RANKERS

JEE Main (2024)

MEMORY BASED PAPER SOLUTION

29 JAN 2024 (S-02)

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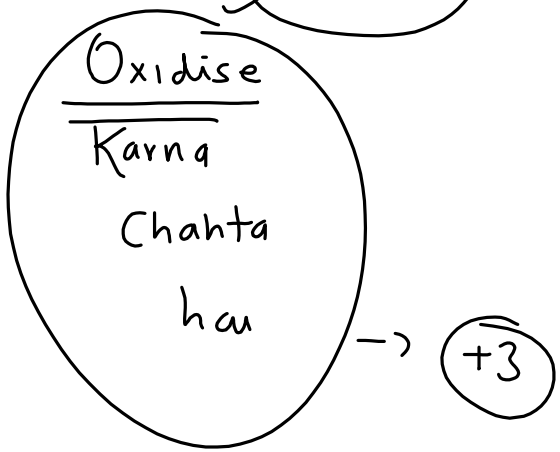
CHEMISTRY

1. Which of the following is act as strong reducing agent ?

(1) Ce^{4+} (2) Gd^{3+} (3) Eu^{2+} (4) Tb^{3+}



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2. Correct IUPAC Name of K_2MnO_4 is :

(1) Potassium tetraoxidomangnate (vi)

(2) Potassium mangnate

(3) Potassium tetraoxido mangnease (vii)

(4) Potassium tetraoxido mangnate (vii)

$2K^+[MnO_4]^{2-}$

Potassium tetraoxidomangnate(VI)

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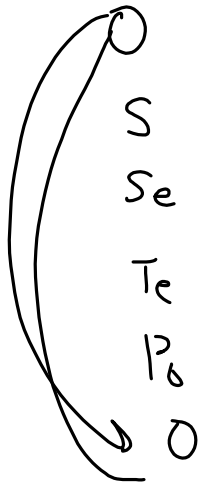
3. **Statement-1 :** F has highest electronegativity in it's group.
Statement-2 : O has least negative electron gain enthalpy in it's group.

(1) Both statements are correct
(2) Both statements are incorrect
(3) Statement-1 is incorrect, Statement-2 is correct
(4) Statement-1 is correct, Statement-2 is incorrect



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4. $Ni^{+2} + x \longrightarrow$ Rosy red ppt.

[X] is :

(1) DMG (2) p-nitrophenol (3) $FeCl_3$ (4) None of these

$[Ni(Dmg)_2]$

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5. Select correct option regarding Zn, Cd & Hg

(1) Hard metals

(2) Paramagnetic in nature

(3) High enthalpy of atomisation

(4) Hg shows variable valency where as Zn, Cd does not

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6.

	Column-I		Column-II
(A)	Lyman	(P)	IR
(B)	Paschen	(Q)	UV
(C)	Balmer	(R)	IR
(D)	Pfund	(S)	Visible

Select correct option :

(1) A – Q, B – P, C – S, D – R

(2) A – R, B – Q, C – P, D – R

(3) A – R, B – P, C – Q, D – S

(4) A – S, B – R, C – P, D – Q

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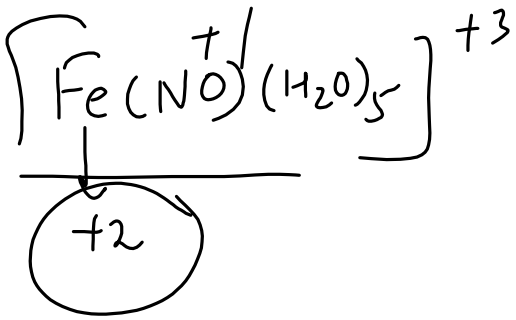
7. The oxidation state of Fe in the complex formed in brown ring test is :



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8. Enthalpy of vapourisation of CCl_4 is 30.5 kJ/mole, then heat required to vaporise 284 gram CCl_4 is _____ kJ. (nearest Integer)

$n \quad 12+35.5\times 4$

$2 \quad 12+420$

154

$154\,g = 30.5\,kJ$

$1\,g = \frac{30.5}{154}$

$284\,g = \frac{30.5}{154} \times 284 = 56.21\,kJ$

56

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9. Radioactive decay of Br^{82} (Z = 35) isotope has half-life of 36 hours, the fraction of remaining particle in one day is _____ $\times 10^{-2}$ (Nearest integer)
{Given antilog (0.2006) = 1.587, log2 = 0.30}

