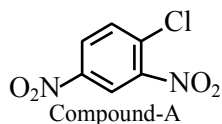
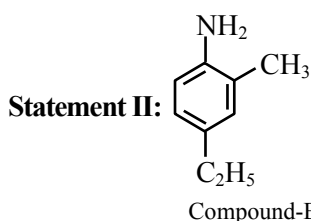


FINAL JEE-MAIN EXAMINATION – APRIL, 2024
(Held On Monday 08th April, 2024)
TIME : 9 : 00 AM to 12 : 00 NOON
CHEMISTRY
SECTION-A

61. Given below are two statements:

Statement I :


IUPAC name of Compound A is 4-chloro-1,3-dinitrobenzene:

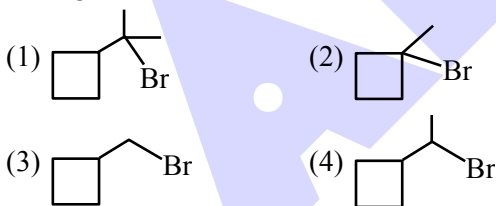


IUPAC name of Compound B is 4-ethyl-2-methylaniline.

 In the light of the above statements, choose the **most appropriate** answer from the options given below:

- (1) Both Statement I and Statement II are correct
- (2) Statement I is incorrect but Statement II is correct
- (3) Statement I is correct but Statement II is incorrect
- (4) Both Statement I and Statement II are incorrect

Ans. (2)

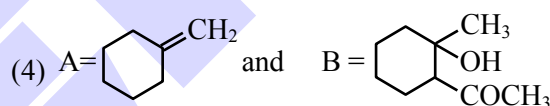
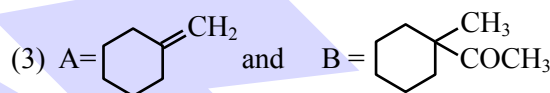
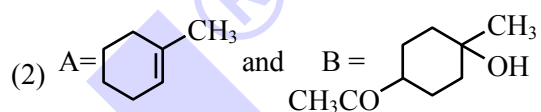
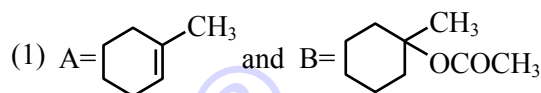
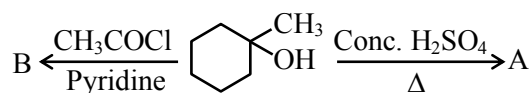
 62. Which among the following compounds will undergo fastest S_N2 reaction.

Ans. (3)

 63. Combustion of glucose ($C_6H_{12}O_6$) produces CO_2 and water. The amount of oxygen (in g) required for the complete combustion of 900 g of glucose is: [Molar mass of glucose in $g\ mol^{-1} = 180$]

- (1) 480
- (2) 960
- (3) 800
- (4) 32

Ans. (2)
TEST PAPER WITH ANSWER

64. Identify the major products A and B respectively in the following set of reactions.


Ans. (1)

 65. Given below are two statements : One is labelled as **Assertion A** and the other is labelled as **Reason R**:

Assertion A : The stability order of +1 oxidation state of Ga, In and Tl is $Ga < In < Tl$.

Reason R : The inert pair effect stabilizes the lower oxidation state down the group.

 In the light of the above statements, choose the *correct* answer from the options given below :

- (1) Both **A** and **R** are true and **R** is the correct explanation of **A**.
- (2) **A** is true but **R** is false.
- (3) Both **A** and **R** are true but **R** is NOT the correct explanation of **A**.
- (4) **A** is false but **R** is true.

