

Organic Chemistry:

Some Basic Principles and Techniques

1. The IUPAC name of neopentane is [AIEEE-2009]

- (1) 2, 2-dimethylpropane
- (2) 2-methylpropane
- (3) 2, 2-dimethylbutane
- (4) 2-methylbutane

2. Arrange the carbanions, $(\text{CH}_3)_3\bar{\text{C}}$, $\bar{\text{CCl}}_3$, $(\text{CH}_3)_2\bar{\text{CH}}$, $\text{C}_6\text{H}_5\bar{\text{CH}}_2$, in order of their decreasing stability [AIEEE-2009]

- (1) $(\text{CH}_3)_2\bar{\text{CH}} > \bar{\text{CCl}}_3 > \text{C}_6\text{H}_5\bar{\text{CH}}_2 > (\text{CH}_3)_3\bar{\text{C}}$
- (2) $\bar{\text{CCl}}_3 > \text{C}_6\text{H}_5\bar{\text{CH}}_2 > (\text{CH}_3)_2\bar{\text{CH}} > (\text{CH}_3)_3\bar{\text{C}}$
- (3) $(\text{CH}_3)_3\bar{\text{C}} > (\text{CH}_3)_2\bar{\text{CH}} > \text{C}_6\text{H}_5\bar{\text{CH}}_2 > \bar{\text{CCl}}_3$
- (4) $\text{C}_6\text{H}_5\bar{\text{CH}}_2 > \bar{\text{CCl}}_3 > (\text{CH}_3)_3\bar{\text{C}} > (\text{CH}_3)_2\bar{\text{CH}}$

3. The alkene that exhibits geometrical isomerism is [AIEEE-2009]

- (1) 2 - methyl propene
- (2) 2 - butene
- (3) 2 - methyl - 2 - butene
- (4) Propene

4. The correct order of increasing basicity of the given conjugate bases ($\text{R} = \text{CH}_3$) is [AIEEE-2010]

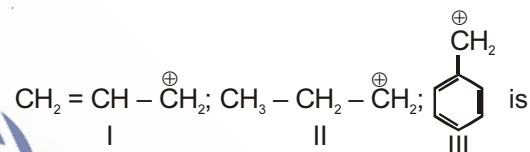
- (1) $\text{RCO}\bar{\text{O}} < \text{HC}\equiv\bar{\text{C}} < \bar{\text{NH}}_2 < \bar{\text{R}}$
- (2) $\text{RCO}\bar{\text{O}} < \text{HC}\equiv\bar{\text{C}} < \bar{\text{R}} < \bar{\text{NH}}_2$
- (3) $\bar{\text{R}} < \text{HC}\equiv\bar{\text{C}} < \text{RCO}\bar{\text{O}} < \bar{\text{NH}}_2$
- (4) $\text{RCO}\bar{\text{O}} < \bar{\text{NH}}_2 < \text{HC}\equiv\bar{\text{C}} < \bar{\text{R}}$

5. 29.5 mg of an organic compound containing nitrogen was digested according to Kjeldahl's method and the evolved ammonia was absorbed in 20 mL of 0.1 M HCl solution. The excess of the acid required 15 mL of 0.1 M NaOH solution for

complete neutralisation. The percentage of nitrogen in the compound is [AIEEE-2010]

- (1) 29.5
- (2) 59.0
- (3) 47.4
- (4) 23.7

6. The order of stability of the following carbocations



[JEE (Main)-2013]

- (1) III > II > I
- (2) II > III > I
- (3) I > II > III
- (4) III > I > II

7. A gaseous hydrocarbon gives upon combustion 0.72 g of water and 3.08 g of CO_2 . The empirical formula of the hydrocarbon is [JEE (Main)-2013]

- (1) C_2H_4
- (2) C_3H_4
- (3) C_6H_5
- (4) C_7H_8

8. For the estimation of nitrogen, 1.4 g of an organic compound was digested by Kjeldahl method and the evolved ammonia was absorbed in 60 mL of

$\frac{\text{M}}{10}$ sulphuric acid. The unreacted acid required 20

mL of $\frac{\text{M}}{10}$ sodium hydroxide for complete neutralization. The percentage of nitrogen in the compound is [JEE (Main)-2014]

