NSEC 2023 (PAPER CODE 32)
FIITJEE ANSWERS KEYS

1.	D	2.	C	3.	C	4.	B
5.	B	6.	A	7.	D	8.	A
9.	B	10.	D	11.	B	12.	B
13.	C	14.	C	15.	C	16.	C
17.	B	18.	B	19.	A	20.	D
21.	B	22.	C	23.	B	24.	C
25.	D	26.	D	27.	D	28.	A
29.	C	30.	B	31.	A	32.	A
33.	C	34.	C	35.	B	36.	D
37.	A	38.	C	39.	C	40.	B
41.	B	42.	A	43.	A	44.	C
45.	D	46.	C	47.	B	48.	C
49.	A, C	50.	A,C,D	51.	A,B,D	52.	A,B,C
53.	A,B,D	54.	A,C	55.	A,B,C,D	56.	A,B,C
57.	B,D	58.	B,C or B,C,D	59.	A,C	60.	C,D

NSEC 2023 (PAPER CODE 32) FIITJEE HINTS & SOLUTIONS

1. For $Z < 1 \rightarrow$ Attractive forces are dominant whereas for $Z > 1$ repulsive forces dominate.

2. ΔU = zero = total work + total heat
$0 = W_{CA} + 600$
$W_{CA} = -600$

3. $n_1 + n_2 = 20$
$\frac{n_1}{n_2} = \frac{T_2}{T_1} = \frac{750}{250}$
$\therefore n_1 = 15, n_2 = 5$

4. $0.0355 = \frac{2 \times n}{2n + \frac{100}{18}}$
$n = 0.1$
So, molality of solution = $\frac{0.1}{0.1} = 1$

5. $X \xrightarrow{\lambda_1}$ $Y \xrightarrow{\lambda_2}$
Given: $\lambda_1 = 2\lambda_2$ $2t_{1/2}(X) = t_{1/2}(Y)$
At t = 0 (activity)

X	Y
2a	a
$\downarrow t_{1/2}(X)$	$\downarrow t_{1/2}(Y)$
a	$a/2$
$\downarrow t_{1/2}(X)$	
$a/2$	

Hence,
$2t_{1/2}(X) = t_{1/2}(Y)$
= time required for activity to be equal.

6. Cell I: A: $Cu \longrightarrow Cu^{2+} + 2e^-$
C: $Cu^{2+} + 2e^- \longrightarrow Cu$
$\therefore$ No change
Cell II: A: $H_2O \longrightarrow \frac{1}{2}O_2 + 2H^+ + 2e^-$
C: $Cu^{2+} + 2e^- \longrightarrow Cu$
$\therefore$ pH decreases

7. $\Delta G_{(Au^{3+} \longrightarrow Au)} = \Delta G_{(Au^{3+} \longrightarrow Au^{+})} + \Delta G_{(Au^{+} \longrightarrow Au)}$
$-3 \times F (1.517) = -2 \times F (x) + (-1)F \times (1.83)$
$x = 1.36$ V

8. EDTA $\rightarrow$ hexadentate ligand.

9. $\Delta_{eg}H$ (noble gas) = +ve
I.E. = always +ve

10. Factual

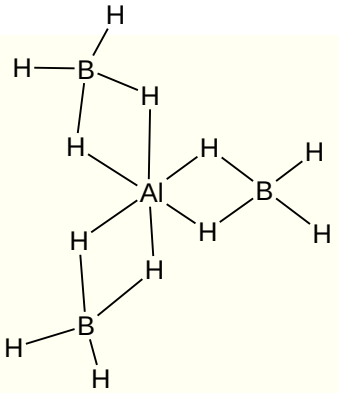
11. NaH_2PO_2 is more reducing than Na_2HPO_3 because NaH_2PO_2 has two P – H bonds whereas Na_2HPO_3 has only one P – H bond.