$\rightarrow t_{1/2} = \frac{\ln 2}{K}$

$\rightarrow 36 = \frac{\ln 2}{K}$

$K = \frac{\ln 2}{36}$

$K = \frac{1}{t} \ln \frac{N_0}{N}$

$\Rightarrow \frac{\ln 2}{t_{1/2}} = \frac{1}{t} \ln \frac{N_0}{N}$

$\Rightarrow \frac{\ln 2}{36} = \frac{1}{24} \ln \frac{N_0}{N}$

$\frac{2.303 \log 2}{36} = \frac{2.303}{24} \log \frac{N_0}{N}$

$\Rightarrow \log 2 = \frac{3}{2} \log \frac{N_0}{N}$

$\Rightarrow \log 2 = \log \left(\frac{N_0}{N}\right)^{3/2}$

$\Rightarrow 2 = \left(\frac{N_0}{N}\right)^{3/2}$

$2^{2/3} = \frac{N_0}{N}$

$\frac{1}{2^{2/3}} = \frac{N}{N_0}$

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10. During electrolysis of $AuCl_4^-$ current is circulated for 10 min. and given mass of cathode is 1.318 gram. Then amount of charge circulated during electrolysis is _____ $\times 10^{-2}$ F. (nearest integer)
[Given atomic mass of Au = 197]

$+3$

$Au^{3+} + 3e^- \rightarrow 1Au$

$3e^- \rightarrow$ n-factor

$197\,g = 3 \times 96500\,C$

$\rightarrow$ electrochemical Equivalent $= \frac{Eq\ wt}{96500}$

$\Rightarrow W = Z \times i \times t$

$\Rightarrow 1318 = \frac{197}{3 \times 96500} \times Q$

$\Rightarrow \boxed{\frac{1318 \times 3 \times 96500\,C}{197} = Q}$

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CHEMISTRY

10. Why oxygen shows anomalous behaviour in 16th group?

(1) Due to large size, high electronegativity.

(2) Due to small size, small electronegativity

(3) Due to small size, high electro negativity, absence of vacant d-orbitals

(4) Due to large size, high electronegativity presence of vacant d-orbitals

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11. On reaction of which of the following Nessler's reagent give Brown precepitate.

(1) NH_3 (2) SO_2 (3) Cl_2 (4) CO_2

$NH_3 / NH_4^{\oplus} + K_2[HgI_4] \longrightarrow \boxed{HgO \cdot Hg(NH_2)I} + KI + H_2O$

Iodide Millon's base

(Brown)

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13. Which of the following has highest ionisation enthalpy?

(1) N (2) C (3) Si (4) Al

7 6 14 13

$1s^2 2s^2 2p^3$

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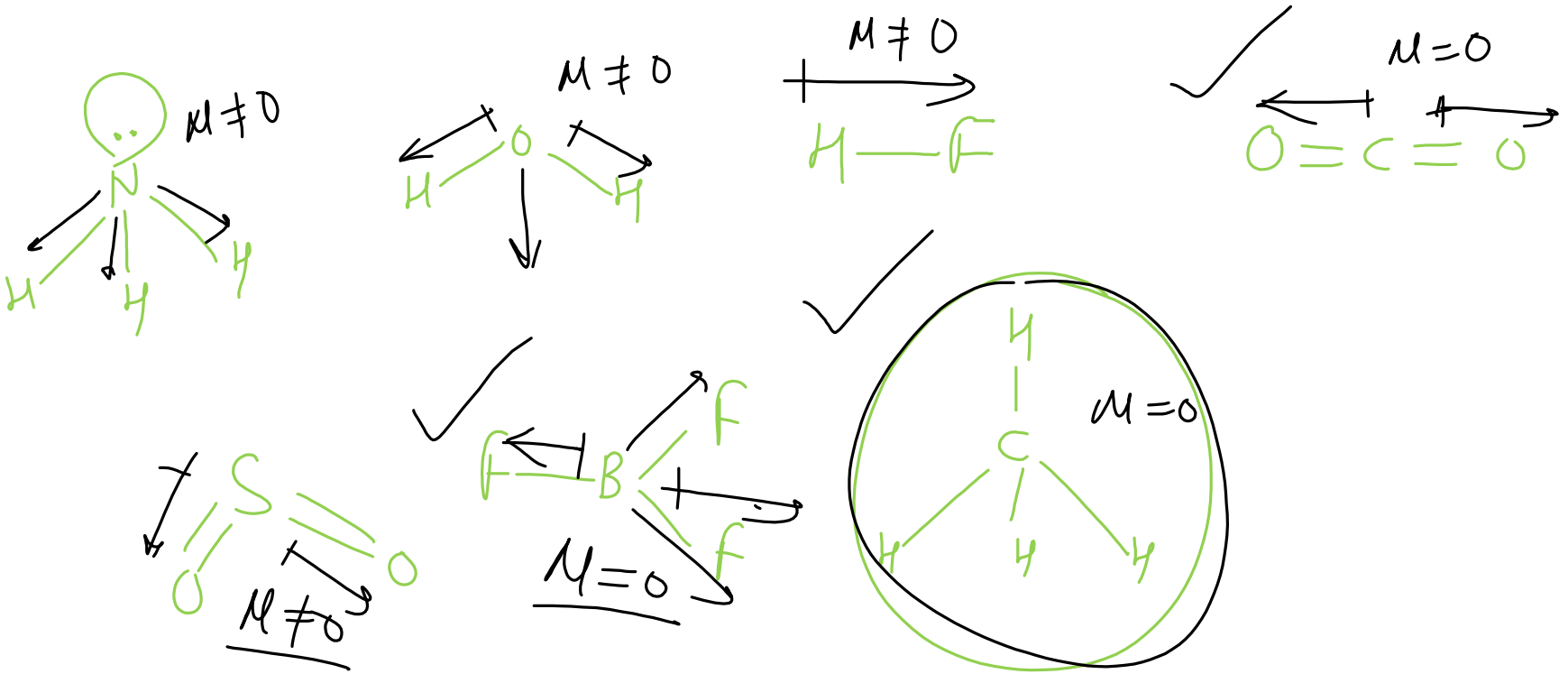
14. How many of the following have zero dipole moment ?

