Kota, Rajasthan
CORE ACADEMY
Enhancing ability to learn & Express

A Premier Institute for

Since **2012**

JEE | NEET | 8th – 12th | Commerce | CA – Foundation | Humanities
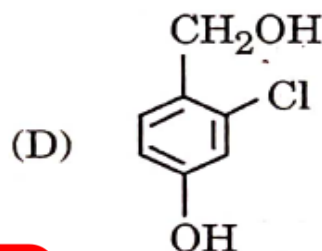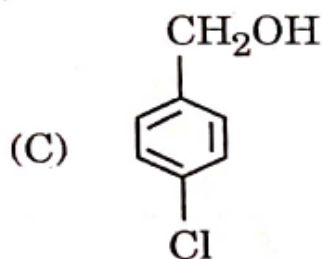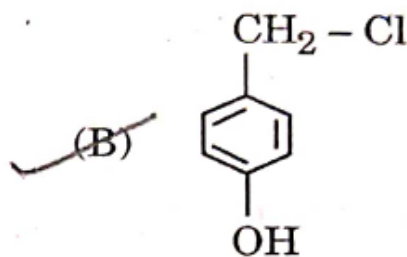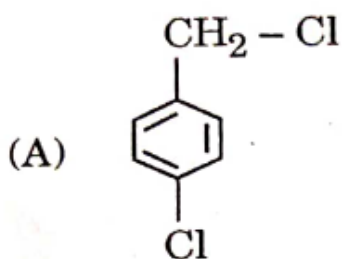
12th CBSE CHEM SET – 3 CODE 56/3/3

1. Which of the following ligands is an ambidentate ligand ?

   (A) CO

   (B) SCN^- ✓

   (C) NH_3

   (D) H_2O

2. On adding $AgNO_3$ solution to 1 mole of $CoCl_3 \cdot 4NH_3$, one mole of AgCl is precipitated. The secondary valency of Co is :

   (A) 6

   (B) 4

   (C) 3

   (D) 7

3. Which of the following elements of 3d series of transition elements has the lowest $\Delta_a H^o$?

   (A) Sc

   (B) Cr

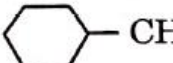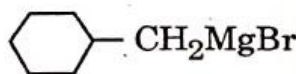   (C) Cu

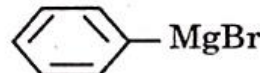   (D) Zn

4. Consider the following reaction :
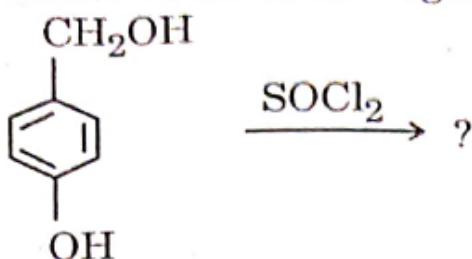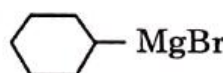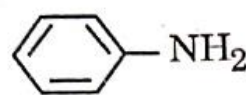
   The major product obtained is :

   (A)

   (B)

   (C)

   (D)

Kota, Rajasthan

CORE
ACADEMY
Enhancing ability to learn & Express

A Premier Institute for

Since 2012

JEE | NEET | 8th – 12th | Commerce | CA - Foundation | Humanities

12th CBSE CHEM SET – 1 CODE 56/3/3

5. Which of the following Grignard reagent will be used with methanal to prepare ⬡–CH_2–OH ?

(A) ⬡–CH_2MgBr

(B) ⬡–CH_2CH_2MgBr

(C) ⬡–$MgBr$

(D) ⬡–$MgBr$

6. $CH_3 - O - CH_3$ when treated with excess HI gives :

(A) $CH_3 - OH + CH_3 - I$

(B) $2CH_3 - OH$

(C) $2CH_3 - I$

(D) $CH_3 - I + CH_4$

7. Which of the following compounds will **not** react with benzene sulphonyl chloride ?

(A) $(C_2H_5)_3N$

(B) $C_2H_5 - NH_2$

(C) $(C_2H_5)_2NH$

(D) ⬡–NH_2

8. 'Scurvy' is caused by the deficiency of vitamin :

(A) E

(B) A

(C) C

(D) D

For more details, Call or Visit

Core Academy, 1st & 2nd Floor above Dr. Rakshit Dental Clinic, Mission Hospital Road, Bilaspur
📱 📞 9630588100, 9893783828   🌐 coreacademybsp.in   ▶ Core Academy

9. A 1% solution of solute 'X' is isotonic with a 6% solution of sucrose (molar mass = 342 g mol^{-1}). The molar mass of solute 'X' is :

   (A) 34·2 g mol^{-1}

   (B) 57 g mol^{-1}

   (C) 114 g mol^{-1}

   (D) 3·42 g mol^{-1}

$$C = C$$
$$\frac{n}{v} = \frac{n}{v}$$
$$0.01 = \frac{0.06}{342}$$
$$\frac{x}{v}$$
$$5\frac{342}{0.06}$$

10. The half life of a first order reaction with rate constant (k) of 3 min^{-1} is :

    (A) 0·693 min

    (B) 2·31 min

    (C) 6·93 min

    (D) 0·231 min

11. Which of the following cells is used in hearing aids ?

    (A) Dry cell

    (B) Mercury cell

    (C) Nickel-cadmium cell

    (D) Fuel cell

Kota, Rajasthan

CORE
ACADEMY
Enhancing ability to learn & Express

A Premier Institute for

Since 2012

| JEE | NEET | 8th – 12th | Commerce | CA - Foundation | Humanities |

12th CBSE CHEM SET – 1 CODE 56/3/3

12. Aniline on reaction with Bromine water gives :

(A) o-bromoaniline

(B) 2,4,6-tribromoaniline

(C) m-bromoaniline

(D) p-bromoaniline

For Questions number 13 to 16, two statements are given — one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer to these questions from the codes (A), (B), (C) and (D) as given below.

(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).

(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is *not* the correct explanation of the Assertion (A).

(C) Assertion (A) is true, but Reason (R) is false.

(D) Assertion (A) is false, but Reason (R) is true.

13. *Assertion (A) :* $\Delta_{mix}H$ and $\Delta_{mix}V$ are zero for an ideal solution.

Reason (R) : The solution which obeys Raoult's law over the entire range of concentration is called an ideal solution.

14. *Assertion (A) :* Rate of reaction decreases with increase in temperature.

Reason (R) : Number of effective collisions increases with increase in temperature.

15. *Assertion (A) :* Phenol on reaction with aqueous NaOH gives sodium phenoxide.

Reason (R) : This reaction supports the acidic nature of phenol.

16. *Assertion (A) :* Boiling point of butan-1-ol is higher than that of butan-1-amine.

Reason (R) : Being more polar, butan-1-ol forms stronger intermolecular hydrogen bonds as compared to butan-1-amine.

