

JEE Main (2024)

MEMORY BASED PAPER SOLUTION

29 JAN 2024 (S-01)




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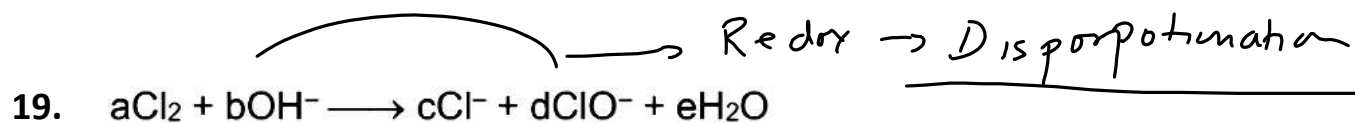
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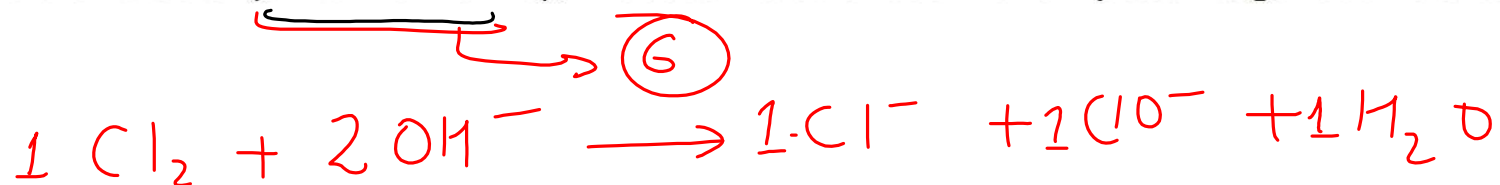
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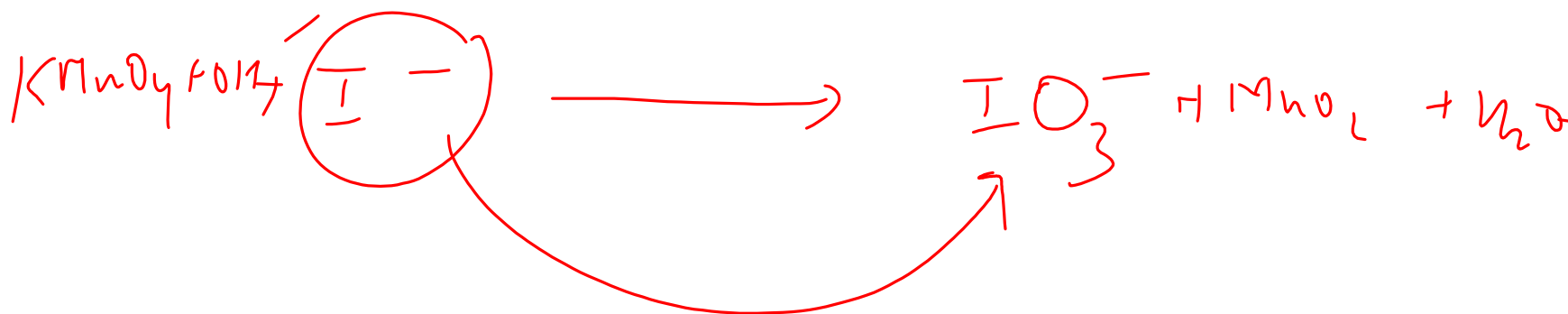
CHEMISTRY