NH_3, H_2O, HF, CO_2, SO_2, BF_3, CH_4



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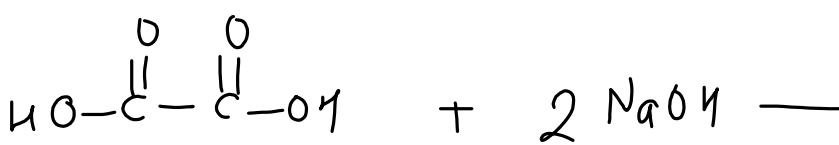
15. 50 ml of 0.5 M oxyalic acid is neutralize by 25 ml of NaOH, then amount of NaOH in 50 ml of solution is _____ gram (Nearest integer)



1 eq 2 eq.

no of milli eq of Oxalic acid = 50×0.5
$= 25$

no of milli eq reqired of NaOH = 2×25
$= 50$

milli eq = $V \times M = 50$

$\Rightarrow 25 \times M = 50$

$M_{NaOH} = 2\ M$

2 M → 1000 mL → 2 mole solute NaOH

50 mL → $\left(\frac{2}{1000} \times 50\right)$ mole NaOH

Mass of NaOH in 50 mL = $\frac{2}{1000} \times 50 \times 40$

$= 4$ gm

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16. In a closed container equilibrium concentration of $NH_3(g)$, $N_2(g)$ and $H_2(g)$ is 1.5×10^{-2} M, 2×10^{-2} M and 3×10^{-2} M respectively, then equilibrium constant for formation of $NH_3(g)$ at 500°C is _____ $\times 10^2$. (nearest integer)

$$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$$

$$K_{equ} = \frac{[NH_3]^2}{[N_2][H_2]^3}$$

$$\Rightarrow K_{eq} = \frac{[1.5 \times 10^{-2}]^2}{[2 \times 10^{-2}][3 \times 10^{-2}]^3}$$

$$\Rightarrow K_{eq} = \frac{2.25 \times 10^{-4}}{2 \times 27 \times 10^{-8}} = \frac{2.25 \times 10^4}{2 \times 27}$$