- (1) 6%
- (2) 10%
- (3) 3%
- (4) 5%

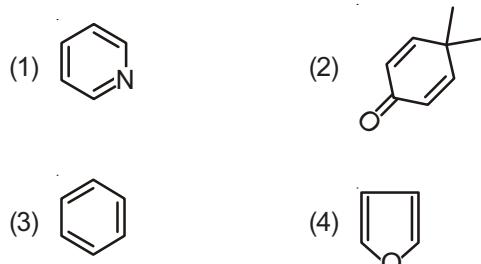
9. In Carius method of estimation of halogens, 250 mg of an organic compound gave 141 mg of AgBr . The percentage of bromine in the compound is (At. mass Ag = 108; Br = 80) [JEE (Main)-2015]

- (1) 24
- (2) 36
- (3) 48
- (4) 60

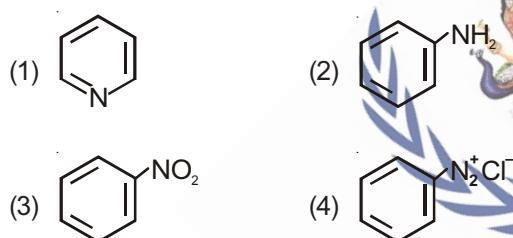
10. The distillation technique most suited for separating glycerol from spent-lye in the soap industry is
[JEE (Main)-2016]

- Fractional distillation
- Steam distillation
- Distillation under reduced pressure
- Simple distillation

11. Which of the following molecules is least resonance stabilized? [JEE (Main)-2017]



12. Which of the following compounds will be suitable for Kjeldahl's method for nitrogen estimation?
[JEE (Main)-2018]



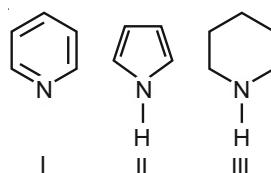
13. Which amongst the following is the strongest acid?
[JEE (Main)-2019]

- CHBr_3
- $\text{CH}(\text{CN})_3$
- CHI_3
- CHCl_3

14. The correct decreasing order for acid strength is
[JEE (Main)-2019]

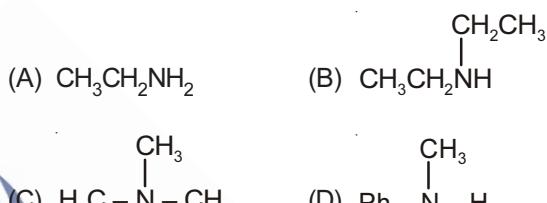
- $\text{FCH}_2\text{COOH} > \text{NCCH}_2\text{COOH} >$
 $\text{NO}_2\text{CH}_2\text{COOH} > \text{CICH}_2\text{COOH}$
- $\text{CNCH}_2\text{COOH} > \text{O}_2\text{NCH}_2\text{COOH} >$
 $\text{FCH}_2\text{COOH} > \text{CICH}_2\text{COOH}$
- $\text{NO}_2\text{CH}_2\text{COOH} > \text{NCCH}_2\text{COOH} >$
 $\text{FCH}_2\text{COOH} > \text{CICH}_2\text{COOH}$
- $\text{NO}_2\text{CH}_2\text{COOH} > \text{FCH}_2\text{COOH} >$
 $\text{CNCH}_2\text{COOH} > \text{CICH}_2\text{COOH}$

15. Arrange the following amines in the decreasing order of basicity
[JEE (Main)-2019]



- $\text{III} > \text{II} > \text{I}$
- $\text{I} > \text{III} > \text{II}$
- $\text{III} > \text{I} > \text{II}$
- $\text{I} > \text{II} > \text{III}$

16. The increasing basicity order of the following compounds is
[JEE (Main)-2019]

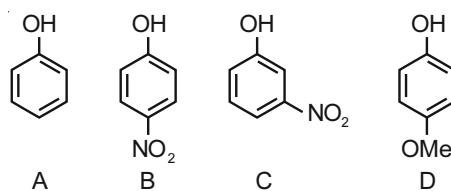


- $(\text{D}) < (\text{C}) < (\text{B}) < (\text{A})$
- $(\text{A}) < (\text{B}) < (\text{C}) < (\text{D})$
- $(\text{A}) < (\text{B}) < (\text{D}) < (\text{C})$
- $(\text{D}) < (\text{C}) < (\text{A}) < (\text{B})$

17. If dichloromethane (DCM) and water (H_2O) are used for differential extraction, which one of the following statements is correct?
[JEE (Main)-2019]

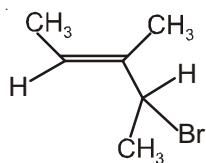
- DCM and H_2O will make turbid/colloidal mixture
- DCM and H_2O will be miscible clearly
- DCM and H_2O would stay as upper and lower layer respectively in the separating funnel (S.F.)
- DCM and H_2O would stay as lower and upper layer respectively in the S.F.

