

MEMORY BASED QUESTIONS JEE-MAIN EXAMINATION – JANUARY 2026
(HELD ON WEDNESDAY 21st JANUARY 2026)
TIME : 9:00 AM TO 12:00 NOON
CHEMISTRY
SECTION-A

1. $\text{PbCl}_2 + \text{K}_2\text{CrO}_4 \rightarrow \text{A} + \text{KCl}$
 $\text{A} + \text{NaOH} \xrightarrow{\text{(excess)}} \text{B} + \text{Na}_2\text{CrO}_4$
 $\text{PbSO}_4 + \text{CH}_3\text{COONH}_4 \rightarrow \text{C} + (\text{NH}_4)_2\text{SO}_4$
 Find A, B, C.

- (1) A : PbCrO_4
 B : PbO_2
 C : $\text{Pb}(\text{OH})_2$
 (2) A : PbCrO_4
 B : $\text{Na}_2[\text{Pb}(\text{OH})_4]$
 C : $\text{Pb}(\text{CH}_3\text{COO})_2$
 (3) A : PbCrO_4
 B : PbO
 C : $[\text{Pb}(\text{NH}_3)_4]^{2+}$
 (4) A : PbO_2
 B : $\text{Pb}(\text{OH})_2$
 C : $[\text{Pb}(\text{CH}_3\text{COO})_4]^{2-}$

Ans. (2)

- Sol.** $\text{PbCl}_2 + \text{K}_2\text{CrO}_4 \rightarrow \text{PbCrO}_4 + \text{KCl}$
 $\text{PbCrO}_4 + 2\text{NaOH} \xrightarrow{\text{(excess)}} \text{Na}_2[\text{Pb}(\text{OH})_4] + \text{Na}_2\text{CrO}_4$
 $\text{PbSO}_4 + 2\text{CH}_3\text{COONH}_4 \rightarrow \text{Pb}(\text{CH}_3\text{COO})_2 + (\text{NH}_4)_2\text{SO}_4$

2. **Statement-I** : Among $[\text{NiCl}_4]^{2-}$, $[\text{Ni}(\text{CN})_4]^{2-}$, $[\text{Ni}(\text{CO})_4]$ & CH_4 the sp^3 hybridized species(s) are 3.

Statement-II : Number of Amphoteric pair(s) among $(\text{SnO}, \text{SnO}_2)$; $(\text{PbO}, \text{PbO}_2)$; $(\text{GeO}, \text{GeO}_2)$ are 3.

- (1) Both statements are correct
 (2) Statement-I correct ; Statement-II incorrect
 (3) Statement-II correct; Statement-I incorrect
 (4) Both statements are incorrect

Ans. (2)

- Sol.** Statement-I $[\text{NiCl}_4]^{2-}$, $[\text{Ni}(\text{CO})_4]$ & CH_4 are sp^3 Hybridised
 $[\text{NiCO}_4] \rightarrow \text{dsp}^2$
 Statement-II GeO and GeO_2 are acidic.

TEST PAPER WITH SOLUTION
3. Statement-I :

Among SF_4 , XeF_4 , $[\text{NiCl}_4]^{2-}$, $[\text{PtCl}_4]^{2-}$, $[\text{Pt}(\text{CN})_4]^{2-}$, $[\text{Ni}(\text{CN})_4]^{2-}$, SeF_4 there are 3 tetrahedral species

Statement-II : Among three pairs $\{[\text{Ni}(\text{CO})_4], [\text{NiCl}_4]^{2-}\}$, $\{[\text{Ni}(\text{CO})_4], [\text{Ni}(\text{CN})_4]^{2-}\}$ and $\{[\text{Ni}(\text{CN})_4]^{2-}, [\text{NiCl}_4]^{2-}\}$ only two pairs are diamagnetic.

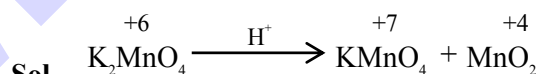
- (1) Both statements are correct
 (2) Statement-I correct ; Statement-II incorrect
 (3) Statement-II correct; Statement-I incorrect
 (4) Both statements are incorrect

Ans. (4)

- Sol.** SF_4 (See-saw), XeF_4 (square planar), $[\text{NiCl}_4]^{2-}$ (Tetrahedral), $[\text{PtCl}_4]^{2-}$ (square planar), $[\text{Pt}(\text{CN})_4]^{2-}$ (square planar), $[\text{Ni}(\text{CN})_4]^{2-}$ (square planar), SeF_4 $[\text{Ni}(\text{CO})_4]$ (diamagnetic), $[\text{NiCl}_4]^{2-}$ (paramagnetic), $[\text{Ni}(\text{CN})_4]^{2-}$ (diamagnetic)