$$\Rightarrow \frac{225}{2 \times 27} \times 10^2$$

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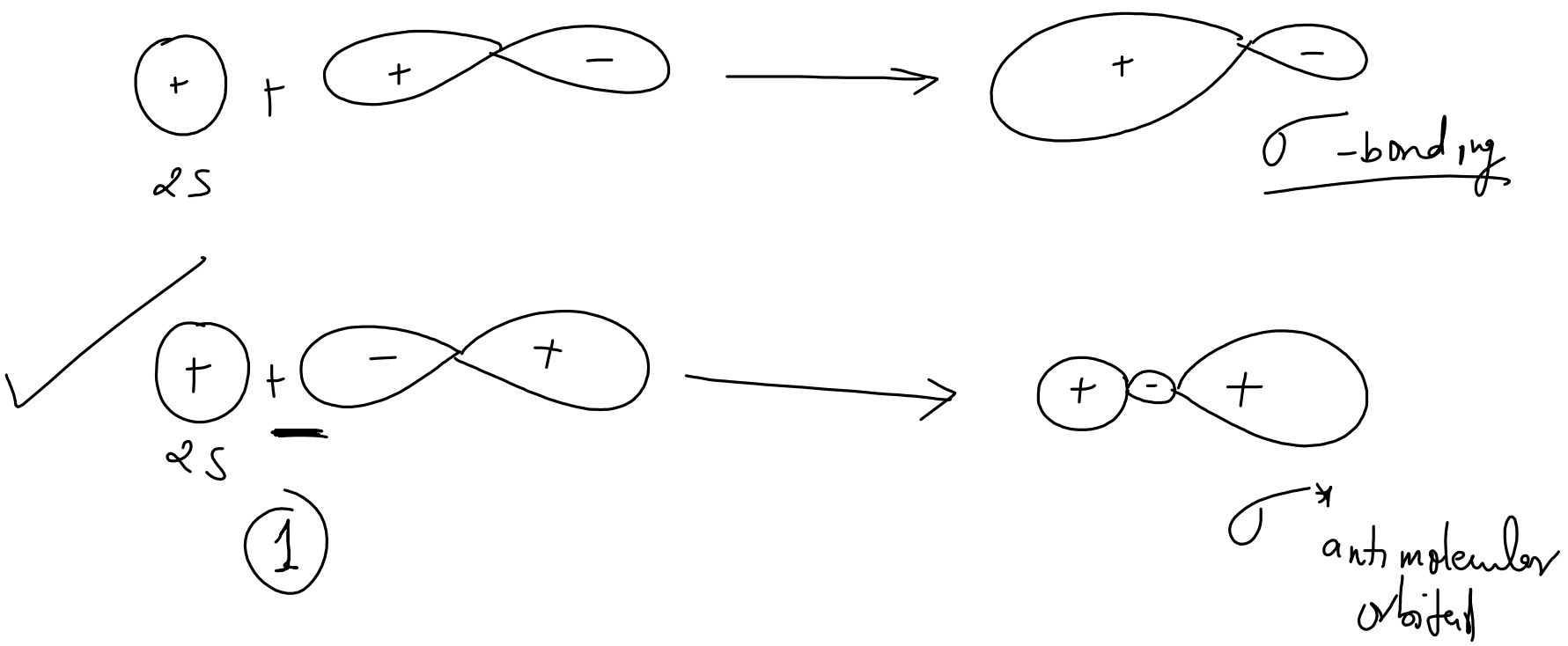
17. Using 2s and 2p orbital intermixing total anitbonding molecular orbital _____ are formed.



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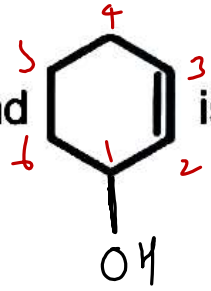
18. IUPAC name of the compound  is :

(1) Cyclohex-2-en-1-ol
(2) Cyclohex-1-en-3-ol
(3) 3-Hydroxycylohexene
(4) Cyclohex-1-en-3-ol

Cyclohex-2-ene-ol

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19. Correct match of the following compounds with given pka value is

	Column-I		Column-II
(A)	Phenol	(P)	7.1
(B)	Ethanol	(Q)	15.1
(C)	para-Nitrophenol	(R)	10.3
(D)	meta-Nitrophenol	(S)	8.3