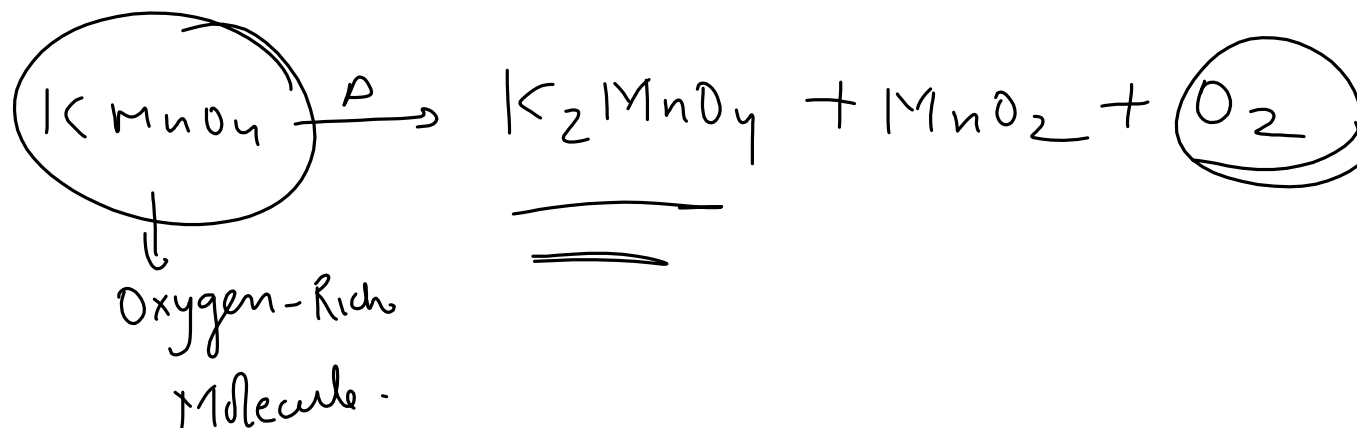
Determine the value of $(a + b + c + d + e)$, if reaction is balanced with simplest integer coefficients



20. I^- will oxidise to in presence of alkaline $KMnO_4$:
(1) I_2 (2) IO_4^- (3) IO^- (4) IO_3^-



21. Heating of KMnO_4 produce:
~~(1) K_2MnO_4 , MnO_2 , O_2~~ (2) MnO_2 , K_2O , O_2 (3) K_2MnO_4 , O_2 , MnO (4) MnO_2 , K_2O , O_3





22. How many of the following is/are paramagnetic and have B.O = 1?

Molecule/ion	H ₂	He ₂ ⁺	N ₂ ²⁻	O ₂ ²⁻	B ₂	F ₂
	2	3	16	18	10	18
	X	-	X	X		X

Handwritten notes and calculations:

- A large circle contains the number 1.
- A circle contains the text: "Odd e- → 10, 16, 32 → pa-".
- Calculation for O₂: $6 \text{ } 1s^2 \text{ } 6^* 1s^1$ (with a dot over the 6) and $1 \times (2 - 1) = \underline{\underline{0.5}}$.
- Calculation for O₂: $O_2 = \underline{\underline{130}}$ (with a dot over the 13).
- Calculation for B.O: $B.O = 1$.



23. Which of the following is incorrectly matched?

(1) Cryolite – Na_3AlF_6 ✓

~~(2) Fluorspar – BF_3~~ ✗ → CaF_2 ✓

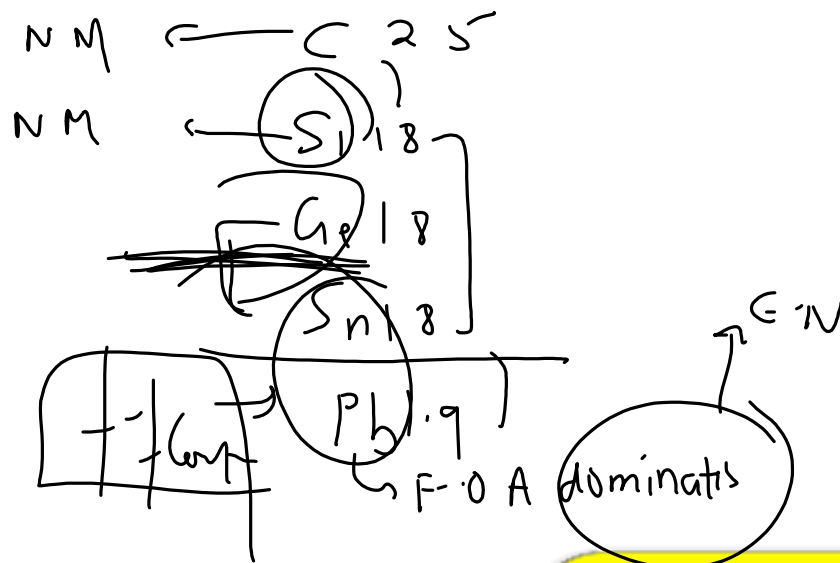
(3) Fluorapatite – $3\text{Ca}_3(\text{PO}_4)_2 \cdot \text{CaF}_2$ ✓