$2 \times 1 = 2$

17. Write the reactions of glucose with :

(a) HI

(b) $(CH_3CO)_2O$

Kota, Rajasthan

CORE
ACADEMY
Enhancing ability to learn & Express

A Premier Institute for

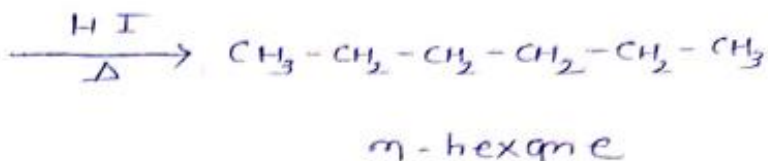Since **2012**

JEE | NEET | 8th – 12th | Commerce | CA - Foundation | Humanities

12th CBSE CHEM SET – 1 CODE 56/3/3

Section - B –

Sol. (17)

(a)

$$\underset{\text{glucose}}{\underset{\begin{array}{c}CHO \\ | \\ (CHOH)_4 \\ | \\ CH_2OH\end{array}}{}} \xrightarrow[\Delta]{HI} CH_3-CH_2-CH_2-CH_2-CH_2-CH_3$$

n-hexane

(b)

$$\underset{\begin{array}{c}CHO \\ | \\ (CHOH)_4 \\ | \\ CH_2OH\end{array}}{} + 5\ (CH_3CO)_2O \longrightarrow \underset{\begin{array}{c}CHO \\ | \\ (CH-OCOCH_3)_4 \\ | \\ CH_2-OCOCH_3\end{array}}{}$$
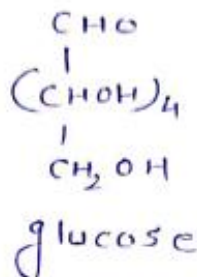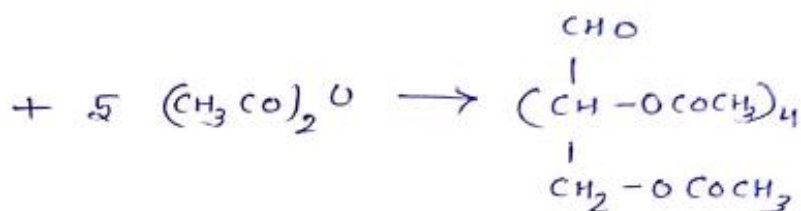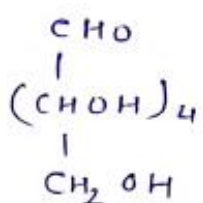
Penta acetyl
glucose

$$+ 5\ CH_3COOH$$

18. (a) Define molal depression constant. How is it related to enthalpy of fusion ?   2

OR

(b) What type of deviation is shown by ethanol and acetone mixture ? Give reason. What type of azeotropic mixture is formed by that deviation ?   2

(a) Molal depression constant –

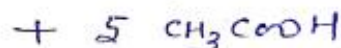The depression in freezing point when one mole of the solute is dissolved in 1000 gm. of the solvent is called molal depression constant.

- It is expressed as K_f.

- The relation between molal depression constant (K_f) and enthalpy of fusion (ΔH) is given by the following equation –

$$K_f = \frac{M_A \cdot R T_f^2}{\Delta H_{fus.} \times 1000}$$

Here = M_A = Molar mass of solvent
T_f = Freezing point of solvent
ΔH_f = enthalpy of fusion.
K_f = molal depression constant
R = universal gas constant

(b) Mixture of ethanol and acetone shows positive deviation from Raoult's Law.

In pure ethanol, molecules are hydrogen bonded. on adding acetone, its molecule get in between the host molecule and break some of the hydrogen bonds between them.

- Upon mixing ethanol and acetone, they form minimum boiling azeotrope mixture.

19. **(a)** In a reaction, if the concentration of reactant 'X' is tripled, the rate of reaction becomes twenty-seven times. What is the order of the reaction?

(b) State a condition under which a bimolecular reaction is kinetically a first-order reaction. Give an example of such a reaction. *1+1=2*

(a) Suppose the rate law for the given reaction is –

$$rate = K[A]^x$$

then.

$$\frac{r\ initial}{r\ final} = \frac{K[A_1]^x}{K[A_2]^x}$$

$$\frac{r}{27r} = \left[\frac{A}{3A}\right]^x$$

$$\frac{1}{27} = \left[\frac{1}{3}\right]^x$$

or $\quad 27 = (3)^x$

or $\quad (3)^3 = (3)^x$

or $\quad \boxed{x = 3}$

So, the order of reaction will be third. order.

Kota, Rajasthan
CORE
ACADEMY
Enhancing ability to learn & Express

A Premier Institute for

Since **2012**

JEE | NEET | 8th – 12th | Commerce | CA - Foundation | Humanities

12th CBSE CHEM SET – 1 CODE 56/3/3

(b) A bimolecular reaction can be a first order reaction kinetically, if one of the reactant is taken in access. In this condition the concentration of the reactant, which has taken in access doesn't affect the rate of reaction.
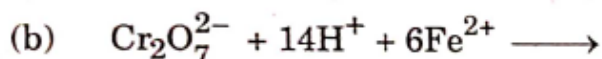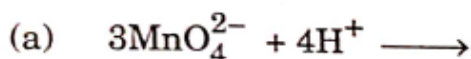
eg. Acid catalysed hydrolysis of ethyl acetate.
(Pseudo first order reaction)

$$CH_3-\overset{O}{\overset{\|}{C}}-OC_2H_5- + H_2O_{(excess)} \xrightarrow{H^{\oplus}} CH_3-\overset{O}{\overset{\|}{C}}-OH + C_2H_5OH$$

(20.) Complete and balance the following chemical equations : $2\times1=2$

(a) $3MnO_4^{2-} + 4H^+ \longrightarrow$

(b) $Cr_2O_7^{2-} + 14H^+ + 6Fe^{2+} \longrightarrow$

Sol. (20) →

(a) $3MnO_4^{-2} + 4H^+ \longrightarrow 2MnO_4^- + MnO_2 + 2H_2O$

(b) $Cr_2O_7^{-2} + 14H^+ + 6Fe^{+2} \longrightarrow 6Fe^{+3} + 2Cr^{+3}$
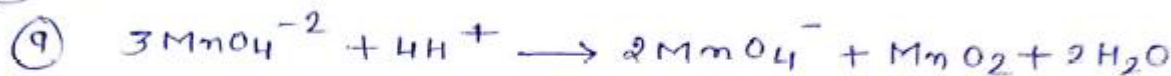
21. (a) Which halogen compound in the following pair will react faster in S_N2 reaction and why ?

