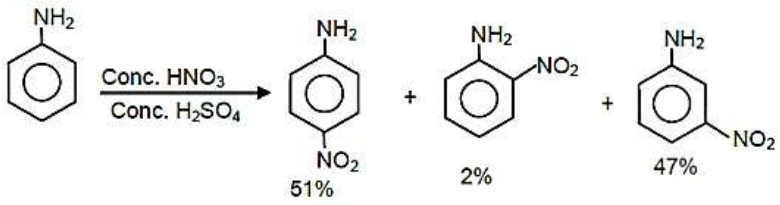
JEE MAIN- 2021

CHEMISTRY

SECTION A

This section contains 20 multiple choice questions. Each question has 4 choices (1), (2), (3) and (4) for its answer, out of which Only One is correct.

61. What is the reason for the formation of meta product in the following reaction?



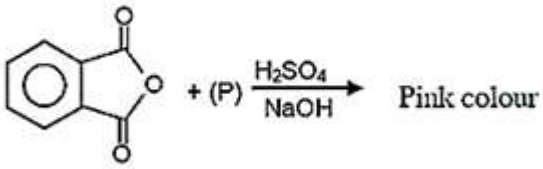
(1) Aniline is ortho/para directing

(2) Aniline is meta directing

(3) In acidic medium, aniline is converted into anilinium ion which is ortho/para directing

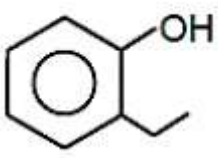
(4) In acidic medium aniline is converted into anilinium ion which is meta directing

62.



Missing reagent (P) is

(1)



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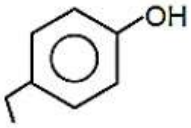

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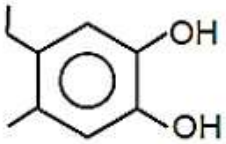

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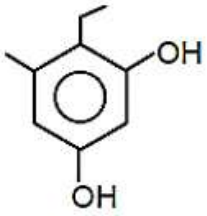


63. Which force is responsible for the stacking of $\alpha-$ helix Structure of protein?

(1) $H-$ bonding

(2) Ionic bonding

(3) Covalent bond

(4) Vander Waal's forces

64. The gas evolved due to anaerobic degradation of vegetation causes?

(1) Global warming and caner

(2) Acid rain

(3) Ozone hole

(4) Metal corrosion

65. Match the column

(i) Caprolactum	(a) Neoprene
(ii) Acrylonitrile	(b) Buna N
(iii) $2-$chlorobuta$-1,3-$diene	(c) Nylon 6
(iv) $2-$Methylbuta$-1,3-$diene	(d) Natural rubber

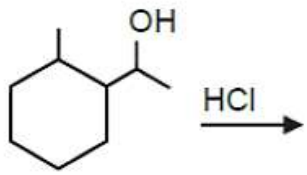
(1) (i) $\rightarrow$ (b), (ii) $\rightarrow$ (c), (iii) $\rightarrow$ (a), (iv) $\rightarrow$ (d)

(2) (i) $\rightarrow$ (a), (ii) $\rightarrow$ (c), (iii) $\rightarrow$ (b), (iv) $\rightarrow$ (d)

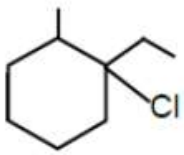
(3) (i) $\rightarrow$ (c), (ii) $\rightarrow$ (b), (iii) $\rightarrow$ (a), (iv) $\rightarrow$ (d)

(4) (i) $\rightarrow$ (c), (ii) $\rightarrow$ (a), (iii) $\rightarrow$ (b), (iv) $\rightarrow$ (d)

66. What is the major product of the following reaction?



(1)



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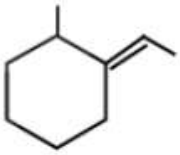

