CHEMISTRY

BOOKS - KVPY PREVIOUS YEAR

MOCK TEST 5

Exercise

1. Equivalent weight of $MnO_4^{\ominus}$ in acidic neutral and basic media are in ratio of:

A. $3:5:15$

B. $5:3:1$

C. $5:1:3$

D. $3:15:5$

Answer:

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2. $\left[Co(NH_3)_4(NO_2)_{92}\right]Cl$ exhibits _____.

A. linkage isomerism, ionization isomerism and geometrical isomerism

B. ionization isomerism, geometrical isomerism and optical isomerism

C. linkage isomerism, geometrical isomerism and optical isomerism

D. linkage isomerism, ionization isomerism and optical isomerism

Answer:

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3. The increasing order of the boiling points for the following compounds is :

(I) C_2H_5OH (II) C_2H_5Cl

(III) $C_2H_5CH_3$ (IV) $C_2H_5OCH_3$

A. $(III) < (IV) < (II) < (I)$

B. $(IV) < (III) < (I) < (II)$

C. $(II) < (III) < (IV) < (I)$

D. $(III) < (II) < (I) < (IV)$

Answer:

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4. Hyperconjugation is more pronounced in

A. 2-methylpropene

B. but-2-ene

C. 2, 3-dimethylbut-2-ene

D. 2-methylbut-2-ene

Answer:

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5. Ice and water are placed in a closed container at a pressure of 1 atm and 273.15 K temperature . If pressure of the system is increased by 2 atm keeping temperature constant the correct observation would be

A. The liquid phase disappears completely

B. The amount of ice decreases

C. The solid phase (ice) disappears completely

D. Volume of the system increases

Answer:

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6. The value of the 'spin only magnetic moment for one of the following configuration is 2.84 BM. The correct one is

A. d^5 (in strong ligand field)

B. d^3 (in weak as well as in strong fields)

C. d^4 (in weak ligand fields)

D. d^4 (in strong ligand fields)

Answer:

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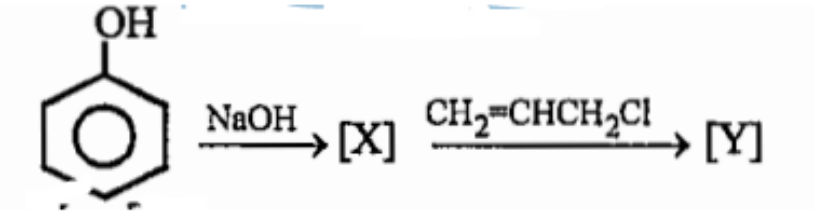
7.



Here[Y] is a

A. single compound

B. mixture of two compounds

C. mixture of three compounds

D. no reaction is possible

Answer:

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8. Gradual addition of KI solution to $Bi(NO_3)_3$ solution initially produces a dark brown precipitate which dissolves in excess of KI to give a clear yellow solution. Write chemical equation for the above reactions.

A. I_2

B. KI_3

C. $Bi(OH)_2$

D. $Bi(OH)(NO_3)_2$

Answer:

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9. If the average life time of an excited state of hydrogen is of the order of 10^{-6} s estimate how may orbits an electron makes, whenit is the state n=2 and before it suffers a transition to state n=1 (Bohr radius $r_0 = 5.3 \times 10^{11}$m)

A. 2.28×10^6

B. 22.8×10^6

C. 8.23×10^6

D. 2.82×10^6

Answer:

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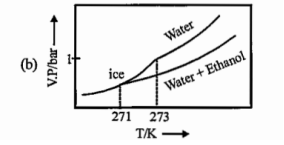
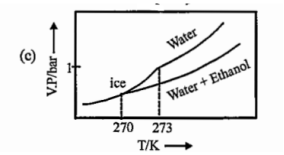
10. Pure water freezes at 273 K and 1 bar. The addition of 34.5 g of ethanol to 500 g of water changes the freezing point of the solution. Use the freezing point depression constant of water as 2 K $kgmol^{-1}$. The figures shown below represent plots of vapour pressure (V.P.) versus temperature (T). [molecular weight of ethanol is$46gmol^{-1}$ Among the following, the option representing change in the freezing point is

A.

B.



C.



D.

Answer:

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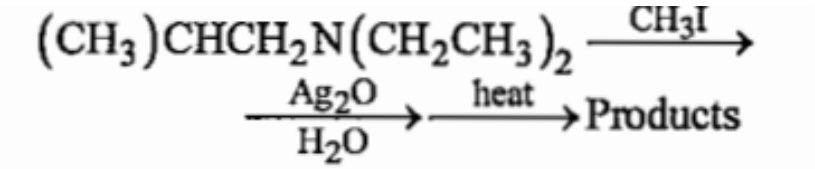
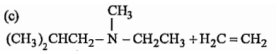
11. The major products obtained from the following sequence of reactions are:



A. $(CH_3)_2CHCH_2NH_2 + H_2C = CH_2$

B. $(CH_3)_2NCH_2CH_3 + H_2C = C(CH_3)_2$

C.