 OR

(b). Why does the presence of nitro groups at ortho- and para- positions in haloarenes increase their reactivity towards nucleophilic substitution reaction ? $1+1=2$
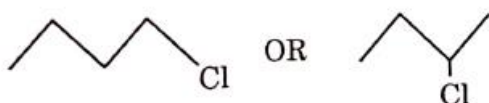
Sol. (21)

(a) $\diagdown\diagup\diagdown\diagup$Cl will react faster than

$\diagdown\diagup\diagdown\diagup$ in S_N2 reaction.
Cl

– The order of reactivity for alkyl halides.
in S_N2 is $\longrightarrow$ $CH_3-X > 1° > 2° > 3°$
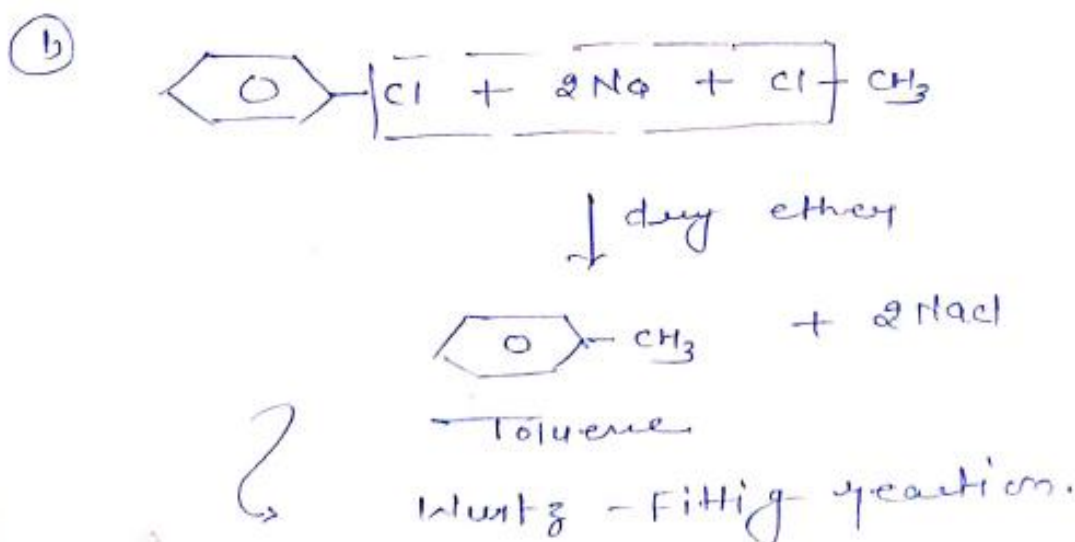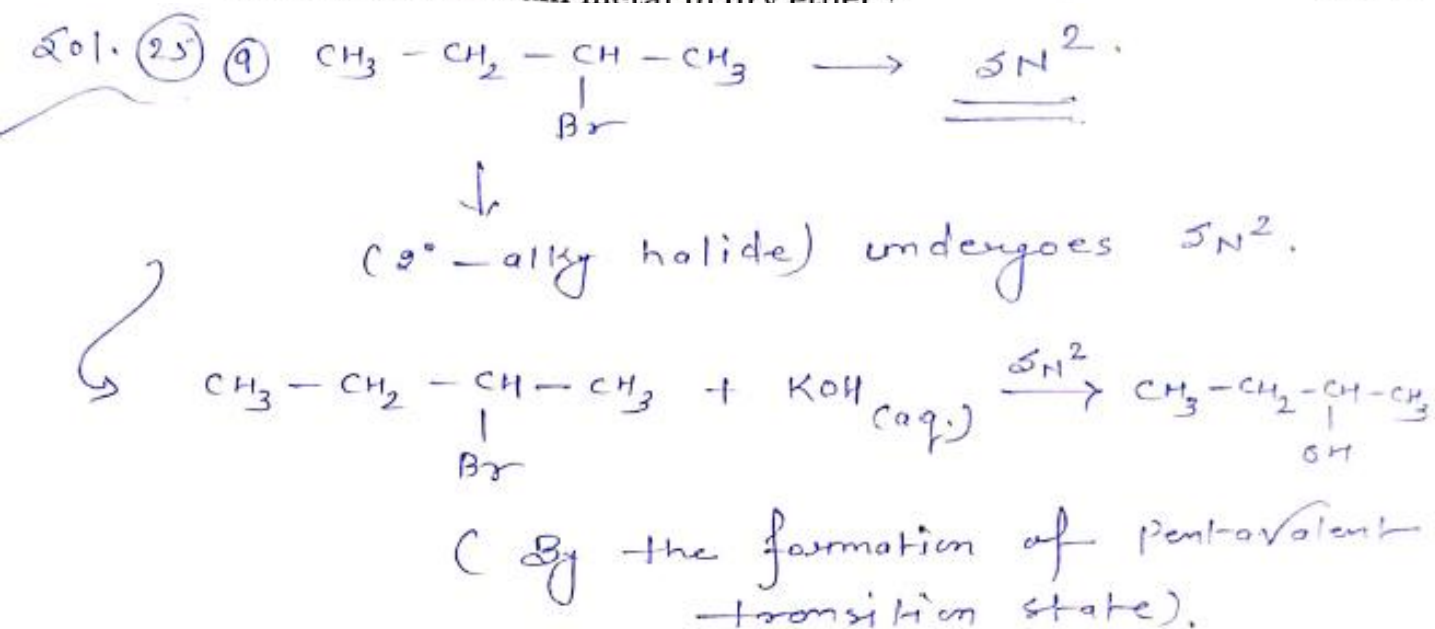
Reason. $\Rightarrow$ Less hindered carbon atom attached
to halogen, backside attack is
easily possible.

(b) Nucleophilic substitution reactions of
halo alkanes take place more rapidally
in presence of e^- withdrawing group.
because it increases the electrophilicity
of c-atom linked to halogen atom. by
$-R$-effect and the intermediate
Carbanion is also estabilized by resonance.

Kota, Rajasthan

CORE
ACADEMY
Enhancing ability to learn & Express

A Premier Institute for

Since **2012**

| JEE | NEET | 8th – 12th | Commerce | CA - Foundation | Humanities |

12th CBSE CHEM SET – 1 CODE 56/3/3

22. (a) What type of nucleophilic substitution (S_N1 or S_N2) occurs in the hydrolysis of 2-Bromobutane to form ($\pm$)-Butan-2-ol ? Give reason.

(b) What happens when chlorobenzene and methyl chloride are treated with sodium metal in dry ether ? 2+1=3

Sol. (22) (a)
$$CH_3 - CH_2 - \underset{\underset{Br}{|}}{CH} - CH_3 \longrightarrow \underline{\underline{SN^2}}$$

↓

($2° -$ alkyl halide) undergoes SN^2.

$$CH_3 - CH_2 - \underset{\underset{Br}{|}}{CH} - CH_3 + KOH_{(aq.)} \xrightarrow{SN^2} CH_3 - CH_2 - \underset{\underset{OH}{|}}{CH} - CH_3$$

(By the formation of pentavalent transition state).