Ans. (1)

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66. Match List I with List-II

List-I (Name of the test)		List-II (Reaction sequence involved) [M is metal]	
A	Borax bead test	I.	$MCO_3 \rightarrow MO$ $\xrightarrow{+\Delta} \text{Co(NO}_3)_2 \rightarrow \text{CoO} \cdot MO$
B.	Charcoal cavity test	II.	$MCO_3 \rightarrow MCl_2 \rightarrow M^{2+}$
C.	Cobalt nitrate test	III.	$MSO_4 \xrightarrow[\Delta]{Na_2B_4O_7}$ $M(BO_2)_2 \rightarrow MBO_2 \rightarrow M$
D.	Flame test	IV.	$MSO_4 \xrightarrow[\Delta]{Na_2CO_3} MCO_3 \rightarrow$ $MO \rightarrow M$

Choose the **correct** answer from the option below :

- (1) A-III, B-I, C-IV, D-II
- (2) A-III, B-II, C-IV, D-I
- (3) A-III, B-I, C-II, D-IV
- (4) A-III, B-IV, C-I, D-II

Ans. (4)

67. Match List I and with List II

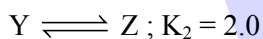
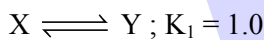
List-I (Molecule)		List-II(Shape)	
A	NH ₃	I.	Square pyramid
B.	BrF ₅	II.	Tetrahedral
C.	PCl ₅	III.	Trigonal pyramidal
D.	CH ₄	IV.	Trigonal bipyramidal

Choose the **correct** answer from the option below :

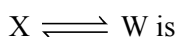
- (1) A-IV, B-III, C-I, D-II
- (2) A-II, B-IV, C-I, D-III
- (3) A-III, B-I, C-IV, D-II
- (4) A-III, B-IV, C-I, D-II

Ans. (3)

68. For the given hypothetical reactions, the equilibrium constants are as follows:



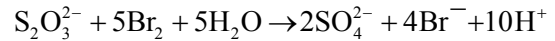
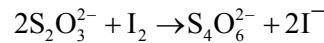
The equilibrium constant for the reaction



- (1) 6.0
- (2) 12.0
- (3) 8.0
- (4) 7.0

Ans. (3)

69. Thiosulphate reacts differently with iodine and bromine in the reaction given below :



Which of the following statement justifies the above dual behaviour of thiosulphate?

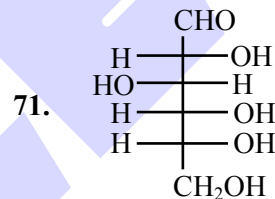
- (1) Bromine undergoes oxidation and iodine undergoes reduction by iodine in these reactions
- (2) Thiosulphate undergoes oxidation by bromine and reduction by iodine in these reaction
- (3) Bromine is a stronger oxidant than iodine
- (4) Bromine is a weaker oxidant than iodine

Ans. (3)

 70. An octahedral complex with the formula $CoCl_3nNH_3$ upon reaction with excess of $AgNO_3$ solution given 2 moles of $AgCl$. Consider the oxidation state of Co in the complex is 'x'. The value of "x + n" is _____.

- (1) 3
- (2) 6
- (3) 8
- (4) 5

Ans. (3)

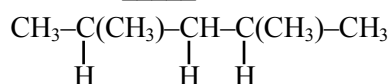


The **incorrect** statement regarding the given structure is

- (1) Can be oxidized to a dicarboxylic acid with Br_2 water
- (2) despite the presence of $-CHO$ does not give Schiff's test
- (3) has 4-asymmetric carbon atom
- (4) will coexist in equilibrium with 2 other cyclic structure

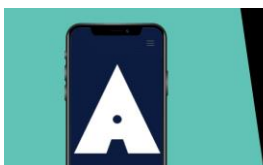
Ans. (1)

72. In the given compound, the number of 2° carbon atom/s is _____.



- (1) Three
- (2) One
- (3) Two
- (4) Four

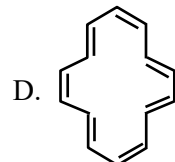
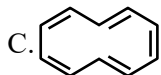
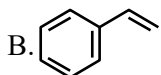
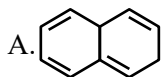
Ans. (2)



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73. Which of the following are aromatic?



