3)_3Br^-$

Answer: A

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118. If heat of dissociation of $CHCl_2COOH$ is 0.7kcal /mole , the , ΔH for the reaction $CHCl_2COOH + KOH \rightarrow CHCl_2COOH$ is $+ H_2O$

A. $-13kcal$

B. $+13kcal$

C. $-14.4kcal$

D. $-13.7kcal$

Answer: A

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119. Which of the following reactions is not involved in serpeck's process of leaching of Al_2O_3 from white bauxite ore ?

A. $Al_2O_3 + N_2 + 3C \xrightarrow{\Delta} 2AlN + 3CO$

B. $SiO_2 + C \xrightarrow{\Delta} Si + 2CO$

C. $Na_2CO_3 + Al_2O_3 \xrightarrow{\Delta} 2NaAlO_2 + CO_2$

D. $2Al(OH)_3 \xrightarrow{\Delta} Al_2O_3 + 3H_2O$

Answer: C

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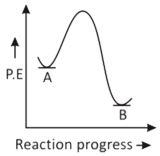
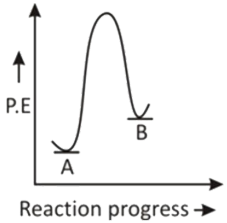
120. For a reaction $A \rightarrow B, E_a = 10kJ/mol, \Delta H = 5kJ/mol$. Thus potential energy profile for this reaction is

A.



B.



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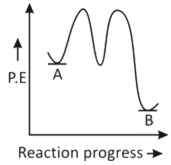

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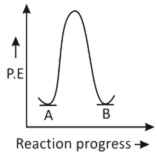

Answer: B

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121. The amount (in grams) of sucrose (mol.wt. = 342g) that should be dissolved in 100 g water in order to produce a solution with a $105.0^{\circ}C$ difference between the boiling point and freezing point is (Given that $k_f = 1.86Kkgmol^{-1}$ and $k_b = 0.52Kkgmol^{-1}$ for water) Report your answer by rounding it up to to the nearest whole number.

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122. Narcotics are chemical substances which produce sleep and unconsciousness. Morphine diacetate is most widely used analgesic . How many double bond equivalents are present in morphine diacetate ?

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123. Total number of low spin complexes are $\left[Fe(CN)_6^{3-}, \left[Co(NO_2)_6\right]^{3-}, [FeF_6]^{3-} [IrF_6]^{3-}, \left[Co(NH_3)_6\right]^{3+}, [Co(H_2$

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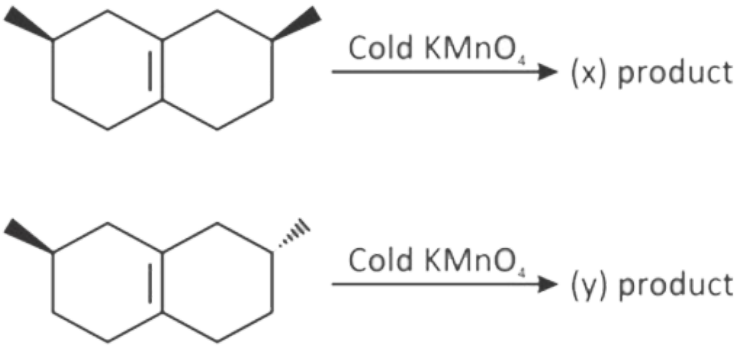
124.



Find the value $\frac{x+y}{2}$ (include sterio isomers)

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125. 245 g impure sample of $KClO_3$ on heating gives $12gO_2(g)$ according to $2KClO_3(s) \rightarrow 2KCl(s) + 3O_2(g)$ Calculate % purity of sample ?

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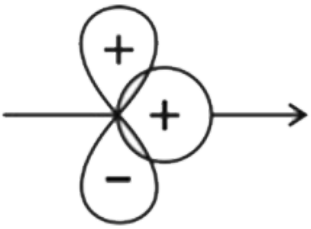
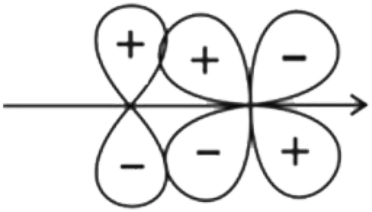
126. Which of the following is a positive overlap that leads bonding ?

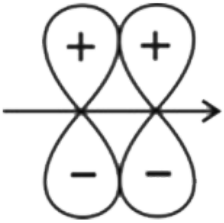
(I)



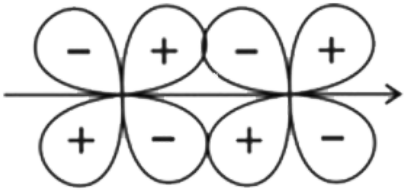
(II)



(III)



(IV)



A. I and II

B. II and III

C. III and IV

D. I and IV

Answer: B

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127. Which among the following compounds does not act as reducing agent ?