(b)

$$\langle \bigcirc \rangle - |Cl + 2Na + Cl| - CH_3$$

↓ dry ether

$$\langle \bigcirc \rangle - CH_3 \quad + 2 NaCl$$

Toluene

Wurtz - Fittig reaction.

Kota, Rajasthan
CORE
ACADEMY
Enhancing ability to learn & Express

A Premier Institute for

Since 2012

JEE | NEET | 8th – 12th | Commerce | CA - Foundation | Humanities

12th CBSE CHEM SET – 1 CODE 56/3/3

23. A first-order reaction is 25% complete in 40 minutes. Calculate the value of rate constant. In what time will the reaction be 80% complete ? **3**

[Given : log 2 = 0·30, log 3 = 0·48, log 4 = 0·60, log 5 = 0·69]
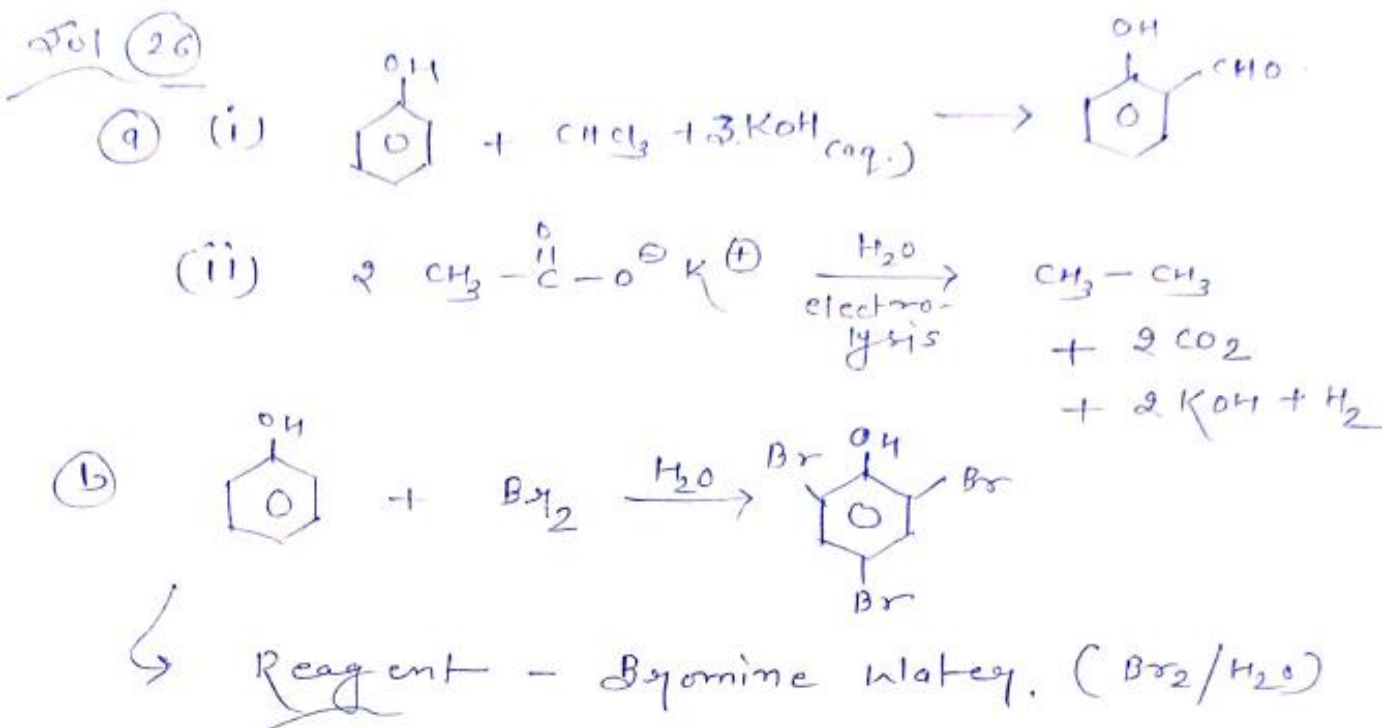
Sol. (24)

$$K = \frac{2.303}{t} \log_{10}\left(\frac{a}{a-x}\right) \longrightarrow \text{rate constant}$$

∵ K will be constant for the reaction at for the given temp., so.

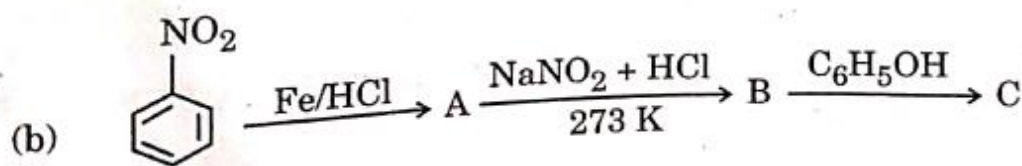40 Min. ← $\dfrac{-t_1}{t_2} = \dfrac{\log_{10}\left(\frac{a}{a-x}\right)_{25\%}}{\log_{10}\left(\frac{a}{a-x}\right)_{80\%}}$

24. (a) Write the reactions involved in the following :