4. MnO_4^{2-} in acidic medium, disproportionates to

- (1) Mn_2O_7 and MnO (2) MnO_4^- and MnO
 (3) MnO_4^- and MnO_4 (4) MnO_4^- and MnO_2

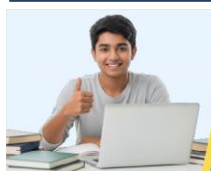
Ans. (4)

Sol.

5. Which of the following is the correct order with respect to the property indicated against it ?

- (1) $\text{B} > \text{S} > \text{P} > \text{F}$ (Ionization energy)
 (2) $\text{K}_2\text{O} > \text{Na}_2\text{O} > \text{MgO} > \text{Al}_2\text{O}_3$ (Basic nature)
 (3) $\text{K} > \text{Na} > \text{Al} > \text{Mg}$ (Metallic character)
 (4) $\text{Cl} > \text{F} > \text{S} > \text{P}$ (EA)

Which of the following option is correct

- (1) 1, 2, 3 are correct
 (2) 2, 4 are correct
 (3) 1, 2, 4 are correct
 (4) 1, 2, 3 are correct

Ans. (2)

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Sol. (1) On moving left to right in a period IE increases and from top to bottom in a group IE decreases.

(2) On moving left to right in a period metallic and basic character decreases.

(3) On moving top to bottom in a group metallic and basic character increases.

(4) EA : Group 17 > Group 16 > Group 15

6. Given below are two statement :

Statement-I : All the pair of molecules (PbO, PbO₂); (SnO, SnO₂) and (GeO, GeO₂) contains amphoteric oxides.

Statement-II : AlCl₃, BH₃, BeH₂ and NO₂ all have incomplete octet.

In the light of about statement, choose the correct option.

(1) Both statements are correct

(2) Statement-I correct ; Statement-II incorrect

(3) Statement-I incorrect; Statement-II correct

(4) Both statements are incorrect

Ans. (3)

Sol. Geo are GeO₂ are acidic in nature.

AlCl₃, BH₃, BeH₂ and NO₂ all have incomplete octet.

7. 14.0 gm calcium metal is allowed to react with excess HCl at 1.0 atm pressure & 273 K. Which of the following statement is incorrect ?

[Molar mass in g·mol⁻¹, Ca = 40, Cl = 35.5]

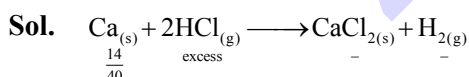
(1) 0.35 mole of H₂ gas is evolved

(2) The limiting reagent is calcium metal

(3) 33.3 g of CaCl₂ is produced

(4) 7.84 L of H₂ gas is evolved

Ans. (3)



= .35 mole .35 mole .35 mole

Volume of H_{2(g)} evolved = .35 × 22.4 = 7.84 L

(3) is wrong because weight of CaCl₂ = .35 × 111 = 38.85 gm

8. 80 ml unknown gaseous hydrocarbon sparked in presence of 264 ml of O₂ gas. After complete combustion gaseous mixture cooled down to 278K & 1 atm then it's volume is equal to 224 ml. After passing the mixture through aqueous KOH volume becomes 64 ml then formula of hydrocarbon will be :

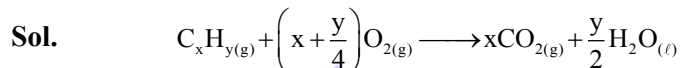
(1) C₂H₂

(2) C₂H₆

(3) C₂H₄

(4) C₄H₄ or None

Ans. (1)



t=0 80 264 0 -

t=t_{final} - 264 - 80 $\left(x + \frac{y}{4}\right)$ 80x -

$$264 - 80\left(x + \frac{y}{4}\right) + 80x = 224$$

$$264 - \frac{80y}{4} = 224$$

$$40 = \frac{80y}{4} \Rightarrow y = 2$$

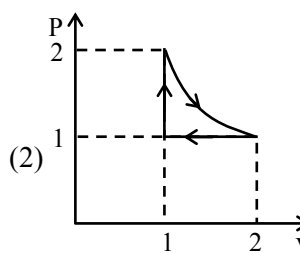
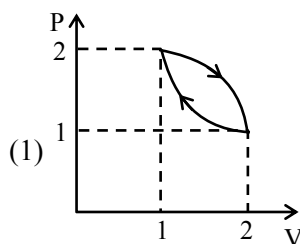
$$264 - 80\left(x + \frac{y}{4}\right) = 64$$