12. $XeF_2 + H_2O \longrightarrow Xe + O_2 + HF$

$XeF_4 + H_2O \longrightarrow Xe + XeO_3 + O_2 + HF$

13. According to Aufbau principle.

14. 6 two centre – two electrons
6 three centre – two electrons



15. (i) - (r)
(ii) – (q)
(iii) – (p)
$Al_2O_3 \Rightarrow$ Amphoteric oxide
$CaO \Rightarrow$ Basic oxide
$As_2O_5 \Rightarrow$ Acidic oxide

16. $\underset{(Base)}{H_2O} + \underset{(acid)}{HCl} \longrightarrow H_3O^+ + Cl^-$

$\underset{(Lewis\ base)}{6H_2O} + \underset{(Lewis\ acid)}{Mg^{2+}} \longrightarrow \left[Mg(H_2O)_6\right]^{2+}$

$2\overset{-2}{H_2O} + 2F_2 \longrightarrow 4HF + \overset{0}{O_2}$

Reductant / reducing agent

17. Oxidising power $\propto E^0_{reduction}$

18. $Sr^{2+} < Rb^+ < Br^- < Se^{2-}$

For isoeolectronic species atomic radii $\propto \dfrac{1}{\text{Number of protons}}$

$\propto \dfrac{1}{\text{atomic number}}$

19. Calcination is carried out in absence of air or limited supply of air below the melting point of ore whereas roasting is carried out in presence of air below the melting point of ore.

20. Coordination position isomerism.

21. Cu^{2+} have one unpaired electron in both the cases.

22. As partially soluble yellowish salt of Ag is formed by $AgNO_3$ and any salt from AB and XY it means one anion is Br^-, while the other is NO_3^- or NO_2^- as the other give brown ring. Hence 'C' is incorrect.

23. On moving down the group decrease in lattice energy in more than decrease in hydration energy between M^{2+} and OH^-.

24. $m = \frac{1000\ M}{1000\ d - Mz}$; $m = \frac{10^{-3} / 63.5}{1}$

(z = 63.5; M = molarity; m = molality; d = density)

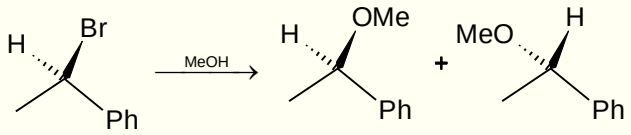
On calculating: $M = 1.247 \times 10^{-5}$

25. T= MnO_2

$MnO_4^- \xrightarrow[\text{or}\\ \text{weakly basic medium}]{\text{neutral}} MnO_2$

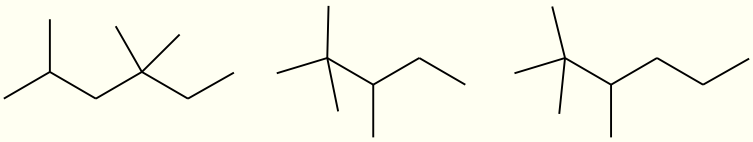
26. $NH_2^- > CH_3O^- > CH_3COO^- > CH_3OH$

27.



(Racemic mixture)

28.



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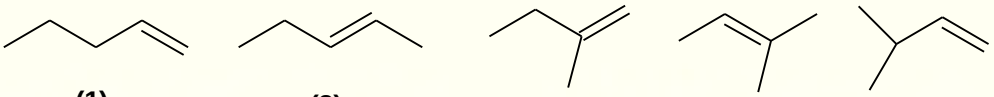
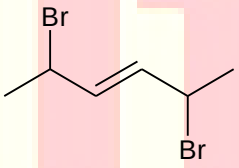
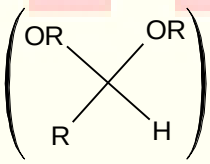


(1) **(2)** **(1)** **(1)** **(1)**

30. The other isomer is



31. Only I and II is acetal



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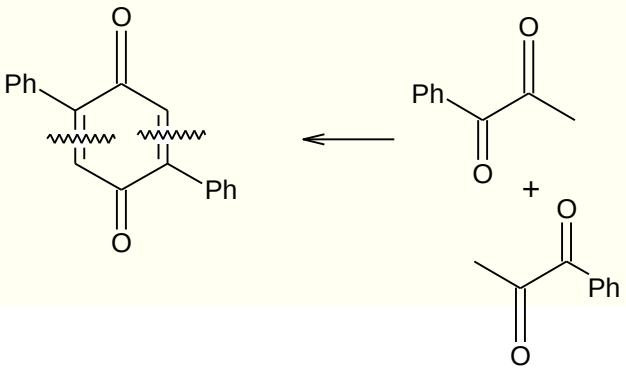