    (i) Reimer-Tiemann reaction

    (ii) Kolbe's reaction

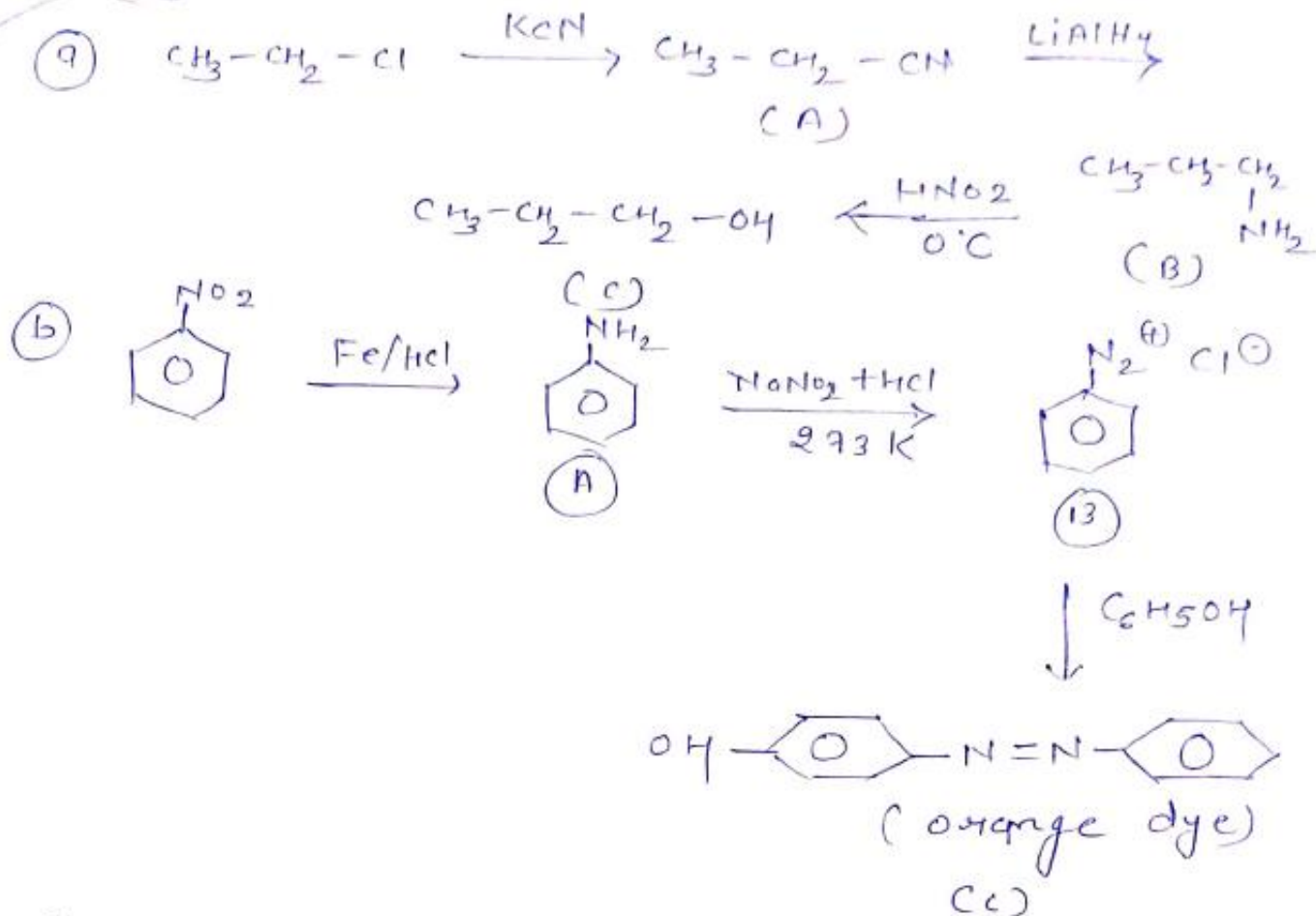(b) Name the reagent used in the bromination of phenol to form 2,4,6-Tribromophenol. **2+1=3**

Vol (26)

(a) (i)

$$\text{C}_6\text{H}_5\text{OH} + \text{CHCl}_3 + 3.\text{KOH (aq.)} \longrightarrow \text{(salicylaldehyde, OH + CHO)}$$

(ii)

$$2\ \text{CH}_3-\overset{\text{O}}{\underset{||}{\text{C}}}-\text{O}^{\ominus}\text{K}^{\oplus} \xrightarrow[\text{electrolysis}]{\text{H}_2\text{O}} \text{CH}_3-\text{CH}_3 + 2\text{CO}_2 + 2\text{KOH} + \text{H}_2$$

(b)

$$\text{C}_6\text{H}_5\text{OH} + \text{Br}_2 \xrightarrow{\text{H}_2\text{O}} \text{(2,4,6-tribromophenol)}$$

↳ Reagent – Bromine water. $(\text{Br}_2/\text{H}_2\text{O})$

25. Give the structures of A, B and C in the following reactions : $2 \times 1\frac{1}{2} = 3$

(a) $\text{CH}_3\text{CH}_2\text{Cl} \xrightarrow{\text{KCN}} \text{A} \xrightarrow{\text{LiAlH}_4} \text{B} \xrightarrow[0°C]{\text{HNO}_2} \text{C}$

(b) $\underset{\text{NO}_2}{\text{C}_6\text{H}_5} \xrightarrow{\text{Fe/HCl}} \text{A} \xrightarrow[273\ \text{K}]{\text{NaNO}_2 + \text{HCl}} \text{B} \xrightarrow{\text{C}_6\text{H}_5\text{OH}} \text{C}$

(9) $CH_3-CH_2-Cl \xrightarrow{KCN} CH_3-CH_2-CN \xrightarrow{LiAlH_4}$
(A)

$CH_3-CH_2-CH_2-OH \xleftarrow[0°C]{HNO_2}$ $CH_3-CH_2-CH_2 \atop \overset{|}{NH_2}$ (B)
(C)

(b)

$\xrightarrow{Fe/HCl}$ (A, NH$_2$ on benzene ring) $\xrightarrow[273K]{NaNO_2 + HCl}$ (13, N$_2^+$ Cl$^-$ on benzene ring)

$\downarrow C_6H_5OH$

$OH-\langle\bigcirc\rangle-N=N-\langle\bigcirc\rangle$
(orange dye)
(C)

26. How will you bring about the following conversions? (any **three**)   3×1=3
   (a) Benzoic acid to Benzaldehyde
   (b) Ethanal to Propanone
   (c) Acetophenone to Benzoic acid
   (d) Bromobenzene to 1-Phenylethanol

For more details, Call or Visit

Core Academy, 1st & 2nd Floor above Dr. Rakshit Dental Clinic, Mission Hospital Road, Bilaspur
9630588100, 9893783828   coreacademybsp.in   Core Academy

Kota, Rajasthan

CORE
ACADEMY
Enhancing ability to learn & Express

A Premier Institute for

Since 2012

JEE | NEET | 8th – 12th | Commerce | CA - Foundation | Humanities

12th CBSE CHEM SET – 1 CODE 56/3/3

Sol. (27)

(a)

$C_6H_5COOH \xrightarrow{SOCl_2} C_6H_5COCl \xrightarrow[\text{Rosenmund reduction}]{Pd/BaSO_4} C_6H_5CHO$

(b) $CH_3 - \overset{O}{\overset{||}{C}} - H \xrightarrow[H_3O^{\oplus}]{CH_3MgBr} CH_3 - \overset{OH}{\underset{CH_3}{\overset{|}{C}}} - H \xrightarrow[300°C]{Cu} CH_3 - \overset{O}{\overset{||}{C}} - CH_3$

(c)

$C_6H_5-CO-CH_3 \xrightarrow[KOH]{KMnO_4} C_6H_5-COO^{\ominus}K^{\oplus} \xrightarrow{H_3O^{\oplus}} C_6H_5-COOH$

(d)

$C_6H_5Br \xrightarrow[ether]{Mg} C_6H_5MgBr \xrightarrow[H_3O^{\oplus}]{CH_3CHO} C_6H_5 - \underset{OH}{\overset{|}{CH}} - CH_3$

(27.) A solution is prepared by dissolving 5 g of a non-volatile solute in 200 g of water. It has a vapour pressure of 31·84 mm Hg at 300 K. Calculate the molar mass of the solute. 3