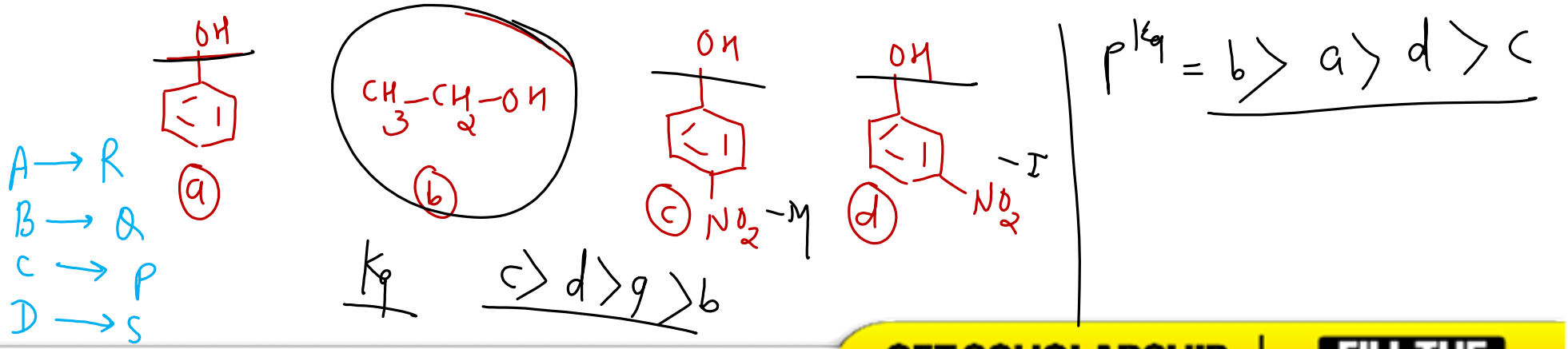
(1) A – R, B – Q, C – P, D – S

(2) A – Q, B – P, C – R, D – S

(3) A – P, B – Q, C – R, D – S

(4) A – S, B – R, C – Q, D – P

Acidic Strength $\propto$ Ka $\propto \frac{1}{pK_a}$



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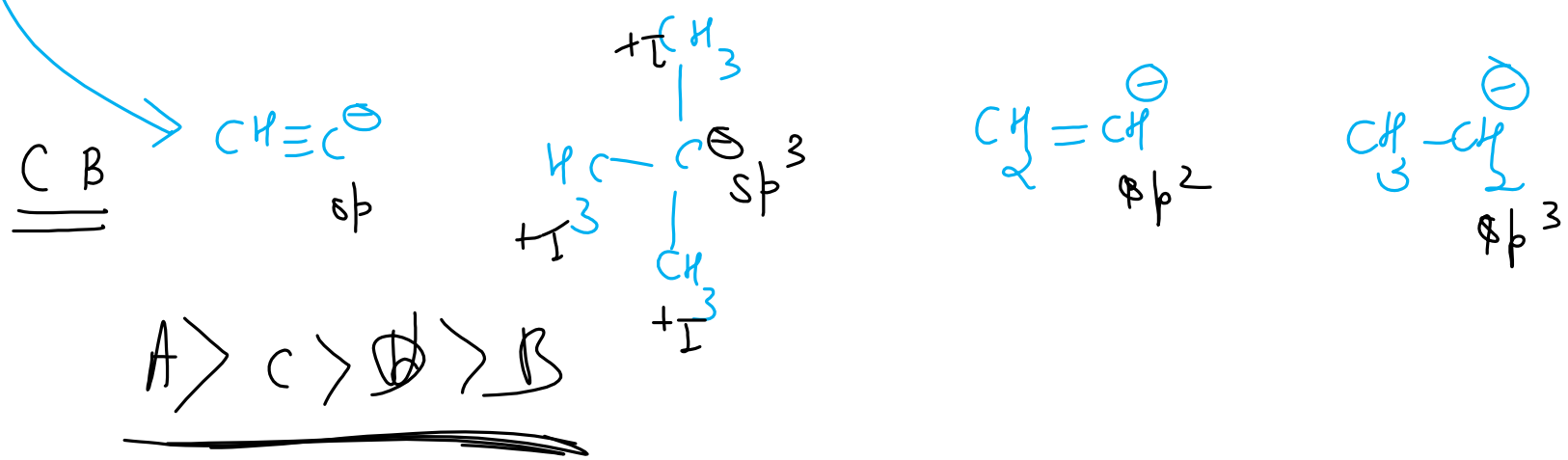
20. The correct ascending order of acidic strength of the following compound is :

(A) $CH \equiv CH$ (B) $CH_3-\underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\overset{|}{\underset{|}{C}}}}-H$ (C) $CH_2=CH_2$ (D) CH_3-CH_3

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



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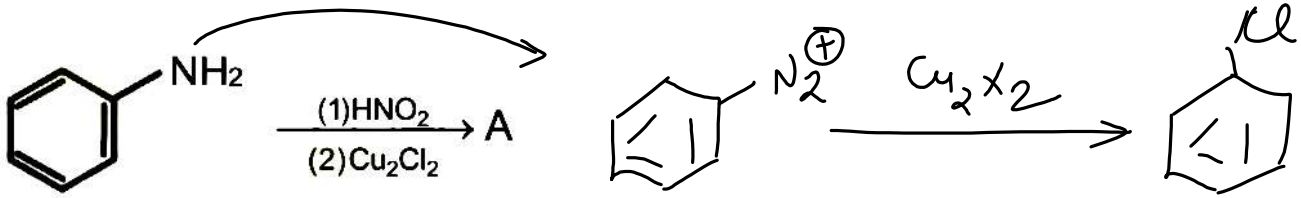
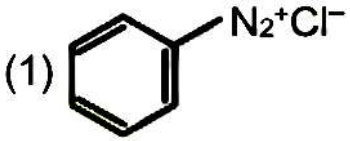
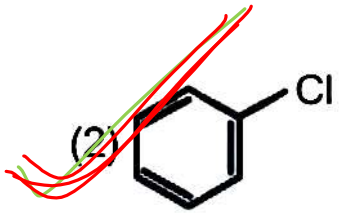
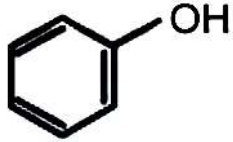
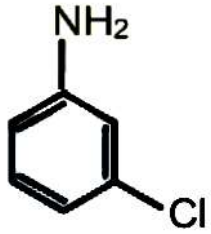
21. 