A. H_2O

B. H_2S

C. H_2Se

D. H_2Te

Answer: A

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128. The initial concentration of X and Y were 2 and 4 mole / L respectively . For the following equilibrium $X + 2Y \Leftrightarrow Z$ which of the following relationship among equilibrium concentrations of x , y and z is not feasible ?

A. $[X] < [Z]$

B. $[X] < [Y]$

C. $[X] > [Y]$

D. $[Y] > [Z]$

Answer: C

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129. Using the Gibbs energy change, $\Delta G^{\circ} = +63.3kJ$, for the following reaction,

$Ag_2CO_3 \Leftrightarrow 2Ag^{+}(aq) + CO_3^{2-}$

the K_{sp} of $Ag_2CO_3(s)$ in water at $25^\circ C$ is

$(R = 8.314 JK^{-1}mol^{-1})$

A. 7.9×10^{-2}

B. 8.0×10^{-12}

C. 2.9×10^{-3}

D. 3.2×10^{-26}

Answer: B

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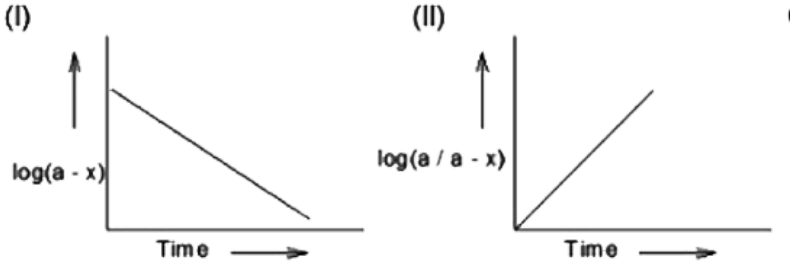
130. Which set represent 1st order reactions out of (I) , (II) and (III)



A. I, II and III

B. I and II

C. II and III

D. I and III

Answer: B

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131. Which one is the wrong statement ?

A. Anhydrous $AlCl_3$ exists as Al_2Cl_6 (dimer)

B. Al_2Cl_6 contains $3c - 4e^-$ bonds

C. Anhydrous $AlCl_3$ fumes in moist air

D. Anhydrous $AlCl_3$ is ionic

Answer: D

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132. When MnO_2 is fused with KOH, a coloured compound is formed. The product and its colour is

A. K_2MnO_4 , green

B. $KMnO_4$, purple

C. Mn_2O_3 brown

D. MnO_2, black

Answer: A

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133. A metal is illumimated by light of two different wavelength $248nm$ and $310nm$. The maximum speeds of the photoelectrons corresponding in these wavelength are u_1 and u_2 respectively . If the ratio $u_1 : u_2 = 2:1$ and $hc = 1240eVnm$, the work function of the metal is nearly

A. 3.7 eV

B. 3.2 eV

C. 2.8 eV

D. 2.5 eV

Answer: A

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134. The number and type of bonds between two carbon atoms in CaC_2 are:

A. one sigma and one pi bonds

B. one sigma and two pi bonds

C. one sigma and half pi bond

D. one sigma bond

Answer: B

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135. For the reaction:

$X_2O_4(l) \rightarrow 2XO_2(g)$

$\Delta U = 2.1cal, \Delta S = 20\text{cal}K^{-1}\text{at}300K$

Hence ΔG is

A. 9.3 kcal

B. 2.7 kcal

C. -2.7 kcal

D. -9.3 kcal

Answer: C

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136. A balloon filled with oxygen is placed in a tank full of hydrogen gas at the same pressure is pricked with a sharp pointed needle. The volume of

balloon just after the pricking would be

A. Shrunk

B. Enlarge

C. Completely collapsed

D. remains unchanged in size

Answer: B

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137. In the Hall-Heroult process for the extraction of Al, which of the following statements is false ?

A. CO and CO_2 are produced in this process

B. AL_2O_3 is mixed with CaF_2 which lowers the melting point of the mixture and brings conductivity

C. Al^{3+} is reduced at the cathode to from Al

D. Na_3AlF_6 helps in increasing the melting point of the mixture

Answer: D

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138. Which of the following acts as an oxidising as well as reducing agent ?

A. Na_2O

B. H_2SO_4

C. HNO_3

D. HNO_2

Answer: D

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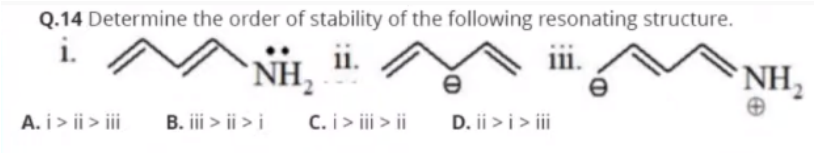
139. Determine the order of stability of the following resonating structure.