$$264 - 80\left(x + \frac{1}{2}\right) = 64$$

$$264 - 80x - 40 = 64$$

$$x = 2$$

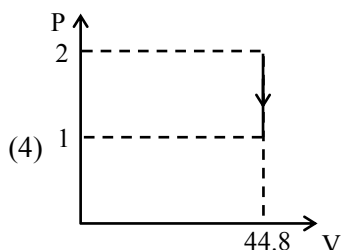
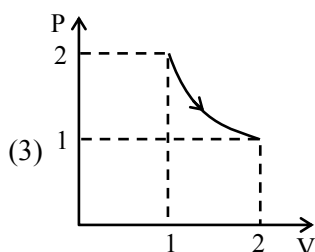
9. One mole of the gas undergo following process :



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In which of the following work done by the gas is maximum.

Ans. (3)

Sol. Area of P v/s V curve is equal to work done by gas.

10. Two solution of PQ & PQ₂ respectively (Non-volatile, Non-ionisable) containing 1 gm solute in 50 gm solvent (K_b = 5 K·kg/mol) elevation in b.p. of solutions are 1.176°C & 0.689°C respectively. Calculate molar masses of P & Q ?

- (1) 75, 25 (2) 60, 25
(3) 25, 60 (4) 25, 75

Ans. (2)

Sol. $(\Delta T_b)_{PQ} = K_b m$

$$1.176 = 5 \times \frac{1}{M_1} \times \frac{1000}{50}$$

$$M_1 = 85.03$$

$$(\Delta T_b)_{PQ_2} = 5 \times \frac{1}{M_2} \times \frac{1000}{50}$$

$$M_2 = 145.13$$

Let molar mass of P & Q are M_p and M_q respectively

$$M_p + M_q = 85.03$$

$$M_p + 2M_q = 145.13$$

$$M_q = 60.1 \approx 60$$

$$M_p = 24.93 \approx 25$$

11. For the reaction : $A_2 + B_2 \xrightarrow{500K} 2AB$: $\log K = 2.2$

	H _f ⁰ (KJ/mole)	S _f ⁰ (J/K-mole)
AB	32	240
A ₂	6	224
B ₂	x	238

Calculate the value of x.

- (1) 70 (2) 60
(3) 50 (4) 80

Ans. (1)

Sol. $A_2 + B_2 \xrightarrow{500K} 2AB$ $\log K = 2.2$

$$\Delta H^\circ = (2 \times 32) - (6 + x) = (58 - x) \text{ kJ}$$

$$\Delta S^\circ = (2 \times 240) - (224 + 238) = 18 \text{ Joule}$$

$$\Delta G^\circ = -RT \ln K$$

$$\Delta G^\circ = -\frac{8.314 \times 500 \times 2.2 \times 2.303}{1000}$$

$$\Delta G^\circ = -21.06$$

$$\Delta H^\circ - T \Delta S^\circ = -21.06$$

$$58 - x - 500 \left(\frac{18}{1000} \right) = -21.06$$

$$x = 70.06 \text{ KJ/mol}$$

12. **Statement-1** : Electrical discharge is passed through the H₂ gas. H₂ dissociates into H atoms & the energetically excited atoms emit discrete frequencies.

Statement-2 : Frequency of 2nd balmer line of He⁺ is equal to 1st line of lyman series of H atom.

- (1) Both statements are correct.
(2) Both statements are incorrect.
(3) Statement-1 is correct and statement-2 is incorrect.
(4) Statement-1 is incorrect and statement-2 is correct.

Ans. (1)



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Sol. $\frac{1}{\lambda} = RZ^2 \left(\frac{1}{n_1^2} - \frac{1}{n_2^2} \right)$