Product A is :

(1) 

(2) 

(3) 

(4) 

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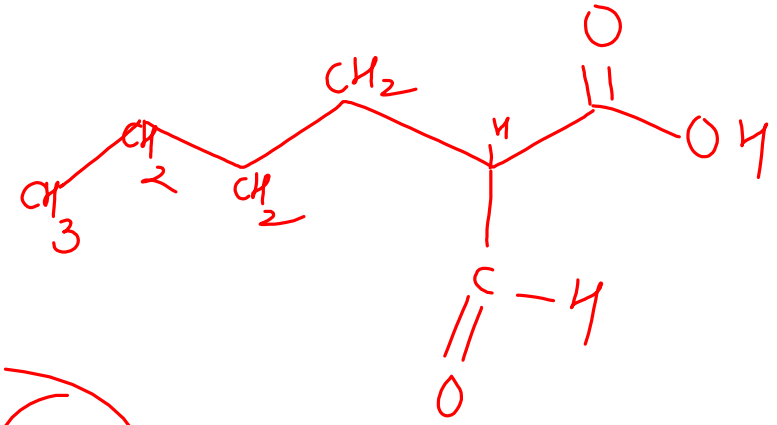
22. Sum of total no. of σ and π bond in 2-formylhexanoic acid is :



$\sigma \rightarrow 21$

$\pi \rightarrow 2$

$\Rightarrow 23$

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23. Correct match is :

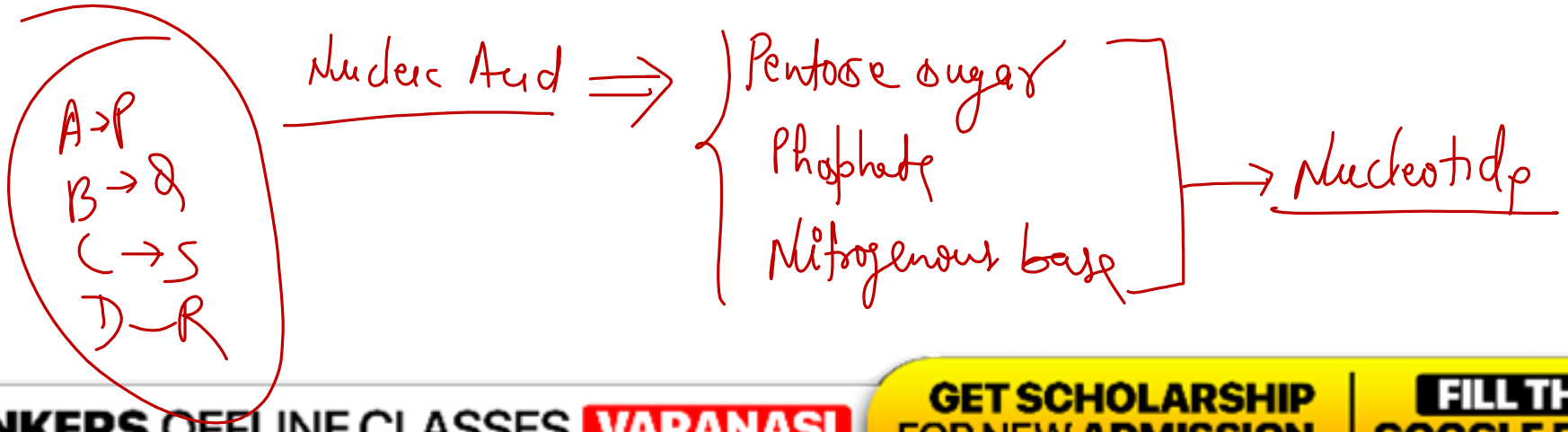
	Column-I		Column-II
(A)	Starch	(P)	α-glucose
(B)	Cellulose	(Q)	β-glucose
(C)	Nucleic acid	(R)	α-amino acid
(D)	Protein	(S)	Nucleotide

(1) A – P, B – R, C – S, D – R

(2) A – R, B – Q, C – S, D – P

(3) A – P, B – Q, C – R, D – S

(4) A – P, B – Q, C – S, D – R



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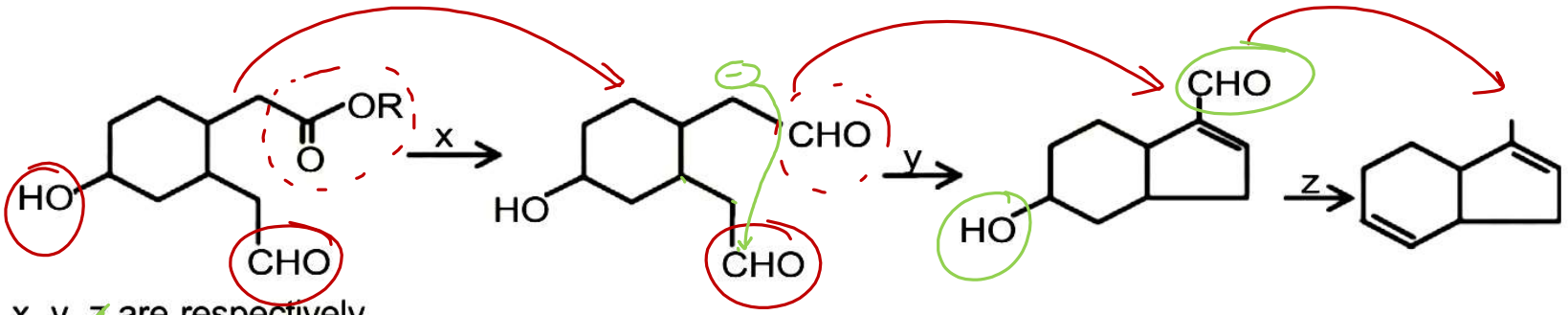
24.