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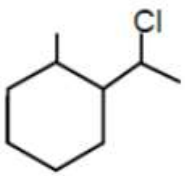
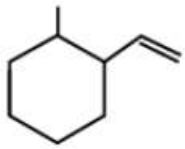
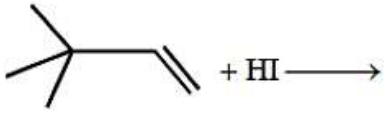
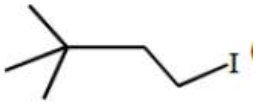
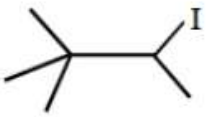


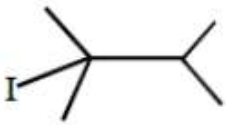
(4) 

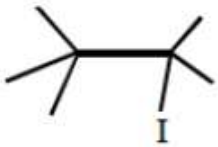
67. What is the major product of following reaction?



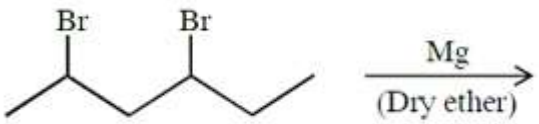
(1) 

(2) 

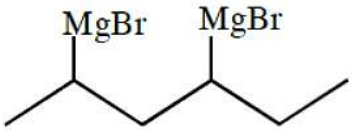
(3) 

(4) 

68. Identify the major product?



(1)



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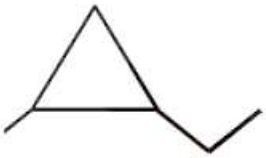

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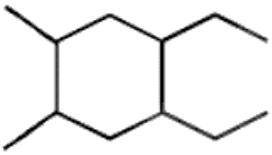

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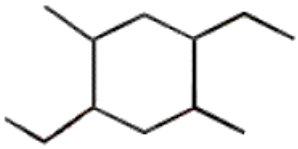

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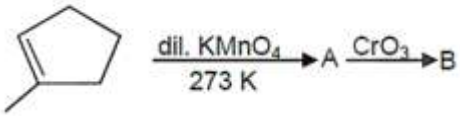
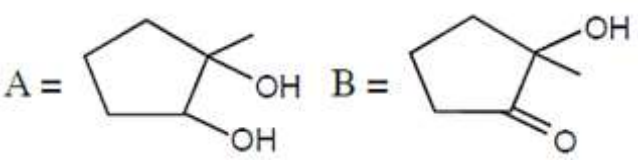


Product A and B are?

(1)



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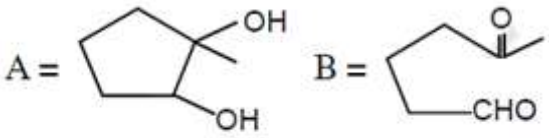

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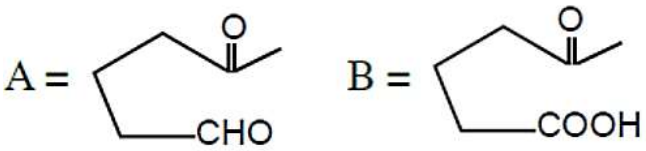

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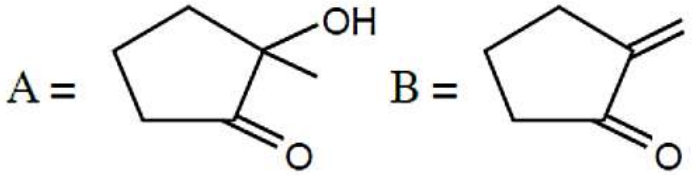


70. $CH_3-CH_2-CH_3 \xrightarrow{A} CH_3-CH_2-\overset{O}{\overset{\|}{C}}-H$

Which reagent (A) is used for following given conversion?

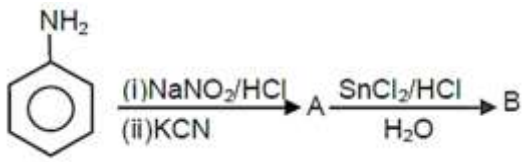
(1) $Cu/\Delta/$ high pressure

(2) Molybdenum oxide

(3) Manganese acetate

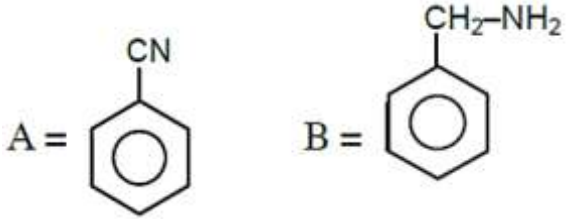
(4) Potassium permanganate

71.