(Vapour pressure of pure water at 300 K = 32 mm Hg)

For more details, Call or Visit

Core Academy, 1st & 2nd Floor above Dr. Rakshit Dental Clinic, Mission Hospital Road, Bilaspur
📱 🟢 9630588100, 9893783828 🌐 coreacademybsp.in ▶ Core Academy

According to Raoult's law –

$$\frac{P^o - P_s}{P^o} = \frac{W_B}{M_B} \times \frac{M_A}{W_A}$$

$$\frac{32 - 31.84}{32} = \frac{.5}{M_B} \times \frac{.18}{200}$$

(28.) The conductivity of 0·2 M solution of KCl is 2.48×10^{-2} S cm^{-1}. Calculate its molar conductivity and degree of dissociation (α).　　　**3**

Given :

$$\lambda^o_{K^+} = 73.5 \text{ S cm}^2 \text{ mol}^{-1}$$

$$\lambda^o_{Cl^-} = 76.5 \text{ S cm}^2 \text{ mol}^{-1}$$

Molar conductivity $(\lambda_m) = \dfrac{K' \times 1000}{M}$

$$= \frac{2.48 \times 10^{-2} \times 1000}{0.2}$$

$$= 124 \quad S \ mol^{-1} cm^2$$

and $\lambda_m^o = \lambda^o_{K^+} + \lambda^o_{Cl^-}$

$$= (73.5 + 76.5) \ S \ cm^2 \ mol^{-1}$$

$$= 150 \ S \ cm^2 \ mol^{-1}$$

$\therefore$　$\alpha = \dfrac{\lambda_m}{\lambda_m^o} = \dfrac{124}{150} = 0.82$ or

$$82\%$$

29. The involvement of $(n-1)d$ electrons in the behaviour of transition elements impart certain distinct characteristics to these elements. Thus, in addition to variable oxidation states, they exhibit paramagnetic behaviour, catalytic properties and tendency for the formation of coloured ions. The transition metals react with a number of non-metals like oxygen, nitrogen and halogens. $KMnO_4$ and $K_2Cr_2O_7$ are common examples.

The two series of inner transition elements, lanthanoids and actinoids, constitute the f-block of the periodic table. In the lanthanoids, there is regular decrease in atomic size with increase in atomic number due to the imperfect shielding effect of 4f-orbital electrons which causes contraction.

Answer the following questions :

(a) Why do transition metals and their compounds act as good catalysts ?   *1*

(b) What is the cause of contraction in the atomic size of lanthanoids ?   *1*

(c) Define lanthanoid contraction. How does it affect the atomic radii of the third transition series and the second transition series ?   *2*

OR

(c) In aqueous media, which is a stronger reducing agent — Cr^{2+} or Fe^{2+} and why ?   *2*

Soln (29)

(a) Due to the tendency to adopt multiple oxidation states and to form complexes.

(b) Poor shielding effect of $4f$ electrons

(c) Do it yourself.

or

(c) Cr^{+2} is stronger reducing agent, because in formation of Cr^{+2} to Cr^{+3} changes is from d^4 to d^3. In d^3 electronic configuration t_{2g} orbital is half filled.

30. Proteins are the most abundant biomolecules of the living system. Proteins are the polymers of about twenty different α-amino acids which are linked by peptide bonds. Ten amino acids are called essential amino acids. In zwitter ionic form, amino acids show amphoteric behaviour as they react both with acids and bases.

On the basis of their molecular shape, proteins are classified into two types : Fibrous and Globular proteins. Structure and shape of proteins can be studied at four different levels i.e., primary, secondary, tertiary and quaternary, each level being more complex than the previous one. The secondary or tertiary structure of proteins get disturbed on change of pH or temperature and they are not able to perform their functions. This is called denaturation of proteins.

Answer the following questions :

(a) What are essential amino acids ?   *1*

(b) What is meant by zwitter ionic form of amino acids ?   *1*

(c) (i) Give one example each for Fibrous protein and Globular protein.

    (ii) What type of linkages hold monomers of proteins together ?. *2×1=2*

OR

(c) (i) What is the structural feature which characterises a reducing sugar ?

    (ii) What is the structural difference between nucleoside and nucleotide ?   *2×1=2*

Kota, Rajasthan

CORE ACADEMY
Enhancing ability to learn & Express

A Premier Institute for

Since **2012**

JEE | NEET | 8th – 12th | Commerce | CA – Foundation | Humanities

12th CBSE CHEM SET – 1 CODE 56/3/3

प्रश्न. (30)

(a) Do it yourself

(b) Do it yourself.

(c) (i) Fibrous protein → Keratin
      Globular protein → Haemoglobin.

(ii) Peptide bond.

OR

(c) (i) Do it yourself
   (ii) Do it yourself.

31. (a) (i) Write the major product(s) in the following reactions :

(1) $C_6H_5-CH_2CH_3 \xrightarrow[\text{b) } H^+]{\text{a) } KMnO_4, KOH}$?

(2) $C_6H_5-CHO + CH_3-\underset{\underset{O}{\|}}{C}-CH_3 \xrightarrow{\text{dil NaOH}}$?

(3) $C_6H_5-COOH \xrightarrow{Br_2/FeBr_3}$?
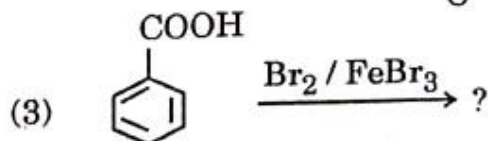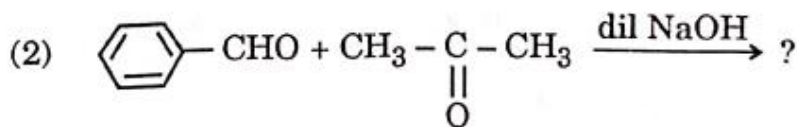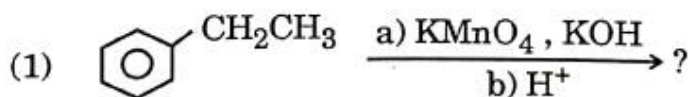
(ii) Give simple chemical tests to distinguish between the following pairs of compounds :

(1) $C_6H_5-COCH_3$ and $C_6H_5-COCH_2CH_3$
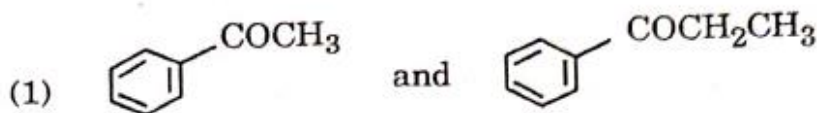
(2) Pentanal and Pentan-3-one

$3+2=5$

OR

(b) (i) Give reasons for the following :

   (1) In semicarbazide, only one $-NH_2$ group is involved in the formation of semicarbazone.