For 1st line of Lyman series in H-atom

$$\frac{1}{\lambda} = R(1)^2 \left(\frac{1}{1^2} - \frac{1}{2^2} \right)$$

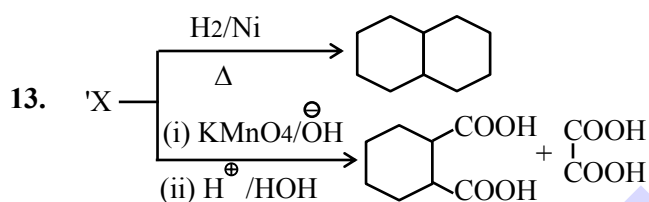
$$\frac{1}{\lambda} = \frac{3R}{4}$$

for 2nd line of Balmer series of He⁺

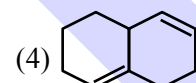
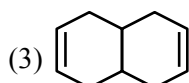
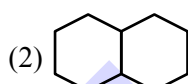
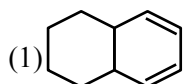
$$\frac{1}{\lambda'} = R(2)^2 \left(\frac{1}{2^2} - \frac{1}{4^2} \right)$$

$$\frac{1}{\lambda'} = \frac{3R}{4}$$

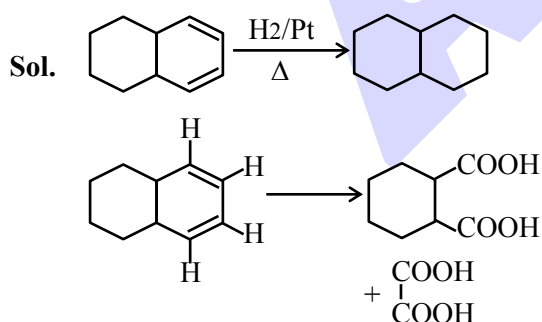
As λ and λ' is equal so frequency of these lines will be also equal.



X is :



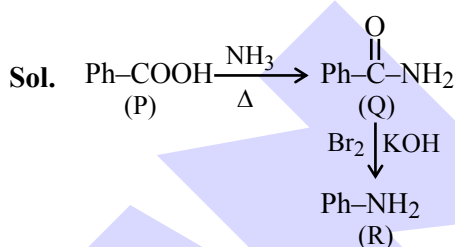
Ans. (1)



14. Compound P when pass on from ammonia & heating gives compound Q which is further treated with $KOH + Br_2$ gives compound R with mol. formula C_6H_7N then find the correct structure of P, Q, R respectively.

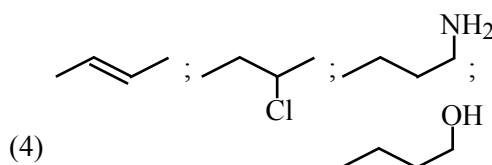
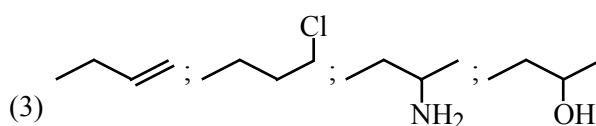
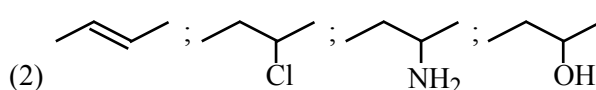
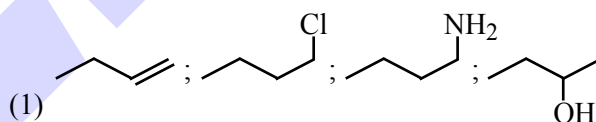
- (1) Benzoic acid, bezamide, aniline
- (2) Benzoic acid, ammonium benzoate, benzene
- (3) Ammonium benzoate, benzamide, benzene
- (4) Benzoic acid, aniline, benzene

Ans. (1)



15. An Alkene P (C_4H_8), gives optically active product Q which further react with ammonia and gives R. R react with $NaNO_2 + HCl$ followed by hydrolysis gives S.

P, Q, R, S are respectively :



Ans. (2)



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16. **Statement-A** : Tryptophan, arginine are essential amino acid.

Statement-B : Glycine has no chiral center

Statement-C : Proline has 6-membered ring

Statement-D : Cysteine is amino acid having sulphur atom

Identify correct statement.

- (1) A, B
- (2) A, B, D
- (3) A, C, D
- (4) A, B, C

Ans. (2)

17. **Statement-A** : Propanal & propanone are functional group isomers.

Statement-B : Ethoxy ethane and methoxy propane are metamers.

Statement-C : But-2-ene show optical isomerism.

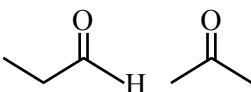
Statement-D : But-2-ene and But-1-ene are functional isomers.

Statement-E : Pentane & 2,2-dimethyl propane are chain isomers.

Identify the correct statement.