D. $(CH_3)_3\overset{+}{N}CH_2CH_3I^- + H_2C = CH_2$

Answer:

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12. The root mean square velocity of an ideal gas to constant pressure varies with density (d) as

A. d^2

B. d

C. $\sqrt{d}$

D. $1/\sqrt{d}$

Answer:

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13. During the process of digestion, the proteins present in food materials are hydrolysed to amino acids. The two enzymes involved in the process are:

$\xrightarrow{\text{Enzyme (A)}}$ Polypeptides

$\xrightarrow[\text{Enzyme (B)}]{}$ Amino acids

A. Diastase and lipase

B. Pepsin and trypsin

C. Invertase and zymase

D. Amylase and maltase

Answer:

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14. To an acidic solution of an anion, a few drops of $Kmno_4$ solution are added. Which of the following, if present, will not decolourise the $KMnO_4$ solution?

A. I^-

B. CO_3^{2-}

C. S^{2-}

D. NO_2^-

Answer:

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15. Select pair of compounds in which both have different hybridization but have same molecular geometry :

A. BF_3, BrF_3

B. ICI_2^- , $BeCl_2$

C. $BCl_3, PCl3$

D. PCl_3, NCl_3

Answer:

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16. Which one of the following compounds would have the highest heat of hydrogenation ?

A. $CH_2 = CH_2$

B. $CH_3 - CH_2 - CH = CH_2$

C. $CH_3CH = CHCH_3$

D. $(CH_3)_2C = C(CH_3)_2$

Answer:

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17. The rate constant, the activation energy and the Arrhenius parameter of a chemical reactions at $25^\circ C$ are $3.0 \times 10^{-4} s^-$, $104.4\,\text{kJ mol}^{-1}$ and $6 \times 10^{14} s^{-1}$ respectively. The value of the rate constant as $T \to \infty$ is

A. $2.0 \times 10^{18} s^{-1}$

B. $6.0 \times 10^{14} s^{-1}$

C. Infinity

D. $3.6 \times 10^{30} s^{-1}$

Answer:

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18. For a 'C'M concentarted solution of a weak electrolyte $A_xB_y\alpha$(degree of dissociation) is

A. $\alpha = \sqrt{K_{eq}/c(x+y)}$

B. $\alpha = \sqrt{K_{eq}c/(xy)}$

C. $\alpha = \left(K_{eq}/c^{x+y-1}x^2y^2\right)^{1/x+y}$

D. $\alpha = (K_{eq}/cxy)$

Answer:

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19. $3g$ of actived chacoal was added to 50mL of acetic acid solution $(0.06N)$ in a flask. After an hour it was filterred and the strength of the

filtrate was found to be $0.042N$. The amount of acetic adsorbed (per gram of charcoal) is:

A. 42mg

B. 54mg

C. 18mg

D. 36mg

Answer:

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20. The standard state Gibbs free energies of formation of) C(graphite and C(diamond) at T = 298 K are

$\Delta_f G^\circ[\mathrm{C(graphite)}] = 0 kJ mol^{-1}$

$\Delta_f G^\circ[\mathrm{C(diamond)}] = 2.9 kJ mol^{-1}$

The standard state means that the pressure should be 1 bar, and substance should be pure at a given temperature. The conversion of graphite [ ) C(graphite] to diamond [C(diamond)] reduces its volume by

$2 \times 10^{-6} m^3 mol^{-1}$. If) C(graphite is converted to C(diamond) isothermally at T = 298 K, the pressure at which) C(graphite is in equilibrium with C(diamond), is

$[\text{Useful information:} 1J = 1kgm^2s^{-2}, 1Pa = 1kgm^{-1}s^{-2}, 1\text{bar} = 10^5 Pa]$

A. 14501 bar

B. 58001 bar

C. 1450 bar

D. 29001 bar

Answer:

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21. Li forms a body-centred cubic lattice. If the edge of the cube is $3.5 \times 10^{-10} m$ and the density is $5.3 \times 10^2 kgm^{-3}$, calculate the percentage occupancy of Li metal.

A. 87.78%

B. 99.87%

C. 97.78%

D. 94.12%

Answer:

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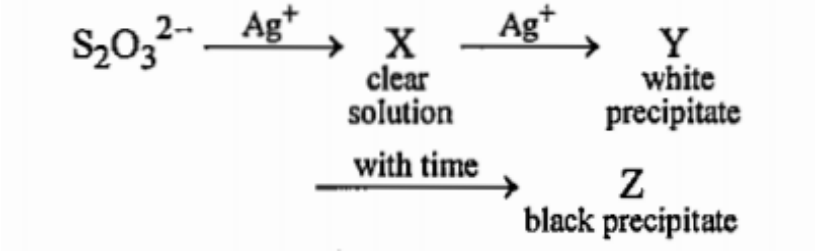
22. In the following reaction sequence in aqueous solution, the species X, Y and Z, respectively, are



A. $\left[Ag(S_2O_3)_2\right]^{3-}, Ag_2S_2O_3, Ag_2S$

B. $\left[Ag(S_2O_3)_3\right]^{5-}, Ag_2SO_3, Ag_2S$

C. $\left[Ag(SO_3)_2\right]^{3-}, Ag_2S_2O_3, Ag$

D. $\left[Ag(SO_3)_3\right]^{3-}, Ag_2SO_4, Ag$

Answer:

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23. The gas phase decomposition of dimethyl ether 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 a constant volume container at $500^\circ C$ and has a half life of $14.5\ \min$. Initially, only dimethyl ether is present at a pressure $0.40atm$. What is the total pressure of the system after $12\ \min$? (Assume ideal gas behaviour)

A. 0.75atm

B. 0.55atm

C. 0.68atm

D. 0.85atm

Answer:

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