(4) Carnalite – $\text{KCl} \cdot \text{MgCl}_2 \cdot 6\text{H}_2\text{O}$ ✓

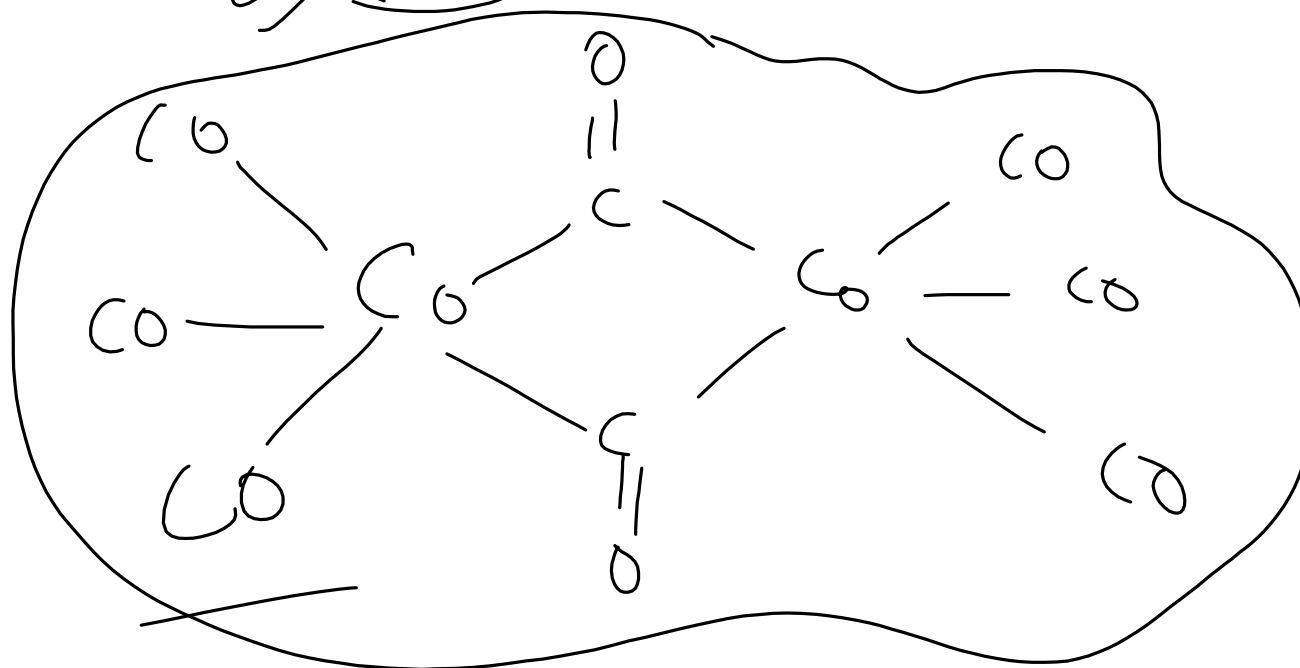
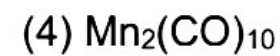
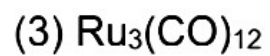
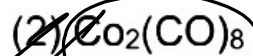
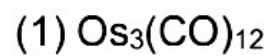
24. **Statement-I:** The electronegativity values of group 14 elements decrease from Si to Pb.

Statement-II: Group 14 contains non-metals, metalloids and metals.

- (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.