18. The increasing order of the pK_a values of the following compounds is
[JEE (Main)-2019]



- $\text{D} < \text{A} < \text{C} < \text{B}$
- $\text{B} < \text{C} < \text{D} < \text{A}$
- $\text{B} < \text{C} < \text{A} < \text{D}$
- $\text{C} < \text{B} < \text{A} < \text{D}$

19. What is the IUPAC name of the following compound?



[JEE (Main)-2019]

- (1) 3-Bromo-1, 2-dimethylbut-1-ene
 - (2) 4-Bromo-3-methylpent-2-ene
 - (3) 3-Bromo-3-methyl-1, 2- dimethylprop-1-ene
 - (4) 2-Bromo-3-methylpent-3-ene
20. The correct match between items I and II is

Item-I (Mixture)

- (A) H₂O : Sugar
- (B) H₂O : Aniline
- (C) H₂O : Toluene

Item-II

- | |
|-----------------------------|
| (Separation method) |
| (P) Sublimation |
| (Q) Recrystallization |
| (R) Steam distillation |
| (S) Differential extraction |

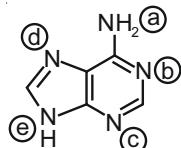
[JEE (Main)-2019]

- (1) (A) → (R), (B) → (P), (C) → (S)
- (2) (A) → (S), (B) → (R), (C) → (P)
- (3) (A) → (Q), (B) → (R), (C) → (P)
- (4) (A) → (Q), (B) → (R), (C) → (S)

21. An organic compound is estimated through Dumas method and was found to evolve 6 moles of CO₂, 4 moles of H₂O and 1 mole of nitrogen gas. The formula of the compound is [JEE (Main)-2019]

- (1) C₆H₈N₂
- (2) C₁₂H₈N
- (3) C₆H₈N
- (4) C₁₂H₈N₂

22. In the following compound,



the favourable site/s for protonation is/are

[JEE (Main)-2019]

- (1) (a)
- (2) (b), (c) and (d)
- (3) (a) and (d)
- (4) (a) and (e)

23. The correct order for acid strength of compounds CH ≡ CH, CH₃ — C ≡ CH and CH₂ == CH₂ is as follows [JEE (Main)-2019]

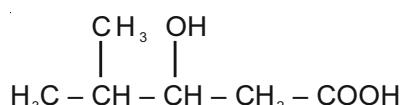
- (1) CH₃ — C ≡ CH > CH ≡ CH > CH₂ = CH₂

- (2) CH₃ — C ≡ CH > CH₂ = CH₂ > HC ≡ CH

- (3) CH ≡ CH > CH₂ = CH₂ > CH₃ — C ≡ CH

- (4) HC ≡ CH > CH₃ — C ≡ CH > CH₂ = CH₂

24. The IUPAC name of the following compound is



[JEE (Main)-2019]

- (1) 3-Hydroxy-4-methylpentanoic acid

- (2) 4-Methyl-3-hydroxypentanoic acid

- (3) 2-Methyl-3-hydroxypentan-5-oic acid

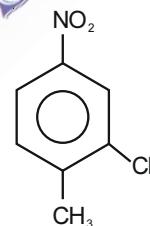
- (4) 4,4-Dimethyl-3-hydroxybutanoic acid

25. Which of the following compounds will show the maximum 'enol' content? [JEE (Main)-2019]

- (1) CH₃COCH₂COOC₂H₅
- (2) CH₃COCH₃

- (3) CH₃COCH₂COCH₃
- (4) CH₃COCH₂CONH₂

26. The correct IUPAC name of the following compound is [JEE (Main)-2019]



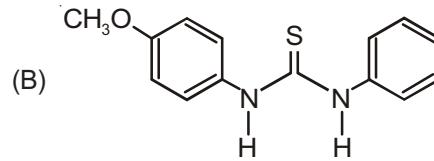
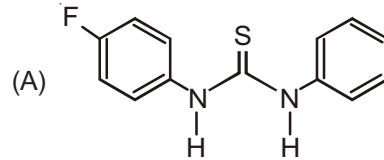
- (1) 3-chloro-4-methyl-1-nitrobenzene

