JEE-MAIN EXAM JANUARY, 2025

Date: - 29-01-2025 (SHIFT-2)

CHEMISTRY

SECTION-A

- 1. Given below are two statements : Statement (I) : On nitration of m-xylene with HNO_3 , H_2SO_4 followed by oxidation, 4-nitrobenzene-1,3dicarboxylic acid is obtained as the major product. Statement (II): $-CH_3$ group is o/p-directing while $-NO_2$ group is m-directing group. In the light of the above statements, choose the correct answer from the options given below : (1) Both Statement I and Statement II are true (2) Statement I is false but Statement II is true (3) Both Statement I and Statement II are false (4) Statement I is true but Statement II is false 2. Which among the following halides will generate the most stable carbocation in the nucleophilic substitution reaction? Ph Br (2) (1) Br Br (3) (4)
- **3.** The type of oxide formed by the element among Li,Na,Be,Mg,B and Al that has the least atomic radius is :

(1) A_2O_3 (2) AO_2 (3) A_2O (4) AO

Drug X becomes ineffective after 50% decomposition. The original concentration of drug in a bottle was 16mg/mL which becomes 4mg/mL in 12 months. The expiry time of the drug in months is ___. Assume that the decomposition of the drug follows first order kinetics.
(1) 3
(2) 2
(3) 12
(4) 6

(2)

5. Which one of the following, with HBr will give a phenol?





OCH₃



6.	Identify the homoleptic complexes with odd number of d electrons in the central metal :										
	(A) $\left[\text{FeO}_4\right]^{2-}$	$(B)\left[Fe(CN)_{6}\right]^{-}$	(C) $\left[Fe(CN)_5 NO \right]^{2}$								
	(D) $\left[\text{CoCl}_4\right]^{2-}$	$\textbf{(E)}\left[Co\left(H_2O\right)_3F_3\right]$									
	Choose the correct ar	Choose the correct answer from the options given below :									
	(1) (C) and (E) only		(2) (A), (B) and (D) only								
	(3) (B) and (D) only		(4) (A), (C) and (E) only								
7.	Total number of sigma	(σ) and $\mathrm{pi}(\pi)$	bonds respectively	present in hex-1-en-4-yne are :							
	(1) 3 and 13	(2) 11 and 3	(3) 13 and 3	(4) 14 and 3							
8.	Consider the equilibrium										
	$CO(g) + 3H_2(g) \rightleftharpoons CH_4(g) + H_2O(g)$										
	If the pressure applied over the system increases by two fold at constant temperature then										
	(A) Concentration of reactants and products increases.(B) Equilibrium will shift in forward direction.(C) Equilibrium constant increases since concentration of products increases.										
	(D) Equilibrium consta	nts and products remain same.									
	Choose the correct ar										
	(1) (A), (B) and (D) on	ly	(2) (B) and (C) only (4) (A) and (B) only								
	(3) (A), (B) and (<mark>C) on</mark>	ly									
9.	Identify the essential a	amino acids from below :									
	(A) Valine	(B) Proline	(C) Lys <mark>ine</mark>	(D) Threonine (E) Tyrosine							
	Choose the correct ar	swer from the options give	ven belo <mark>w</mark> :								
	(1) (C), (D) and (E) on	ly	(2) (B), (C) and (E) only								
	(3) (A), (C) and (D) on	ly	(4) (A), (C) and (E) only								
10.	. Given below are two statements : Statement (I): It is impossible to specify simultaneously with arbitrary precision, both the lir										

Statement (I): It is impossible to specify simultaneously with arbitrary precision, both the linear momentum and the position of a particle.

Statement (II) : If the uncertainty in the measurement of position and uncertainty in measurement of momentum are equal for an electron, then the uncertainty in the measurement of velocity is

$$\geqslant \sqrt{\frac{\mathrm{h}}{\pi}} \times \frac{1}{2\mathrm{m}}.$$

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

- (1) Statement I is true but Statement II is false
- (2) Both Statement I and Statement II are false
- (3) Both Statement I and Statement II are true
- (4) Statement I is false but Statement II is true
- **11.** The calculated spin-only magnetic moments of $K_3[Fe(OH)_6]$ and $K_4[Fe(OH)_6]$ respectively are : (1) 4.90 and 4.90 B.M. (2) 3.87 and 4.90 B.M. (3) 4.90 and 5.92 B.M. (4) 5.92 and 4.90 B.M.