- (1) A, B, E
- (2) A, B, C
- (3) B, E
- (4) A, B

Ans. (1)

Sol.  \Rightarrow Functional isomer

$\text{CH}_3\text{-CH=CH-CH}_3$ & $\text{CH}_3\text{-CH}_2\text{-CH=CH}_2$

Position isomer

$\text{CH}_3\text{-CH}_2\text{-O-CH}_2\text{-CH}_3$ & $\text{CH}_3\text{-CH}_2\text{-CH}_2\text{-O-CH}_3$

Metamer

$\text{CH}_3\text{-CH=CH-CH}_3$ show G.I. not optical isomer

 Chain isomer

18. In Carrius method, 0.75 gm of an organic compound gave 1.2 gm of barium sulphate, find % of sulphur (molar mass of S is 32 gm mol^{-1})

Molar mass of barium sulphate is 233 gm mol^{-1}

- (1) 16.48 %
- (2) 4.55 %
- (3) 21.97 %
- (4) 10.30 %

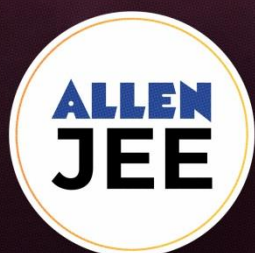
Ans. (3)

Sol.
$$\frac{n_{\text{BaSO}_4} \times 32}{W_{(\text{unknown comp.})}} \times 100$$

$$= \frac{1.2 \times 32}{233} \times 100$$

$$= 21.97\%$$

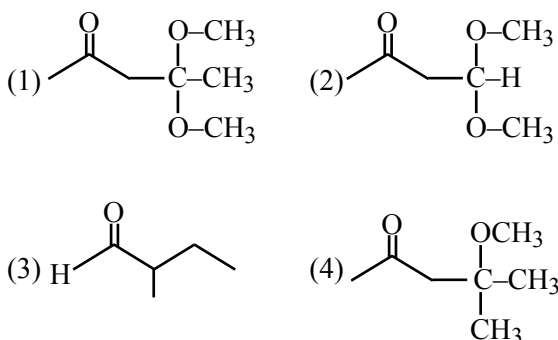
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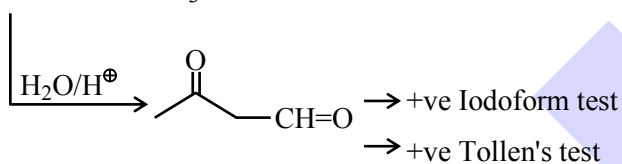
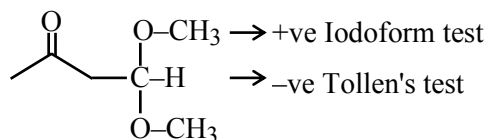


19. Compound A gives +ve iodoform test but -ve tollen's test. Acidic hydrolysis of A gives product P which gives positive tollen's test and also positive iodoform test. Compound A can be :

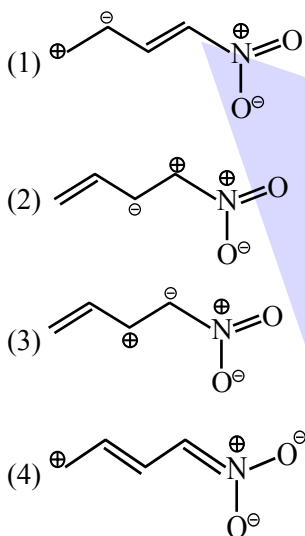


Ans. (2)

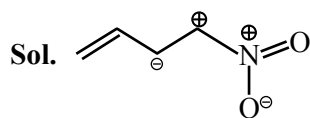
Sol.



20. Which of the following least stable resonating structure ?



Ans. (2)



This resonating structure having +ve charge on adjacent atoms so it is least stable.

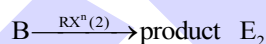
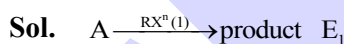
SECTION-B

1. For two chemical reaction A & B, if the difference between their activation energy is 20 KJ of 300K

determine $\ln \left(\frac{k_2}{k_1} \right)$:

$[R=8.3 \text{ J/mol-K}]$

Ans. (8)



Assuming 'A' same for both reaction.

$\ln k_1 = \ln A - \frac{E_1}{300R}$

$\ln k_2 = \ln A - \frac{E_2}{300R}$

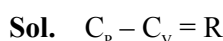
$\ln \left(\frac{k_2}{k_1} \right) = \frac{E_1 - E_2}{300R} = \frac{20 \times 1000}{300R}$

$= 8.032$

2. 10 moles of O_2 gas is heated at constant volume from 30°C to 40°C . The change in the internal energy of gas is _____ cal.