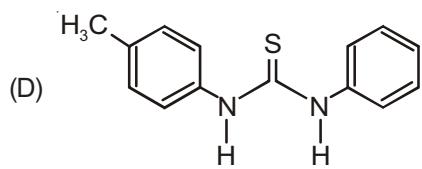
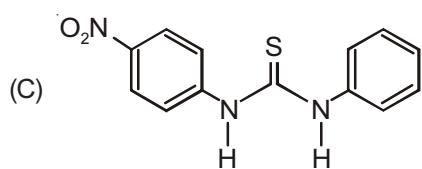
- (2) 5-chloro-4-methyl-1-nitrobenzene

- (3) 2-methyl-5-nitro-1-chlorobenzene

- (4) 2-chloro-1-methyl-4-nitrobenzene

27. The increasing order of the pK_b of the following compound is





[JEE (Main)-2019]

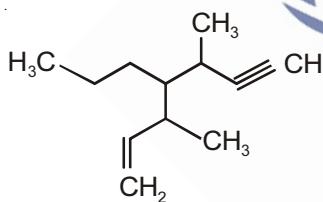
- (1) (B) < (D) < (A) < (C) (2) (A) < (C) < (D) < (B)
 (3) (B) < (D) < (C) < (A) (4) (C) < (A) < (D) < (B)

28. The correct statement among the following is

[JEE (Main)-2019]

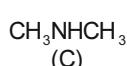
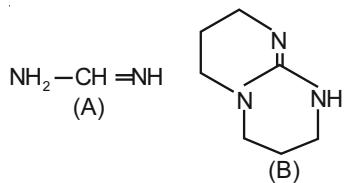
- (1) $(\text{SiH}_3)_3\text{N}$ is planar and less basic than $(\text{CH}_3)_3\text{N}$
 (2) $(\text{SiH}_3)_3\text{N}$ is pyramidal and more basic than $(\text{CH}_3)_3\text{N}$
 (3) $(\text{SiH}_3)_3\text{N}$ is pyramidal and less basic than $(\text{CH}_3)_3\text{N}$
 (4) $(\text{SiH}_3)_3\text{N}$ is planar and more basic than $(\text{CH}_3)_3\text{N}$

29. The IUPAC name for the following compound is



[JEE (Main)-2019]

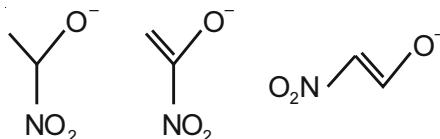
- (1) 3-methyl-4-(1-methylprop-2-ynyl)-1-heptene
 (2) 3-methyl-4-(3-methylprop-1-enyl)-1-heptyne
 (3) 3,5-dimethyl-4-propylhept-1-en-6-yne
 (4) 3,5-dimethyl-4-propylhept-6-en-1-yne

30. The increasing order of pK_b for the following compounds will be

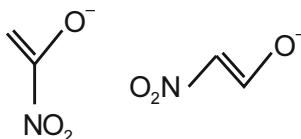
[JEE (Main)-2020]

- (1) (B) < (C) < (A) (2) (B) < (A) < (C)
 (3) (C) < (A) < (B) (4) (A) < (B) < (C)

31. The correct order of stability for the following alkoxides is



(B)



(D)

[JEE (Main)-2020]

- (1) (B) > (A) > (C) (2) (C) > (B) > (A)
 (3) (B) > (C) > (A) (4) (C) > (A) > (B)

32. Arrange the following compounds in increasing order of C – OH bond length [JEE (Main)-2020]

methanol, phenol, p-ethoxyphenol

- (1) phenol < p-ethoxyphenol < methanol
 (2) methanol < phenol < p-ethoxyphenol
 (3) methanol < p-ethoxyphenol < phenol
 (4) phenol < methanol < p-ethoxyphenol