x, y, z are respectively

(1) Dibal-H, NaOH aq/Δ, Zn Hg-conc HCl, Δ

(2) Dibal-H, NaOH alc/Δ, NH_2–NH_2/KOH, Δ

(3) $LiAlH_4$, NaOH aq/Δ, Zn, Hg-conc HCl, Δ

(4) $LiAlH_4$, NaOH aq/Δ, NH_2–NH_2/OH^-, Δ

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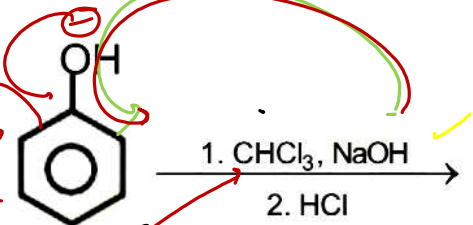
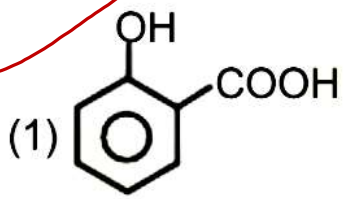
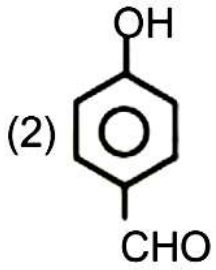
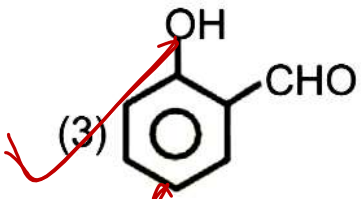
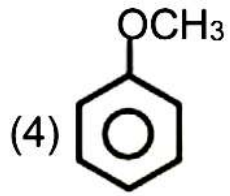
25. 

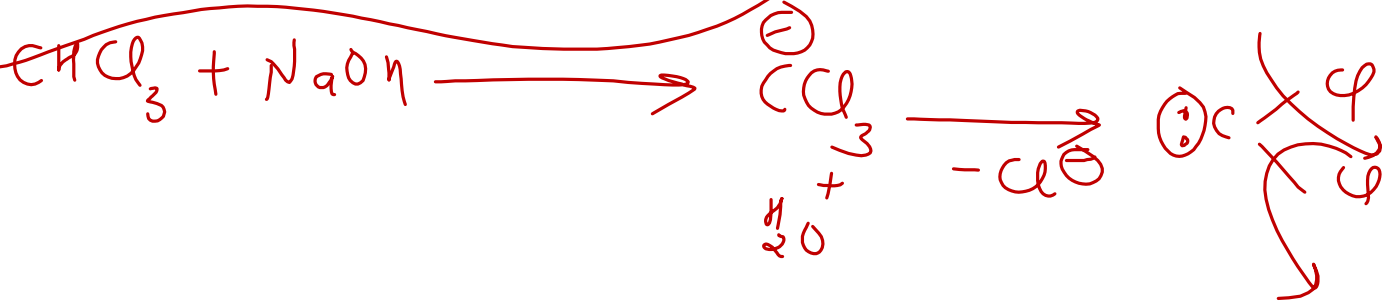
P, major product P of the reaction is :











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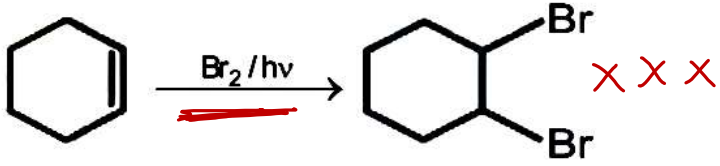
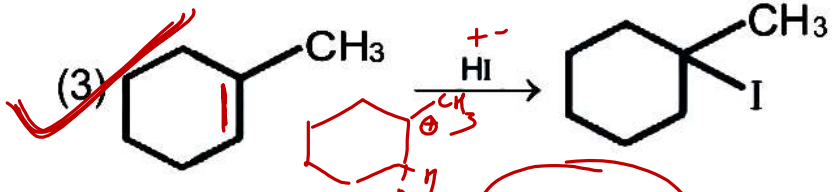
26. Which of the following represent correct reaction