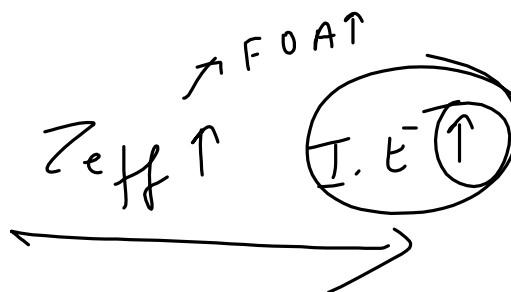


25. In which of the following complex co form bridge between metal atoms ?





26. **Assertion** : In a period on going left to right Ionisation energy decrease.
 Reason : In a period on moving left to right nuclear charge outweighs the shielding.
 In light of above statement identify correct option.
- (1) Both assertion and reason are true and reason is correct explanation of assertion.
 (2) Assertion is wrong reason is true
 (3) Assertion is true and reason is false.
 (4) Both assertion & reason are false





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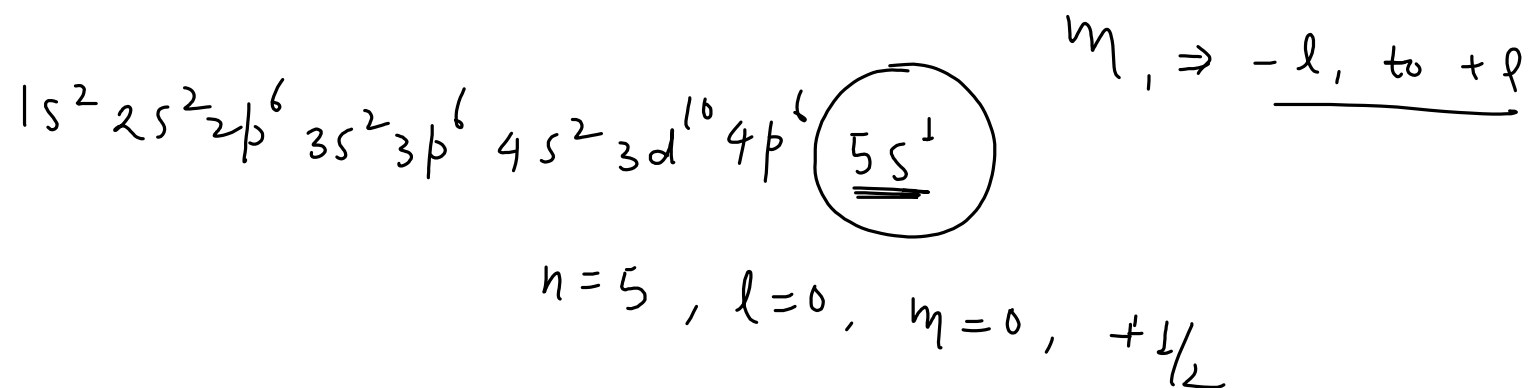