33. A flask contains a mixture of isohexane and 3-methylpentane. One of the liquids boils at 63°C while the other boils at 60°C. What is the best way to separate the two liquids and which one will be distilled out first? [JEE (Main)-2020]

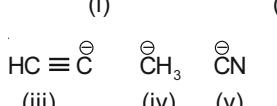
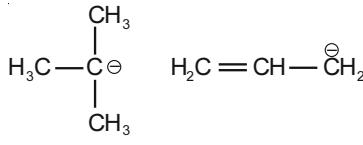
- (1) Simple distillation, isohexane
 (2) Fractional distillation, isohexane
 (3) Simple distillation, 3-methylpentane
 (4) Fractional distillation, 3-methylpentane

34. Kjeldahl's method cannot be used to estimate nitrogen for which of the following compounds?

[JEE (Main)-2020]

- (1) $\text{CH}_3\text{CH}_2-\text{C}\equiv\text{N}$ (2) $\text{NH}_2-\overset{\text{O}}{\underset{||}{\text{C}}}-\text{NH}_2$
 (3) $\text{C}_6\text{H}_5\text{NO}_2$ (4) $\text{C}_6\text{H}_5\text{NH}_2$

35. The increasing order of basicity for the following intermediates is (from weak to strong)



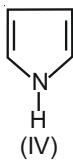
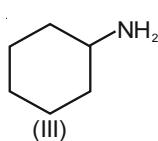
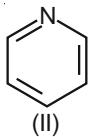
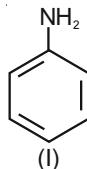
[JEE (Main)-2020]

- (1) (v) < (i) < (iv) < (ii) < (iii)
 (2) (iii) < (iv) < (ii) < (i) < (v)
 (3) (v) < (iii) < (ii) < (iv) < (i)
 (4) (iii) < (i) < (ii) < (iv) < (v)

36. Which of the following has the shortest C – Cl bond?
[JEE (Main)-2020]

- $\text{Cl} - \text{CH} = \text{CH} - \text{NO}_2$
- $\text{Cl} - \text{CH} = \text{CH}_2$
- $\text{Cl} - \text{CH} = \text{CH} - \text{CH}_3$
- $\text{Cl} - \text{CH} = \text{CH} - \text{OCH}_3$

37. The decreasing order of basicity of the following amines is

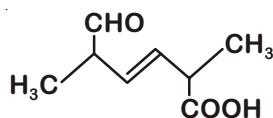


- (III) > (I) > (II) > (IV)
- (II) > (III) > (IV) > (I)
- (I) > (III) > (IV) > (II)
- (III) > (II) > (I) > (IV)

38. In Carius method of estimation of halogen, 0.172 g of an organic compound showed presence of 0.08 g of bromine. Which of these is the correct structure of the compound?
[JEE (Main)-2020]

-
-
- $\text{H}_3\text{C} - \text{Br}$
- $\text{H}_3\text{C} - \text{CH}_2 - \text{Br}$

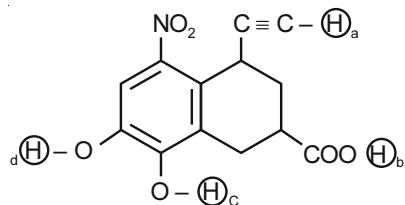
39. The IUPAC name for the following compound is



[JEE (Main)-2020]

- 6-formyl-2-methyl-hex-3-enoic acid
- 2, 5-dimethyl-6-carboxy-hex-3-enal
- 2, 5-dimethyl-5-carboxy-hex-3-enal
- 2, 5-dimethyl-6-oxo-hex-3-enoic acid

40. Arrange the following labelled hydrogens in decreasing order of acidity



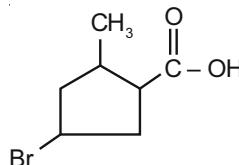
[JEE (Main)-2020]

- b > c > d > a
- b > a > c > d
- c > b > d > a
- c > b > a > d

41. Which one of the following compounds possesses the most acidic hydrogen?
[JEE (Main)-2020]

- $\text{H}_3\text{C} - \text{C}(=\text{O}) - \text{CH}_3$
- $\text{H}_3\text{C} - \text{C} \equiv \text{C} - \text{H}$
- $\text{N} \equiv \text{C} - \text{C} \equiv \text{N}$
-