   (2) Acetaldehyde is more reactive than acetone towards addition of HCN.

   (ii) (1) Arrange the following in decreasing order of their acidic strength :

   $CH_3COOH, \quad O_2N - CH_2 - COOH, \quad HCOOH$

   (2) Name the reagent in the following reaction :

   $$CH_3 - CH = CH - CH_2 - CN \xrightarrow{\quad ? \quad}$$
   $$CH_3 - CH = CH - CH_2 - CHO$$
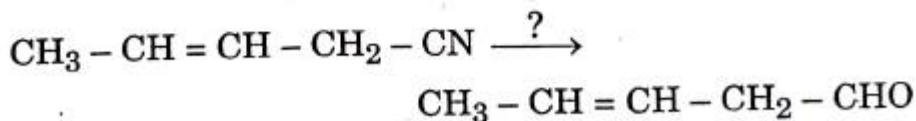
   (iii) Write the reaction involved in Hell-Volhard-Zelinsky reaction.

   $$2+2+1=5$$

(a) (i)
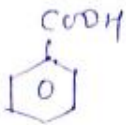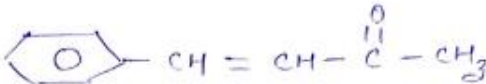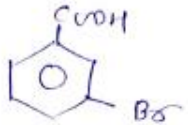
① COOH (oxidation of alkyl benzene)

② $CH = CH - \overset{O}{\overset{||}{C}} - CH_3$ (Aldol condensation)

③ COOH, Br (– COOH is deactivating and meta directing group)

(ii)

① Haloform test

② Tollen's reagent

$$\underline{OR.}$$

(b) (i)

① $NH_2 - NH - \overset{O}{\overset{||}{C}} - \overset{..}{N}H_2$ ⟶ The e.p. of other NH_2 group is delocalised and involved in resonance.

② Due to +I effect of $-CH_3$ group.

(ii)

① $O_2N - CH_2 - COOH > HCOOH > C\underline{H_3}COOH$.

② $SnCl_2 / HCl$ (Stephen's reduction).

(iii) Do it yourself.

Kota, Rajasthan

CORE ACADEMY
Enhancing ability to learn & Express

A Premier Institute for

Since 2012

JEE | NEET | 8th – 12th   Commerce | CA - Foundation   Humanities

12th CBSE CHEM SET – 1 CODE 56/3/3

32. Attempt any *five* of the following :   5×1=5

(a)   Write the IUPAC name of the complex :

$[Co(H_2O)(CN)(en)_2]^{2+}$
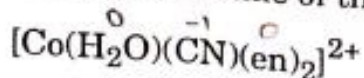
(b)   Why is geometrical isomerism not possible in tetrahedral complexes having two different types of unidentate ligands coordinated with the central metal ion ?

(c)   Arrange the following complex ions in increasing order of their crystal field splitting energy (Δ_o) :

$[Co(NH_3)_6]^{3+}$, $[CoF_6]^{3-}$, $[Co(CN)_6]^{3-}$
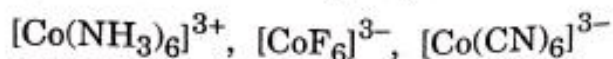
(d)   Write the hybridization and magnetic character of the complex $[Ni(CO)_4]$ on the basis of valence bond theory.

[Atomic No. : Ni = 28]

(e)   Out of $[CoF_6]^{3-}$ and $[Co(C_2O_4)_3]^{3-}$, which one complex is :

(i)   more stable ?

(ii)   the high spin complex ?

(f)   What is the difference between an ambidentate ligand and bidentate ligand ?

(g)   Write the electronic configuration of d^5 in terms of t_{2g} and e_g in an octahedral field when :

(i) $\Delta_o > P$,   and   (ii) $\Delta_o < P$

(a) Aqua cyanido Bis-(ethylene diammine) cobalt(II) ion

(b) Not planar.

(c) $[Co(CN)_6]^{3-} > [Co(NH_3)_6]^{3+} > [CoF_6]^{3-}$

(d) sp^3 , $\mu = \sqrt{n(n+2)}$, $n = 0$

$= 0$

(e) (i) $[Co(C_2O_4)_3]^{3-}$ $C_2O_4^{2-}$ strong ligand

(ii) $[CoF_6]^3$ F^- weak ligand

(f) do it.

(g) do it.

33. **(a)** **(i)** Calculate emf of the following cell at 25°C :

$$Zn\,(s)\mid Zn^{2+}\,(0\cdot001M)\mid\mid Cd^{2+}\,(0\cdot1\,M)\mid Cd\,(s)$$

Given : $E^o_{Zn^{2+}/Zn} = -0\cdot76\,V$, $E^o_{Cd^{2+}/Cd} = -0\cdot40\,V$ [log 10 = 1]

(ii) State Faraday's second law of electrolysis. How will the pH of aqueous NaCl solution be affected when it is electrolysed ?   3+2=5

OR

(b) **(i)** Calculate the Δ_rG^o and log K_c for the following cell reaction :

$$Fe\,(s) + Ag^+\,(aq) \rightleftharpoons Fe^{2+}(aq) + Ag\,(s)$$
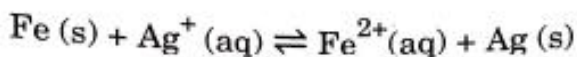
Given : $E^o_{Fe^{2+}/Fe} = -0\cdot44\,V$, $E^o_{Ag^+/Ag} = +0\cdot80\,V$,

1 F = 96500 C mol^{-1}

(ii) Write any two advantages of the fuel cells over primary and secondary batteries ?

(iii) How many Faradays are required for the oxidation of 1 mole of H_2O to O_2 ?   3+1+1=5

Sol. (31)

(a) (i) $E^{\circ}_{cell} = E^{\circ}_{cathode} - E^{\circ}_{anode}$

$= -0.40 - (-0.76)$

$= -0.40 + 0.76.$

$= 0.36 \checkmark.$

$E_{cell} = E^{\circ}_{cell} - \dfrac{0.059}{n} \log_{10} \dfrac{[P]}{[R]}$

$= 0.36 - \dfrac{0.059}{2} \log_{10} \dfrac{[10^{-3}]}{[10^{-1}]}$

$= +0.419 \checkmark.$

(ii) Theory based.