A. $i > ii > iii$

B. $iii > ii > i$

C. $i > iii > ii$

D. $ii > i > iii$

Answer: A

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140. The ionization energies of Li and Na are $520kJmol^{-1}$ and $495kJmol^{-1}$ respectively. The energy required to convert all the atoms present in 7 mg of Li vapours and 23 mg of sodium vapours to their respective gaseous captions respectively are :

A. 52 J , 49.5 J

B. 520 J , 495 J

C. 49.5 J , 52 J

D. 495 J , 52 J

Answer: B

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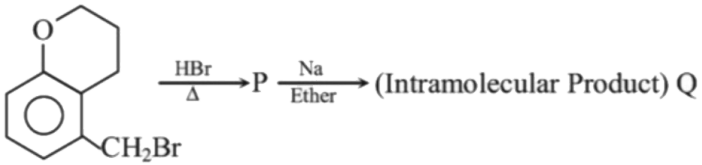
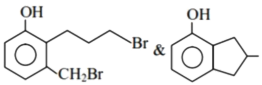
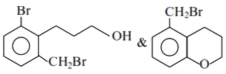
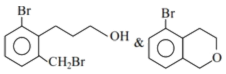
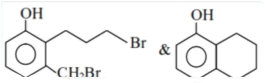
141. In the following reaction sequence, structures of P and Q , are respectively



A. 

B. 

C. 

D. 

Answer: D

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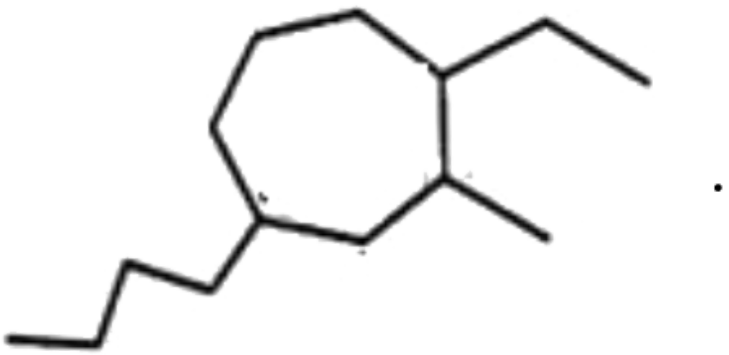
142. Provide the systematic name of the compound shown



A. 4 - Butyl - 2 ethyl - 1 methylcycloptane

B. 1 - Butyl - 4 ethyl - 3 methylcycloptane

C. 2 - Butyl - 4 ethyl - 1 methylcycloptane

D. 4 - Butyl - 1 ethyl - 2 methylcycloptane

Answer: D

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143. Which reagent can be used to convert a carboxylic acid chloride into a ketone ?

A. Chromic acid

B. PCP

C. Diborane , hydrogen peroxide

D. An organolithium compound

Answer: D

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144. Which of the following can not be made by reduction of ketone or aldenhyde with $NaBH_4$?

A. 1 - Butanol

B. 2 - Butanol

C. 2 - Methyl - 1 - propanol

D. 2 - Methyl - 2 - propanol

Answer: D

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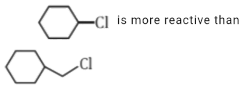
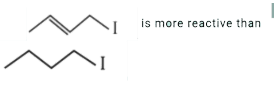
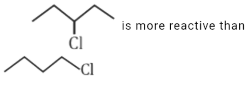
145. which of the following statement is correct for the reactivity in S_N2 reaction ?

A. 

B. 

C. 

is more reactive than

D. 

is more reactive than

Answer: B

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146. pH of the anodic solution of the following cell is $Pt, H_2(1atm)|H^+(xM)||H^+(1M)|H_2(1atm), Pt$ if $E_{\text{cell}} = 0.2364V$.

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147. The vapour pressure of pure water at $26^\circ C$ is 25.5 torr. . The vapour pressure of a solution which contains 20.0 glucose, $(C_6H_{12}O_6)$, in 100 g water (in torr) is ?

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148. The number of geometric isomers of the complex $Cr(NH_3)_3Cl_3$ are

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149. A hydrocarbon $(A)C_nH_{2n-4}$ on ozonolysis gives $(CH_3)_2CHCH_2CHO, 2OHCCH_2CH_2CHO$ and CH_3COCH_3 The value of n is

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150. The gas phase decomposition of dimethylether follows first order kinetics $CH_3-O-CH_3(g) \rightarrow CH_4(g)+H_2(g)+CO_{(g)}$ The reaction is carried out in constant volume container at $500^\circ C$ and has a half - life of 14.5 . Initially only dimethylether is present at a pressure of 0.40 atm . The total pressure of the system after 12 min is $\frac{x}{100}$ atm . The value of x is [Given $10^{0.25}=1.778$]

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