CHEMISTRY



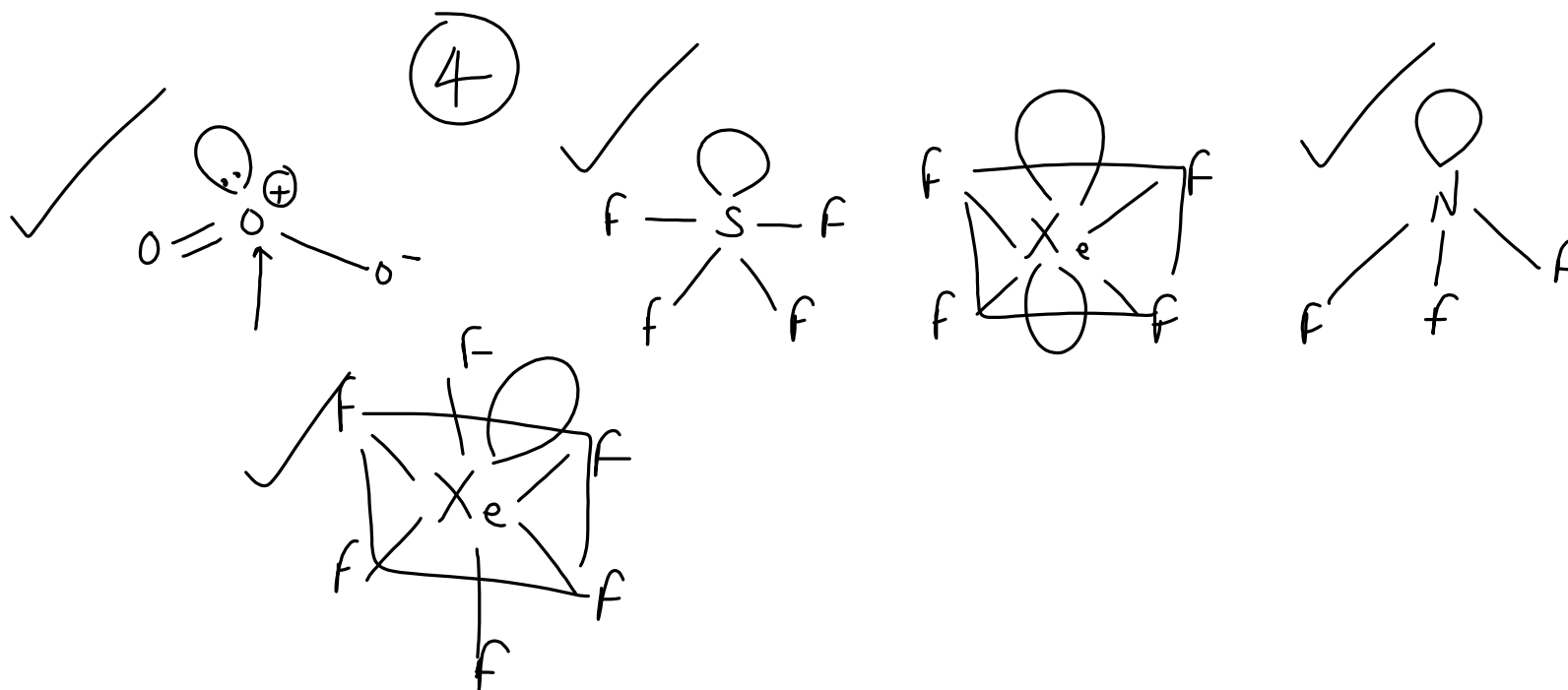
1. For Rb ($Z = 37$) correct set of quantum numbers for last electron is :

	n	l	m	s
(1)	4	0	1	+1/2
(2)	3	1	1	+1/2
✓(3)	5	0	0	+1/2
(4)	3	1	-1	+1/2





2. How many of the following have one lone pair on central atoms?
 O_3 , SF_4 , XeF_4 , NF_3 , XeF_6





3. Given $k_{net} = \frac{k_1 k_2}{k_3}$

When $E_{a1} = 40$ KJ/mol, $E_{a2} = 50$ KJ/mol and $E_{a3} = 60$ KJ/mol. Calculate the value of $(E_a)_{net}$ in KJ/mol

$$K = A e^{-E_a/RT}$$
$$\rightarrow k_{net} = \frac{k_1 \times k_2}{k_3}$$

$$e^{-E_{a_{net}}} = e^{-\left\{ \begin{array}{l} \text{---} \rightarrow 30 \text{ KJ/mol} \\ (\cancel{E_{a1} + E_{a2}}) + E_{a3} \end{array} \right\}}$$

$$E_{a_{net}} = \frac{E_{a1} + E_{a2} - E_{a3}}{}$$
$$= \frac{(40 + 50 - 60) \text{ KJ/mol}}{}$$
$$= \underline{30 \text{ KJ/mol}}$$



4. Match the column:

Column-A

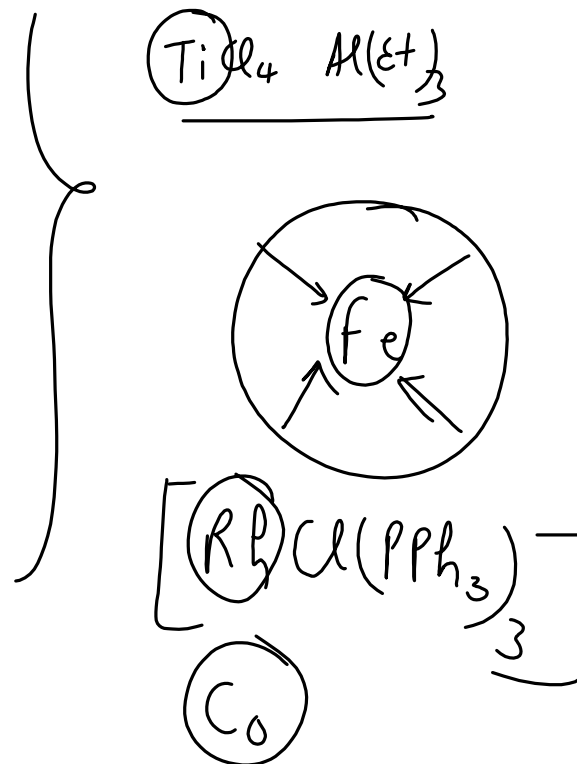
- (a) Ziegler Natta catalyst
- (b) Blood pigment
- (c) Wilkinson catalyst
- (d) Vitamin B12