$$\underline{OR}$$

(b) (i)

$$Fe_{(s)} \longrightarrow Fe^{+2}_{(aq.)} + 2e^-$$

$$Ag^+_{(aq.)} + e^- \longrightarrow Ag^\circ_{(s)} \times 2$$

$$Fe_{(s)} + 2Ag^+_{(aq.)} \longrightarrow Fe^{+2}_{(aq.)} + 2Ag^\circ_{(s)}$$
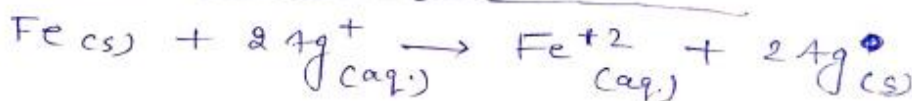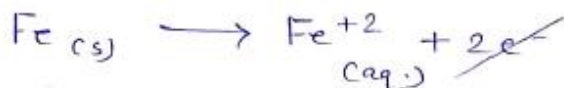
$$\therefore \Delta_r G^\circ = -nFE^\circ_{cell}$$

$$= -2 \times 96500 \times 1.24$$

$$= 239320 \ J/mol$$

$$= 239.32 \ KJ/mol.$$

$$\begin{cases} E^\circ_{cell} = E^\circ_{cathode} - E^\circ_{anode} \\ = 0.80 - (-0.4 \\ = +1.24 \ V. \end{cases}$$

$$\therefore \Delta G^\circ = -nFE^\circ = 239.32 \ KJ/mol.$$

and $\Delta G^\circ = -2.303 \ mRT \log_{10}K = 239320.$

$$\therefore K = 10^{-20.97} = 8 \times 10^{20} \ 2 \times 10^{-21}$$

2.

(i) $E_{cell} = E^\circ - \dfrac{0.0591}{2} \log \dfrac{[Zn^{2+}]}{[Cd^{2+}]}$

(ii) do it.

(b) (i) $\Delta G^\circ = -2.303 \ RT \log K_{eq}.$

(ii) It produce pure water and not discharge.

(iii) $2H_2O \longrightarrow O_2 + 4H^+ + 4e^-$

2 mol   4e⁻

1 mol $2e^- = 2F$

12th CBSE CHEM SET – 2 CODE 56/3/3

Attention! Class 12th Appearing/Passed Students

Top Leading Institute in BILASPUR Zone since 2012 ...
Announces....

Bilaspur Zone's
NO.1
Institute since 2013

COURSES FOR YOUR NEED

CRASH COURSE

FOR NEET / CUET 2024

In 42 days, get assured preparation for marks **550⁺**. We have week wise plan with test series accordingly.

22nd MARCH 2024

• हिन्दी माध्यम के लिए पृथक बैचेज

TEST SERIES JEE / NEET

FOR NEET / JEE 2024

NEET: 25 MOCK TESTS, OFFLINE (English and Hindi Medium)
JEE MAIN: 40 MOCK TESTS, ONLINE (Only English medium)

MARCH, APRIL 2024

• At ₹1500 only, **4 tests are FREE for all**

FREE*   FREE*   FREE* **Useful Tools for You** FREE*   FREE*   FREE*

1. NCERT **line by line questions** (50 – 100 Qs from each chapter) for NEET.

2. Test Series for JEE MAIN / ADV / NEET 2024 With discussion (4 Free mock tests for all).

3. CBSE 12th Board 2024 Q. papers solution on same day (provided on WhatsApp or our you tube channel.

Free*

To get these, scan this code OR visit Academy or call

coreacademybsp.in/enquiry

Our Best Faculty for Your Crash Course

OMESH RENWAL
Director, Exp. 13 Years
B.Tech. – UCE, KOTA, RAJ.
MATHS

ROHIT SHUKLA
Exp. 8 Years
M. Sc. (Physics), GGU
PHYSICS

PRADIP KATHROTIYA
Exp. 7 Years
B. TECH. NIT DELHI

Dr. PRABHAKAR SHRIVAS
Exp. 9 Years
Ph. D. VNIT NAGPUR
CHEMISTRY

DEEPAK KAUSHIK
Exp. 15 Years
B. E. CHEMICAL (GGU)

Dr. SWARNAV BOSE
Exp. 2 Year
B. D. S. Triveni Institute, BSP
BIOLOGY

MANMOHAN SAHU
Exp. 3 Year
M. Sc., CTET

Be the part of Bilaspur zone's No. 1 Institute since 2013

Enroll Till 19th March 2024
& Get Flat **20.0% off**

For more details, Call or Visit

12th CBSE CHEM SET – 2 CODE 56/3/3

Success Stories : JEE (Last 3 Years)

2024

99.31 (Percentile)	**98.79** (Percentile)	**97.67** (Percentile)	**93.04** (Percentile)	**92.09** (Percentile)
GAURAV BAIRAGI 1.5 Yr. Classroom	AMISHA RAO 1 Yr. Classroom	NAYAN PAL 2 Yr. Classroom	DEEP JYOTISHI 2 Yr. Classroom	AYUSH AGRAWAL 3 Yr. Classroom

2023

98.13 (Percentile)	**2169** (AIR)	**96.12** (Percentile)	**93.51** (Percentile)
NIT TRICHI* GAURAV BAIRAGI 1 Yr. Classroom	IIT KHARAGPUR ADITYA P. SINGH 4 Yr. Classroom	NIT RAIPUR MAHIMA SHUKLA 1 Yr. Classroom	NIT RAIPUR MAYANK K GUPTA 2 Yr. Classroom

4 / 27
SELECTION RATIO
Got NIT or IIT

2022

99.44 (Percentile)	**99.40** (Percentile)	**98.20** (Percentile)	**96.37** (Percentile)	**96.12** (Percentile)
NIT SURATHKAL SANIDDHYA SINGH 4 Yr. Classroom	NIT ROURKELA SWATI KATAILIHA 2 Yr. Classroom	NIT ROURKELA KUNAL SHARMA 3 Yr. Classroom	NIT RAIPUR PRAKHAR SHRIVASTAVA 3 Yr. Classroom	VIT VELLORE RADHIKA CHOPDE 2 Yr. Classroom

8 / 30
SELECTION RATIO
Got NIT or IIT

Success Stories : NEET (Last 2 Years)

MBBS 1st Attempt 2023	MBBS 1st Attempt 2023	MBBS 1st Attempt 2023	MBBS 1st Attempt 2022	MBBS 1st Attempt 2022
NANDINI PATRA 4 Yr. Classroom	PALAK KAUSHIK 4 Yr. Classroom	AMIT K JAGAT Short Term Course	ANANYA SHRIVASTAVA Short Term Course	AYUSHI DUBEY 3 Yr. Classroom
GMC, JAGDALPUR	GMC, KANKER	GMC, RAIPUR	GMC, KANKER	GMC, KORBA

MBBS 1st Attempt 2022	MBBS 1st Attempt 2022	MBBS 1st Attempt 2022		
ANVITAA MURTY 4 Yr. Classroom	SIDDHI AGRAWAL 4 Yr. Classroom	PRIYAL YADAV 4 Yr. Classroom	SELECTION RATIO 2023 **03 / 43** Got MBBS	SELECTION RATIO 2022 **05 / 24** Got MBBS
IMS, Bhubaneswar	YENEPOYA, MANGLORE	RIMS, RAIPUR		