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16. First ionisation enthalpy values of first four group 15 elements are given below. Choose the correct value for the element that is a main component of apatite family :

(1)
$$834 \text{ kJ} \text{ mol}^{-1}$$
 (2) $1402 \text{ kJ} \text{ mol}^{-1}$ (3) $1012 \text{ kJ} \text{ mol}^{-1}$ (4) $947 \text{ kJ} \text{ mol}^{-1}$

17. If *C* (diamond)
$$\rightarrow$$
 C (graphite)+*X*kJmol⁻¹

C (diamond)
$$+O_2(g) \rightarrow CO_2(g) + YkJmol^{-1}$$

C (graphite)
$$+O_2(g) \rightarrow CO_2(g) + ZkJmol^{-1}$$

at constant temperature. Then

(1)
$$X = Y + Z$$
 (2) $X = Y - Z$ (3) $X = -Y + Z$ (4) $-X = Y + Z$

18. For hydrogen like species, which of the following graphs provides the most appropriate representation of E vs Z plot for a constant n ?

- [E: Energy of the stationary state,
- Z : atomic number, n = principal quantum number]



19. Given below are two statements :

Statement (I): In partition chromatography, stationary phase is thin film of liquid present in the inert support.

Statement (II) : In paper chromatography, the material of paper acts as a stationary phase. In the light of the above statements, choose the correct answer from the options given below :

- (1) Both Statement I and Statement II are false
- (2) Statement I is false but Statement II is true
- (3) Both Statement I and Statement II are true
- (4) Statement I is true but Statement II is false
- **20.** Given below are two statements :

Statement (I): NaCl is added to the ice at 0° C, present in the ice cream box to prevent the melting of ice cream.

Statement (II) : On addition of NaCl to ice at 0° C, there is a depression in freezing point.

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

- (1) Both Statement I and Statement II are false
- (2) Statement I is false but Statement II is true
- (3) Statement I is true but Statement II is false
- (4) Both Statement I and Statement II are true



SECTION-B

21. In the sulphur estimation, 0.20 g of a pure organic compound gave 0.40 g of barium sulphate. The percentage of sulphur in the compound is $___ \times 10^{-10}$ %.

(Molar mass : $O=16, S=32, Ba=137 \ \text{in} \ gmol^{-1}$)

22. Consider the following low-spin complexes

 $K_{3}\left[Co\left(NO_{2}\right)_{6}\right], K_{4}\left[Fe(CN)_{6}\right], K_{3}\left[Fe(CN)_{6}\right], Cu_{2}\left[Fe(CN)_{6}\right] and Zn_{2}\left[Fe(CN)_{6}\right].$

The sum of the spin-only magnetic moment values of complexes having yellow colour is _____

B.M. (answer in nearest integer)

- **23.** Total number of non bonded electrons present in NO_2^- ion based on Lewis theory is_____.
- 24. In the Claisen-Schmidt reaction to prepare, dibenzalacetone from 5.3 g of benzaldehyde, a total of 3.51 g of product was obtained. The percentage yield in this reaction was ____%.
- **25.** Isomeric hydrocarbons \rightarrow negative Baeyer's test

(Molecular formula C_9H_{12})

The total number of isomers from above with four different non-aliphatic substitution sites is -

NTA ANSWERS													
1.	(1)	2.	(1)	3.	(1)	4.	(4)	5.	(1)	6.	(3)	7.	(7)
8.	(4)	9.	(3)	10.	(3)	11.	(4)	12.	(2)	13.	(2)	14.	(3)
15.	(2)	16.	(3)	17.	(2)	18.	(2)	19.	(4)	20.	(4)	21.	(275)
22.	(0)	23.	(12)	24.	(60)	25.	(2)						