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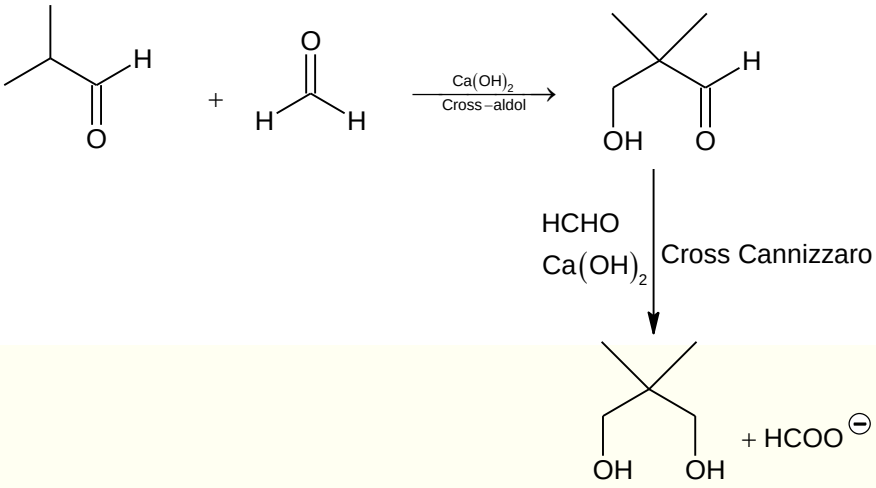

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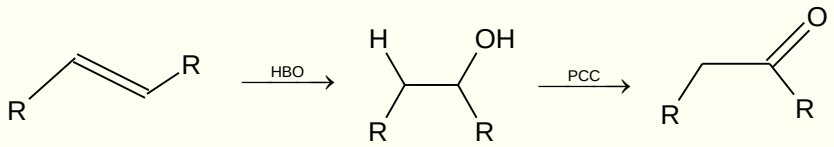

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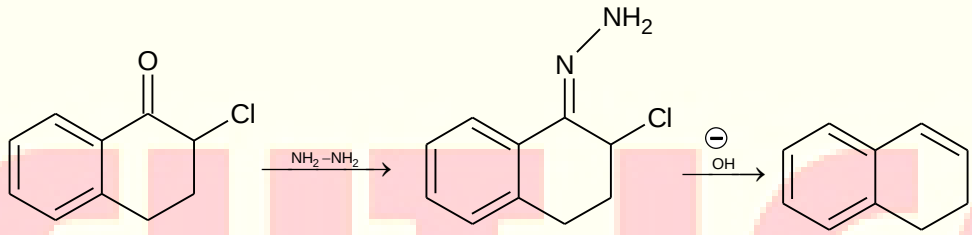

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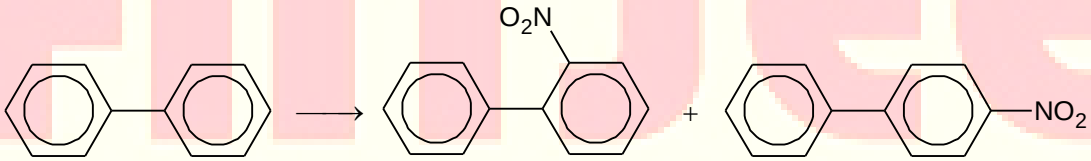

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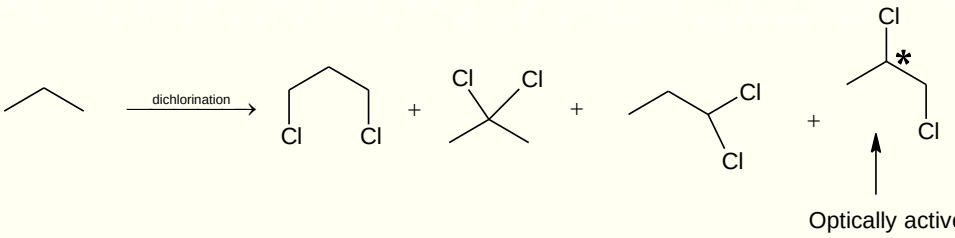
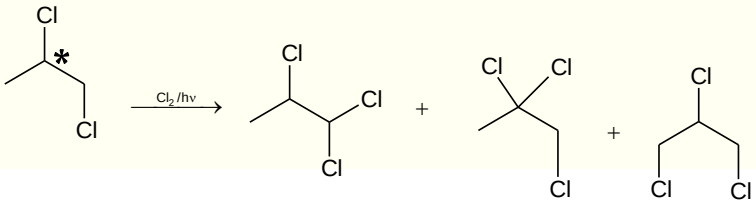