42. The IUPAC name of the following compound is



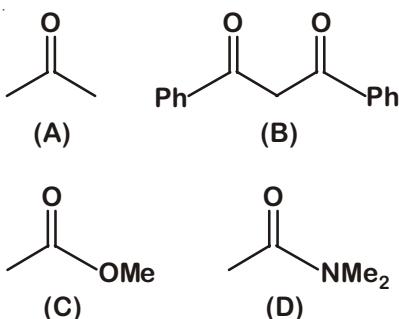
[JEE (Main)-2020]

- 3-Bromo-5-methylcyclopentane carboxylic acid
- 3-Bromo-5-methylcyclopentanoic acid
- 5-Bromo-3-methylcyclopentanoic acid
- 4-Bromo-2-methylcyclopentane carboxylic acid

43. Among the following compounds, which one has the shortest C – Cl bond?
[JEE (Main)-2020]

-
-
- $\text{H}_3\text{C} - \text{Cl}$
-

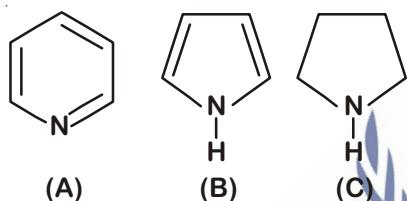
44. The increasing order of the acidity of the α -hydrogen of the following compounds is



[JEE (Main)-2020]

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

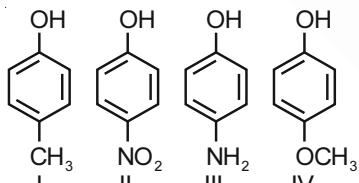
45. The increasing order of basicity of the following compounds is



[JEE (Main)-2020]

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

46. The increasing order of boiling points of the following compounds is

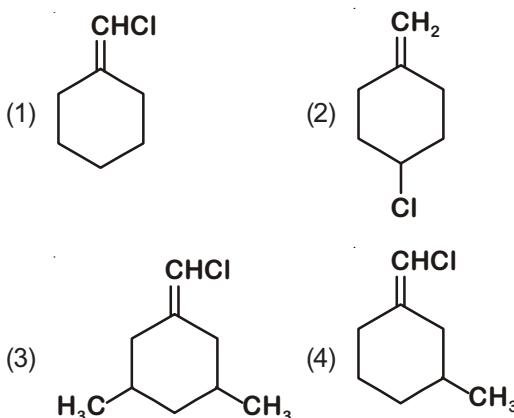


[JEE (Main)-2020]

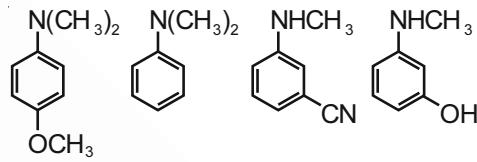
- (1) III < I < II < IV
- (2) IV < I < II < III
- (3) I < III < IV < II
- (4) I < IV < III < II

47. Among the following compounds geometrical isomerism is exhibited by

[JEE (Main)-2020]



48. The increasing order of pK_b values of the following compounds is



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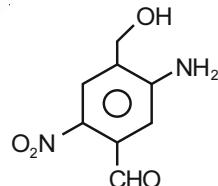
- (1) I < II < IV < III
- (2) I < II < III < IV
- (3) II < I < III < IV
- (4) II < IV < III < I

49. Which of the following compounds shows geometrical isomerism?

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- (1) 2-methylpent-1-ene
- (2) 4-methylpent-1-ene
- (3) 2-methylpent-2-ene
- (4) 4-methylpent-2-ene

50. The IUPAC name of the following compound is



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- (1) 4-amino-2-formyl-5-hydroxymethyl nitrobenzene
- (2) 5 - a m i n o - 4 - h y d r o x y m e t h y l - 2-nitrobenzaldehyde
- (3) 3 - a m i n o - 4 - h y d r o x y m e t h y l - 5-nitrobenzaldehyde
- (4) 2-nitro-4-hydroxymethyl-5-amino benzaldehyde

51. In an estimation of bromine by Carius method, 1.6 g of an organic compound gave 1.88 g of AgBr. The mass percentage of bromine in the compound is _____.

(Atomic mass, Ag = 108, Br = 80 g mol⁻¹)

[JEE (Main)-2020]