$C_p = 7 \text{ Cal/mol-K}, R = \frac{2 \text{ Cal}}{\text{mol-K}}$

Ans. (500 Cal)



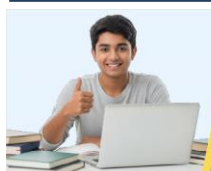
$7 - C_v = 2$

$C_v = 5 \text{ Cal/mol-K}$

$\Delta U = nC_v \Delta T$

$= 10 \times 5 [10]$

$= 500 \text{ Cal}$



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3. pH & conductance of a standard solution of HX are 5 & 4×10^{-5} S respectively. The standard solution is present in cell having length between electrodes 15 cm & Area is 1 cm^2 then calculate limiting molar conductivity ($\text{Sm}^2 \text{mol}^{-1}$) of standard solution. [Assume degree of dissociation of HX $\ll 1$]

Ans. (6)

Sol. pH = 5

$$[\text{H}^+] = 10^{-5} = [\text{HX}] \cdot \alpha$$

$$= [\text{HX}] \cdot \frac{\Lambda_m}{\Lambda_m^\infty}$$

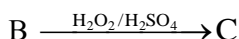
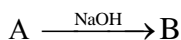
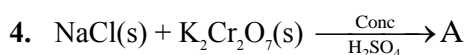
$$\Lambda_m = \frac{k \times 1000}{[\text{HX}]}$$

$$K = G \cdot G^* = 4 \times 10^{-5} \times \frac{15}{1} = 6 \times 10^{-4} \text{ S} \cdot \text{cm}^{-1}$$

$$[\text{H}^+] = 10^{-5} = [\text{HX}] \times \frac{6 \times 10^{-4} \times 1000}{\Lambda_m^\infty \times [\text{HX}]}$$

$$\Lambda_m^\infty = 60000 \text{ S} \cdot \text{cm}^{-1} \text{ mol}^{-1}$$

$$\Lambda_m^\infty = 6 \text{ S} \cdot \text{m}^2 \text{ mol}^{-1}$$



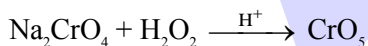
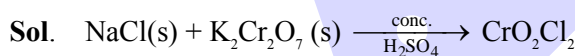
If number of O_2^{2-} ion in C = X

If number of O atom in C = Y

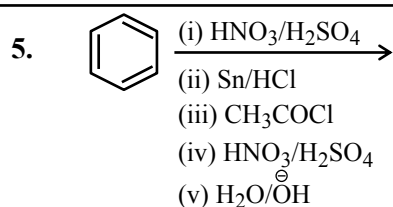
If oxidation state of Cr in C = Z

Then (X + Y + Z) is _

Ans. (13)



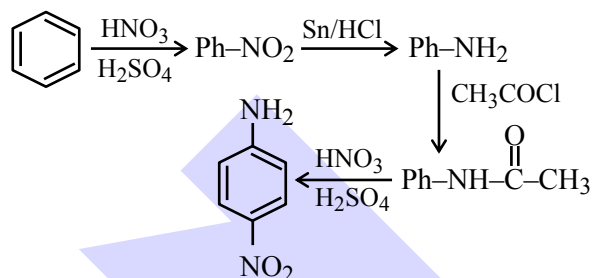
X = 2, Y = 5, Z = 6



Find % of N in the final product.

Ans. 20.29%

Sol.



$$\text{Mol. wt} = (6 \times 12) + (6 \times 1) + (2 \times 14) + (2 \times 16) = 138$$

$$\% \text{N} = \frac{28}{138} \times 100 = 20.29\%$$



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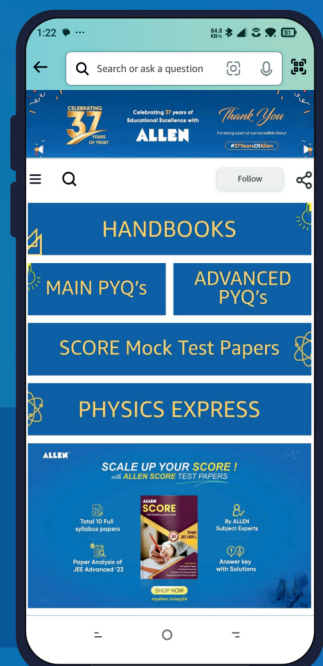
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