Column-B

- (i) Rh
- (ii) Co
- (iii) Fe
- (iv) Ti

Correct answer is :

- ✓ (1) a-(iv), b-(iii), c-(i), d-(ii)
- (2) a-(iii), b-(i), c-(iv), d-(ii)
- (3) a-(ii), b-(i), c-(iv), d-(iii)
- (4) a-(i), b-(ii), c-(iii), d-(vi)





5. Osmotic pressure of a solution at 273K is 2.73×10^{-5} bar, then osmotic pressure of same solution at 283K is _____ $\times 10^{-4}$ bar. (Nearest integer)

$$\pi_1 = CRT_1$$

$$\pi_2 = CRT_2$$

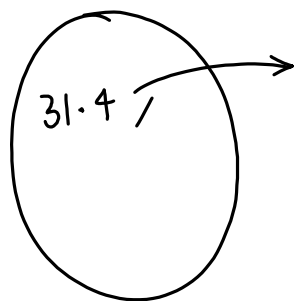
$$\frac{\pi_1}{\pi_2} = \frac{T_1}{T_2}$$

$$\frac{3.73 \times 10^{-5}}{\pi} = \frac{273}{283}$$



6. If the percentage by weight of a solution (M.wt, 98 gm/mol) is 31.4% and density of the solution is 1.56 gm/cm³ then the molarity of the solution is _____ M.

$$M = \frac{\text{moles of solute}}{\text{volume of solution (L)}}$$



100 gm \Rightarrow 31.4 gm solute

$$\text{moles of solute} = \frac{31.4}{98}$$

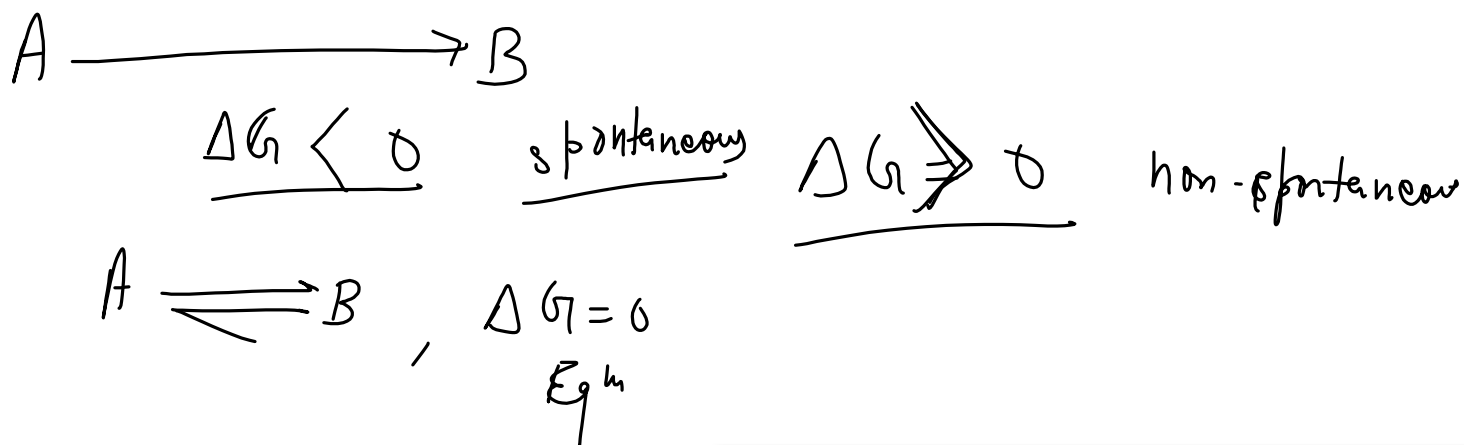
$$\rho_{\text{sol}} = \frac{100}{\text{Volume}}$$
$$\text{Vol} = \frac{100}{1.56} \text{ mL}$$

$$M = \frac{31.4/98}{100/1.56} \times 1000$$



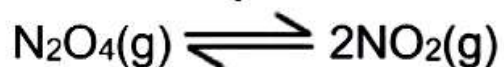
7. Among the following incorrect option is:

- (1) $\Delta G = (-)$ ve, spontaneous
- (2) $\Delta G = (+)$ ve, spontaneous
- (3) $\Delta G = 0$, equilibrium
- (4) $\Delta G = (+)$ ve, nonspontaneous





8. For decomposition of N_2O_4 at 300 K value of $K_P = 0.246$ atm



then value of K_C is $\underline{\quad} \times 10^{-2}$ [Nearest integer]

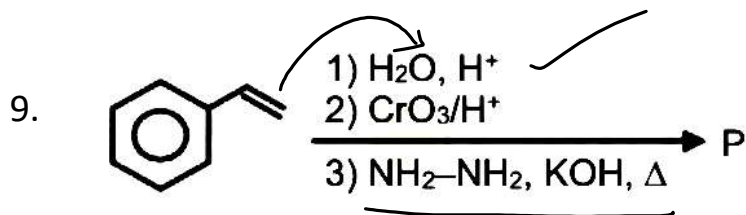
(Given $R = 0.082 \frac{\text{atm} \times \text{Lit}}{\text{mole} \times \text{K}}$)

$$K_P = K_C (RT)^{\Delta n}$$

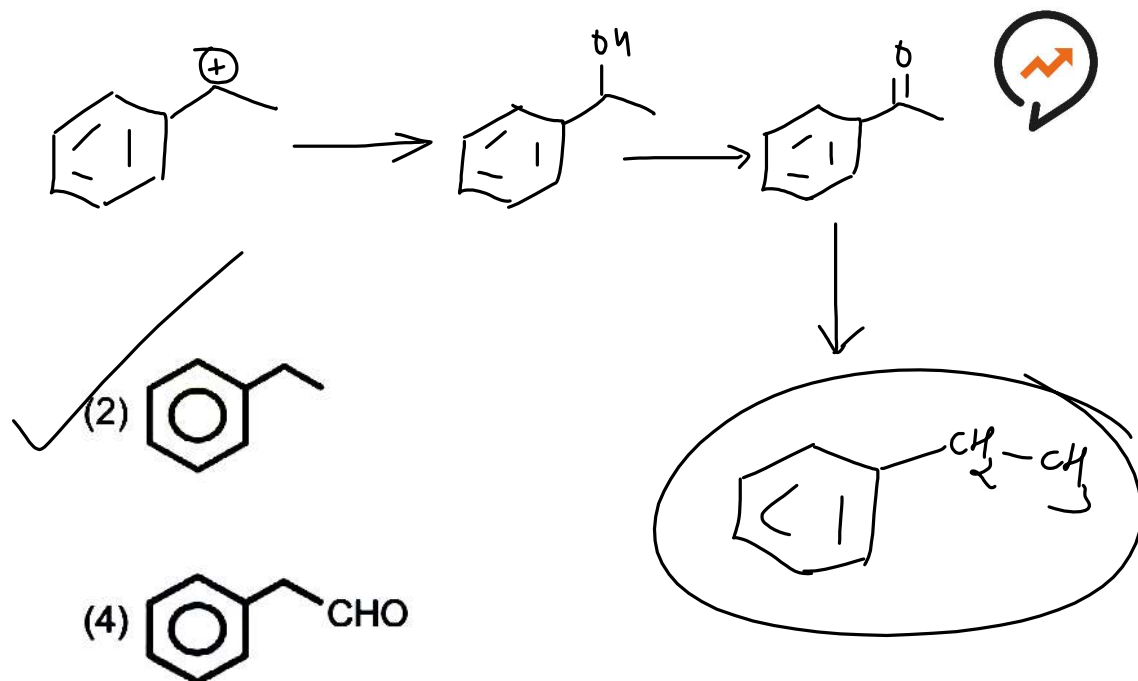
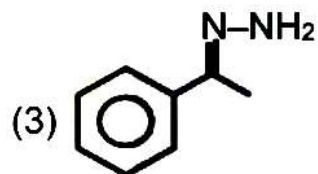
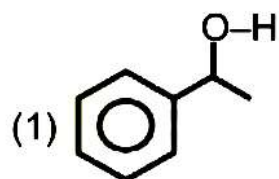
$\Delta n = 1$