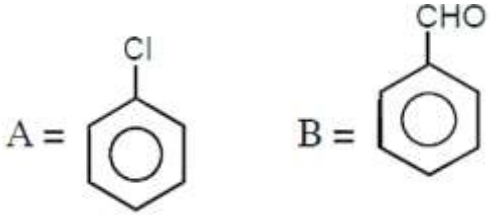


Find A and B ?

(1)



(2)



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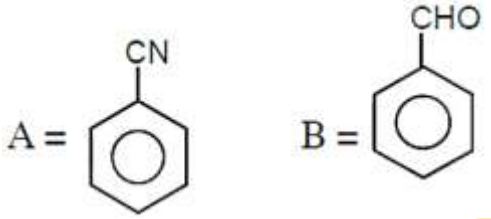

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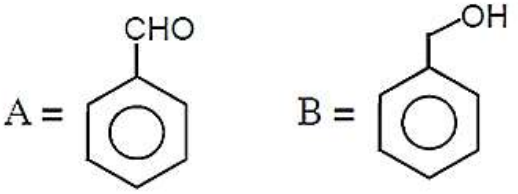


72. Which of the following have both the compound isostructural.

(a) $TiCl_4, SiCl_4$

(b) SO_4^{2-}, CrO_4^{2-}

(c) NH_3, NO_3^-

(d) ClF_3, BCl_3

(1) (a), (b)

(2) (a), (c)

(3) (b), (c)

(4) (a), (d)

73. Which of the following ores are concentrated by cyanide of group 1 element?

(1) Sphalerite

(2) Malachite

(3) Calamine

(4) Siderite

74. S_1 : Colourless cupric metaborate is converted into cuprous metaborate in luminous flame.

S_2 : Cuprous metaborate is formed by reacting copper sulphate with boric anhydride heated in non - luminous flame.

(1) S_1 is true and S_2 is false

(2) S_1 is false and S_2 true

(3) Both are false

(4) Both are true.

75. (i) $I_2 + H_2O_2 + 2OH^- \rightarrow 2I^- + 2H_2O + O_2$

(ii) $H_2O_2 + HOCl \rightarrow Cl^- + H_3O^+ + O_2$

(1) H_2O_2 is acting as oxidising agent in both the reaction

(2) H_2O_2 is acting as reducing agent in both the reaction

(3) H_2O_2 is acting as oxidising agent in reaction (i) and as reducing agent in rection (ii)

(4) H_2O_2 is acting as reducing agent in reaction (i) and as oxidising agent in reaction (ii)

76. $E^0_{M^{2+}/M}$ has positive value for which of the element of $3d$ transition series.

(1) Fe

(2) Cu

(3) Zn

(4) Al

77. $Al + NaOH \rightarrow X \xrightarrow{Y_{(g)}} Z$

Identify X, Y, Z in the above reaction sequence

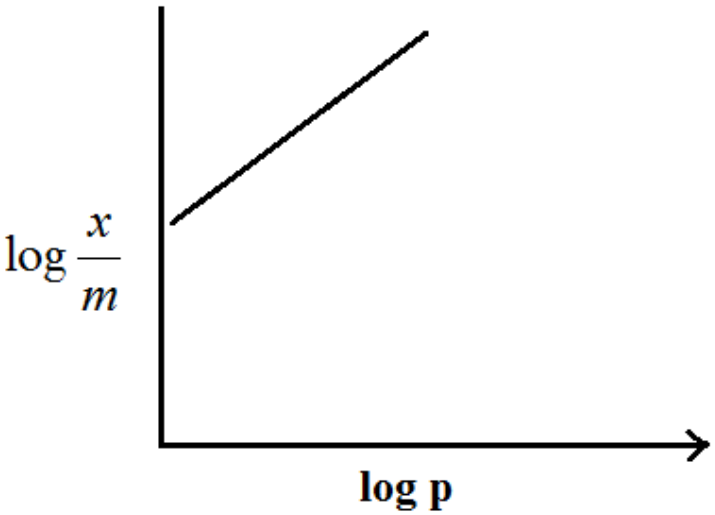
(1) $X = Na[Al(OH)_4]$; $Y = CO_2$; $Z = Al_2O_3.xH_2O$