3 – possible trichlorinated products
for optically active dichlorinated product

40. $-X \longrightarrow$ *o*/*p* directing

$-NH-\underset{\underset{O}{\|}}{C}-CH_3 \longrightarrow$ EDG

$-\underset{\underset{O}{\|}}{C}-H \longrightarrow m-$ directing

$-CH_3 \longrightarrow$ Activating group

41. $\underset{}{-\overset{\overset{O}{\|}}{C}-H} > \underset{+I}{-\overset{\overset{O}{\|}}{C}-R} > \underset{+R}{-\overset{\overset{O}{\|}}{C}-OR} > \underset{+R}{-\overset{\overset{O}{\|}}{C}-NR_2}$

+R effect decreases the electrophilicity of Carbonyl carbon.

42. (i) $\lambda_{max} \propto \frac{1}{T}$ (Wein's law)

(ii) $T \uparrow \Rightarrow \lambda_{max} \downarrow \Rightarrow$ Energy density $\uparrow$

43. $Fe(s) + 2HCl(aq) \longrightarrow FeCl_2(s) + H_2(g)$

$W = \frac{x}{56} \times 8.314 \times 300$

$\Rightarrow x = \frac{1000 \times 56}{8.314 \times 300} = 22.4$ g

44. $\frac{2.9}{58 \times 100} \times 1000 \times V = \frac{6 \times 10^{-3} \times 2 \times 10^{3}}{2}$

V = 12 ml.

45. In cell I E^{o}_{RP} of Fe^{2+} is more so it will be reduced.

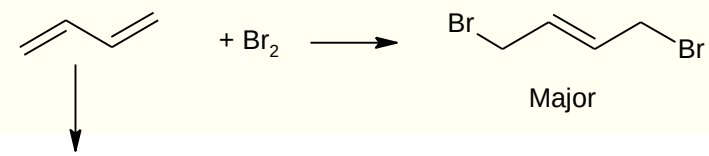
In cell II E^{o}_{RP} of Fe^{2+} is less so it will be oxidised.

46. V = M
U = L
Y = N
X = O

47. Fact

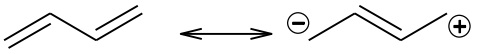
48. Fact

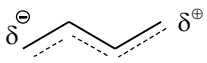
49. Fact

50. 

Major

Resonating structure



So, hybrid 

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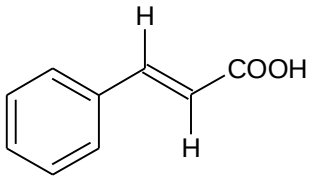

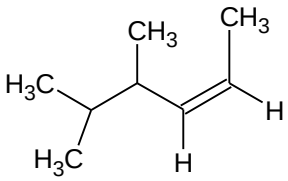

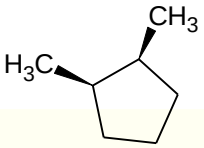

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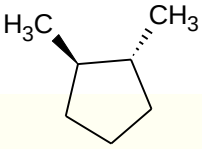


56. $Fe^{3+} + 6H_2O \longrightarrow \left[Fe(H_2O)_6\right]^{3+}$

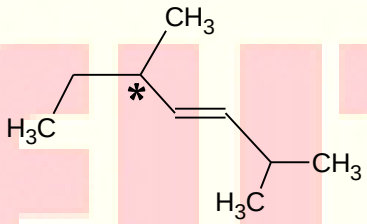
$\left[Fe(H_2O)_6\right]^{3+} + H_2O \rightleftharpoons \left[Fe(H_2O)_5(OH)\right]^{2+} + H_3O^+$

(violet)

Reaction goes left upon addition of HNO_3.

$\left[Fe(H_2O)_5\,OH\right]^{2+} + HCl \longrightarrow \left[FeCl_4\right]^-$

57. (A) No chiral centre
(B) 2 chiral centre and no POS and COS.
(C) 2 chiral centre but POS is present.
(D) 1 chiral centre



59. Abrupt change in pH, 6 to 11 $\Rightarrow$ Case of weak acid and strong base titration.
Salt of weak acid and strong base undergo hydrolysis.

60. $E = -13.6\frac{Z^2}{n^2}\,eV/atom$

n = constant, $Z \uparrow \Rightarrow E \downarrow$

Hund's rule of maximum multiplicity.