(1) $CH_3–CH_2–CH_2–NH_2 \xrightarrow[0–5°C]{NaNO_2, HCl} CH_3–CH_2–OH$

(2) 

(3) 

(4) $CH_3–CH_2–CONH_2 \xrightarrow{Br_2, NaOH} CH_3–CH_2–CH_2–NH_2$

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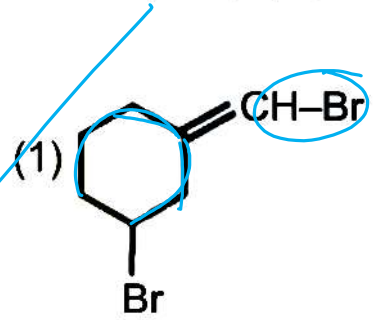
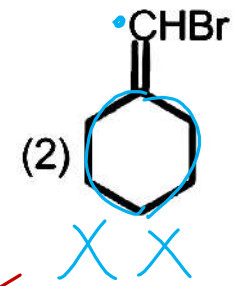
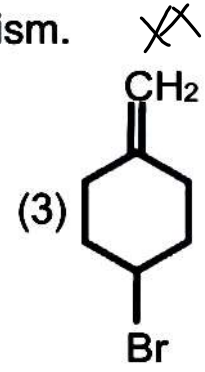
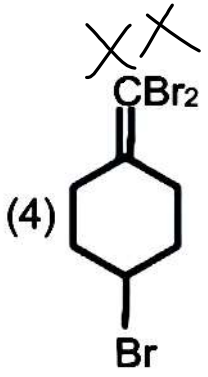
27. Which of the following show geometrical isomerism.

(1) 

(2) 

(3) 

(4) 

→ Restricted Rot^{n}

→ Different grouping at each centre

→ All four bonds should on the same directional plane.

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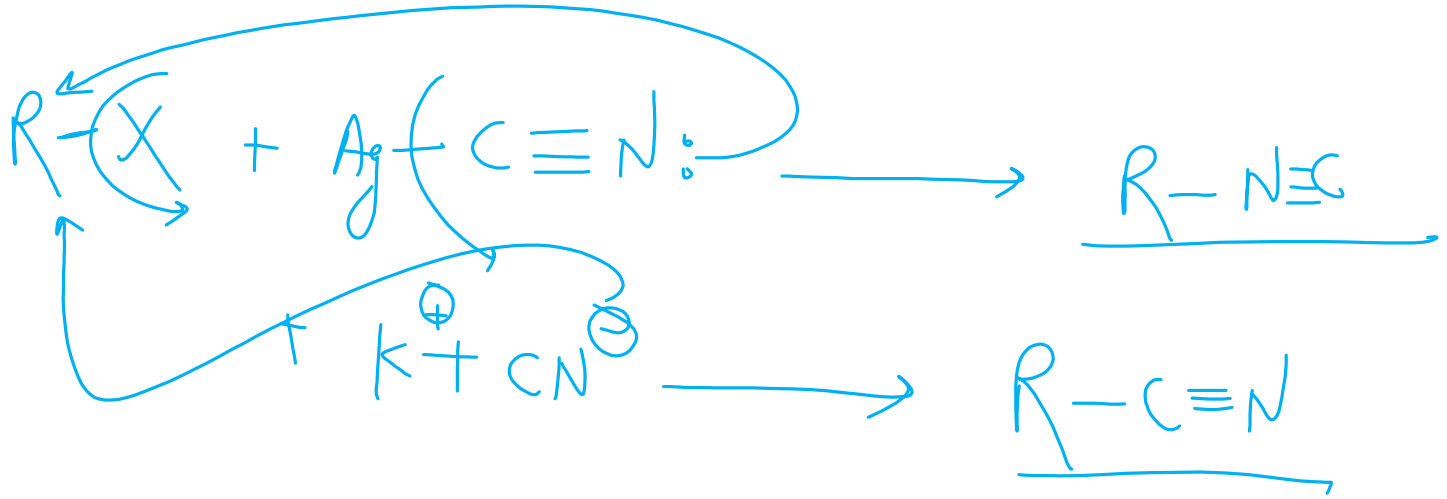
28. **Statement-I :** Alkyl halide can be directly converted to alkyl isocyanide.
Statement-II : The reagent used to convert alkyl halide to alkyl isocyanide is AgCN.
(1) **Statement-I** is incorrect & **Statement-II** is correct.
(2) **Statement-I** is correct & **Statement-II** is incorrect.
(3) Both **Statements** I & II are incorrect.
(4) Both **Statements** I & II are correct.



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29. Different adsorption method used in which type of chromatography.

X → TLC Y → Column chromatography Z → Paper chromatography.

(1) Only X (2) Only Y (3) Only X and Y (4) all X, Y and Z

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