(2) $X = Na[Al(OH)_4]$; $Y = SO_2$; $Z = Al_2O_3.xH_2O$

(3) $X = Al(OH)_3$; $Y = CO_2$; $Z = Al_2O_3$

(4) $X = Al(OH)_3$; $Y = SO_2$; $Z = Al_2O_3$

78. The slope of the straight line given in the following diagram for adsorption is



(1) $\frac{1}{n}(0 \text{ to } 1)$

(2) $\frac{1}{n}(0.1 \text{ to } 0.5)$

(3) $\log n$

(4) $\log \frac{1}{n}$

79. Composition of gun metal is

(1) Cu, Zn, Sn

(2) Al, Mg, Mn, Cu

(3) Cu, Ni, Fe

(4) Cu, Sn, Fe

80. Arrange the following in the correct order of ionisation potential

(1) $Al < Mg < Si < S < P$

(2) $Mg < Al < Si < S < P$

(3) $Mg < Al < Si < P < S$

(4) $Al < Mg < Si < P < S$

SECTION B

This section contains 10 Numerical Value Questions. Any 5 numerical value questions have to be attempted.

81. $Cl_2(g) \rightleftharpoons 2Cl(g)$

For the given reaction at equilibrium moles of $Cl_2(g)$ is equal to the moles of $Cl(g)$ and equilibrium pressure is $1atm$. If K_p of this reaction is $y \times 10^{-1}$. Find y.

82. $S_8 + bOH^- \rightarrow cS^{2-} + dS_2O_3^{2-} + H_2O$. Find the value of c.

83. Calculate time taken in seconds for 40% completion of first order reaction if rate constant is 3.3×10^{-4} sec^{-1}.

84. For a chemical reaction K_{eq} is 100 at $300K$, the value of $\Delta_r G$ is $-xR$ Joule at $1atm$ pressure. Find the value of x. (Use In $10 = 2.3$).

85.

$Cu^{2+} + NH_3 \rightleftharpoons \left[Cu(NH_3)\right]^{2+}$	$K_1 = 10^4$
$\left[Cu(NH_3)\right]^{2+} + NH_3 \rightleftharpoons \left[Cu(NH_3)_2\right]^{2+}$	$K_2 = 1.58\times10^3$
$\left[Cu(NH_3)_2\right]^{2+} + NH_3 \rightleftharpoons \left[Cu(NH_3)_3\right]^{2+}$	$K_3 = 5\times10^2$
$\left[Cu(NH_3)_3\right]^{2+} + NH_3 \rightleftharpoons \left[Cu(NH_3)_4\right]^{2+}$	$K_4 = 10^2$

Dissociation constant of $\left[Cu(NH_3)_4\right]^{2+}$ is $x\times10^{-12}$. Determine x.

86. When 9.45 g of $ClCH_2COOH$ is dissolved in water and resulting solution is made 500 ml, then depression in freezing point is $0.5°C$. Then percentage dissociation of $ClCH_2COOH$ is:

$\left[\text{Given } K_f(H_2O) = 1.86\, K\, kg\, mol^{-1}\right]$

87. What is the coordination number in Body centred cubic (BCC) arrangement of identical particles.

88. Among the following compounds how many are amphoteric in nature $Be(OH)_2, BeO, Ba(OH)_2, Sr(OH)_2$.

89. $4.5\ \text{g}$ of solute having molar mass of $90\ \text{g mol}^{-1}$ is dissolved in water to make $250\ \text{ml}$ solution Calculate molarity of the solution.

90. Mass of Li^{3+} is 8.33 times mass of proton Li^{3+} and proton are accelerated through same potential difference. Then ratio of De Broglie's wavelength of Li^{3+} to proton is $x\times10^{-1}$. Find x.