- (1) B and D only
 (2) A and C only
 (3) A and B only
 (4) C and D only

Ans. (1)

74. Among the following halogens

 F_2 , Cl_2 , Br_2 and I_2

Which can undergo disproportionation reaction?

- (1) Only I_2
 (2) Cl_2 , Br_2 and I_2
 (3) F_2 , Cl_2 and Br_2
 (4) F_2 and Cl_2

Ans. (2)

75. Given below are two statements:

Statement I : $N(CH_3)_3$ and $P(CH_3)_3$ can act as ligands to form transition metal complexes.

Statement II: As N and P are from same group, the nature of bonding of $N(CH_3)_3$ and $P(CH_3)_3$ is always same with transition metals.

In the light of the above statements, choose the **most appropriate** answer from the options given below:

- (1) Statement I is incorrect but Statement II is correct
 (2) Both Statement I and Statement II are correct
 (3) Statement I is correct but Statement II is incorrect
 (4) Both Statement I and Statement II are incorrect

Ans. (3)

76. Match List I with List II

List-I (Elements)		List-II (Properties in their respective groups)	
A	Cl, S	I.	Elements with highest electronegativity
B.	Ge, As	II.	Elements with largest atomic size
C.	Fr, Ra	III	Elements which show properties of both metals and non metal
D.	F, O	IV	Elements with highest negative electron gain enthalpy

Choose the **correct** answer from the options given below :

- (1) A-II, B-III, C-IV, D-I
 (2) A-III, B-II, C-I, D-IV
 (3) A-IV, B-III, C-II, D-I
 (4) A-II, B-I, C-IV, D-III

Ans. (3)

77. Iron (III) catalyses the reaction between iodide and persulphate ions, in which

- A. Fe^{3+} oxidises the iodide ion
 B. Fe^{3+} oxidises the persulphate ion
 C. Fe^{2+} reduces the iodide ion
 D. Fe^{2+} reduces the persulphate ion

Choose the **most appropriate** answer from the options given below:

- (1) B and C only (2) B only
 (3) A only (4) A and D only

Ans. (4)

78. Match List I with List II

List-I (Compound)		List-II (Colour)	
A	$Fe_4[Fe(CN)_6]_3 \cdot xH_2O$	I.	Violet
B.	$[Fe(CN)_5NOS]^{4-}$	II.	Blood Red
C.	$[Fe(SCN)]^{2+}$	III.	Prussian Blue
D.	$(NH_4)_3PO_4 \cdot 12MoO_3$	IV.	Yellow

Choose the **correct** answer from the options given below :

- (1) A-III, B-I, C-II, D-IV
 (2) A-IV, B-I, C-II, D-III
 (3) A-II, B-III, C-IV, D-I
 (4) A-I, B-II, C-III, D-IV

Ans. (1)



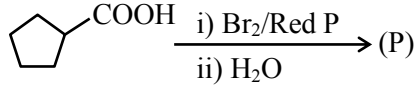
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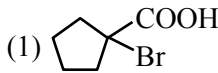
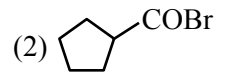
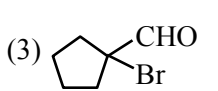
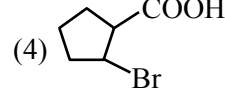
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79. Number of complexes with even number of electrons in t_{2g} orbitals is -
 $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$, $[\text{Co}(\text{H}_2\text{O})_6]^{2+}$, $[\text{Co}(\text{H}_2\text{O})_6]^{3+}$,
 $[\text{Cu}(\text{H}_2\text{O})_6]^{2+}$, $[\text{Cr}(\text{H}_2\text{O})_6]^{2+}$
- (1) 1 (2) 3
 (3) 2 (4) 5

Ans. (2)

80. Identify the product (P) in the following reaction:

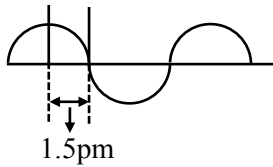


- (1)  (2) 
 (3)  (4) 

Ans. (1)

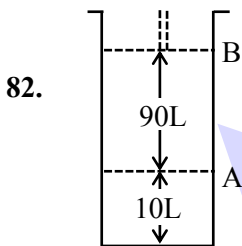
SECTION-B

81. A hypothetical electromagnetic wave is shown below.



The frequency of the wave is $x \times 10^{19}$ Hz.
 $x =$ _____ (nearest integer)

Ans. (5)



Consider the figure provided.

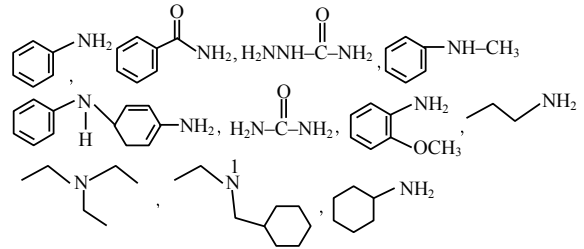
1 mol of an ideal gas is kept in a cylinder, fitted with a piston, at the position A, at 18°C . If the piston is moved to position B, keeping the temperature unchanged, then 'x' L atm work is done in this reversible process.

$x =$ _____ L atm. (nearest integer)

[Given : Absolute temperature = $^\circ\text{C} + 273.15$,
 $R = 0.08206 \text{ L atm mol}^{-1} \text{ K}^{-1}$]

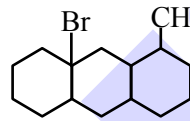
Ans. (55)

83. Number of amine compounds from the following giving solids which are soluble in NaOH upon reaction with Hinsberg's reagent is _____.



Ans. (5)

84. The number of optical isomers in following compound is : _____.



Ans. (32)

85. The 'spin only' magnetic moment value of MO_4^{2-} is _____ BM. (Where M is a metal having least metallic radii. among Sc, Ti, V, Cr, Mn and Zn).
 (Given atomic number : Sc = 21, Ti = 22, V = 23, Cr = 24, Mn = 25 and Zn = 30)

Ans. (0)

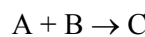
86. Number of molecules from the following which are exceptions to octet rule is _____.
 CO_2 , NO_2 , H_2SO_4 , BF_3 , CH_4 , SiF_4 , ClO_2 , PCl_5 ,
 BeF_2 , C_2H_6 , CHCl_3 , CBr_4

Ans. (6)

87. If 279 g of aniline is reacted with one equivalent of benzenediazonium chloride, the maximum amount of aniline yellow formed will be _____ g. (nearest integer)
 (consider complete conversion)

Ans. (591)

88. Consider the following reaction



The time taken for A to become $1/4^{\text{th}}$ of its initial concentration is twice the time taken to become $1/2$ of the same. Also, when the change of concentration of B is plotted against time, the resulting graph gives a straight line with a negative slope and a positive intercept on the concentration axis.

The overall order of the reaction is _____.

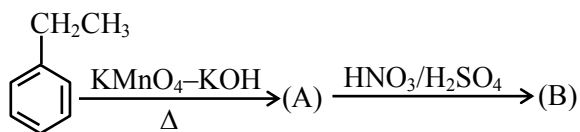
Ans. (1)



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89. Major product B of the following reaction has _____ π -bond.



Ans. (5)

90. A solution containing 10g of an electrolyte AB_2 in 100g of water boils at 100.52°C . The degree of ionization of the electrolyte (α) is _____ $\times 10^{-1}$. (nearest integer)
[Given : Molar mass of $\text{AB}_2 = 200\text{g mol}^{-1}$. K_b (molal boiling point elevation const. of water) = $0.52\text{ K kg mol}^{-1}$, boiling point of water = 100°C ; AB_2 ionises as $\text{AB}_2 \rightarrow \text{A}^{2+} + 2\text{B}^-$]

Ans. (5)

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