$$R = 0.0824$$
$$T = 300 \text{ K}$$
$$0.246 = K_C (0.0824 \times 300)$$

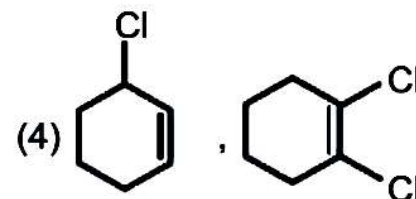
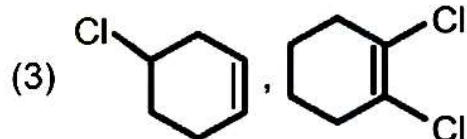
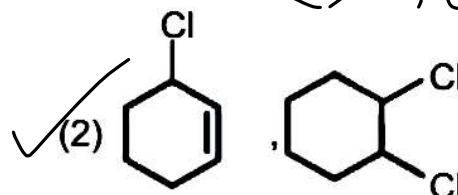
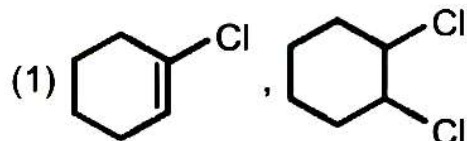
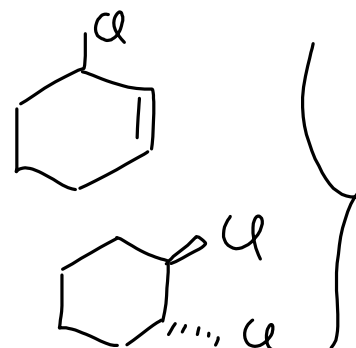
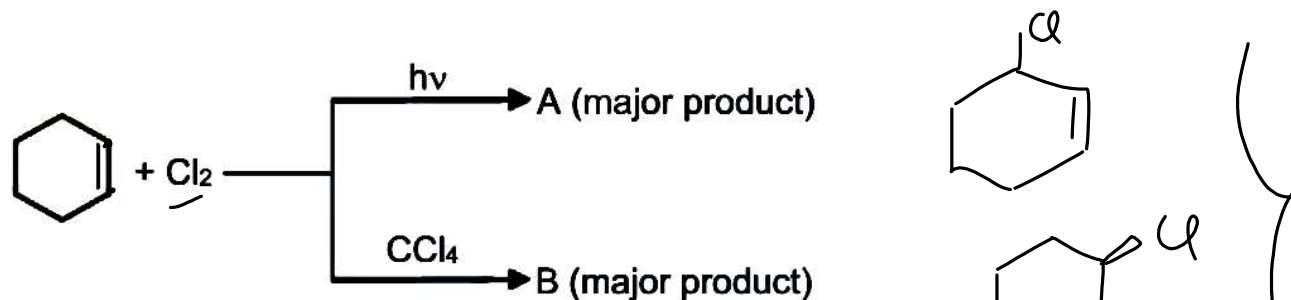
$$K_C = \frac{0.246}{0.0824 \times 300}$$
$$\approx 2.46 \times 10^{-3}$$
$$= 24.6 \times 10^{-4}$$
$$= 0.246 \times 10^{-2}$$
$$= 2.46 \times 10^{-2}$$



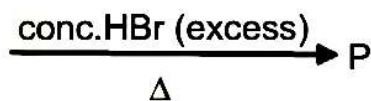
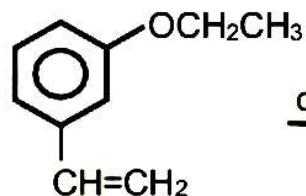
Product P is



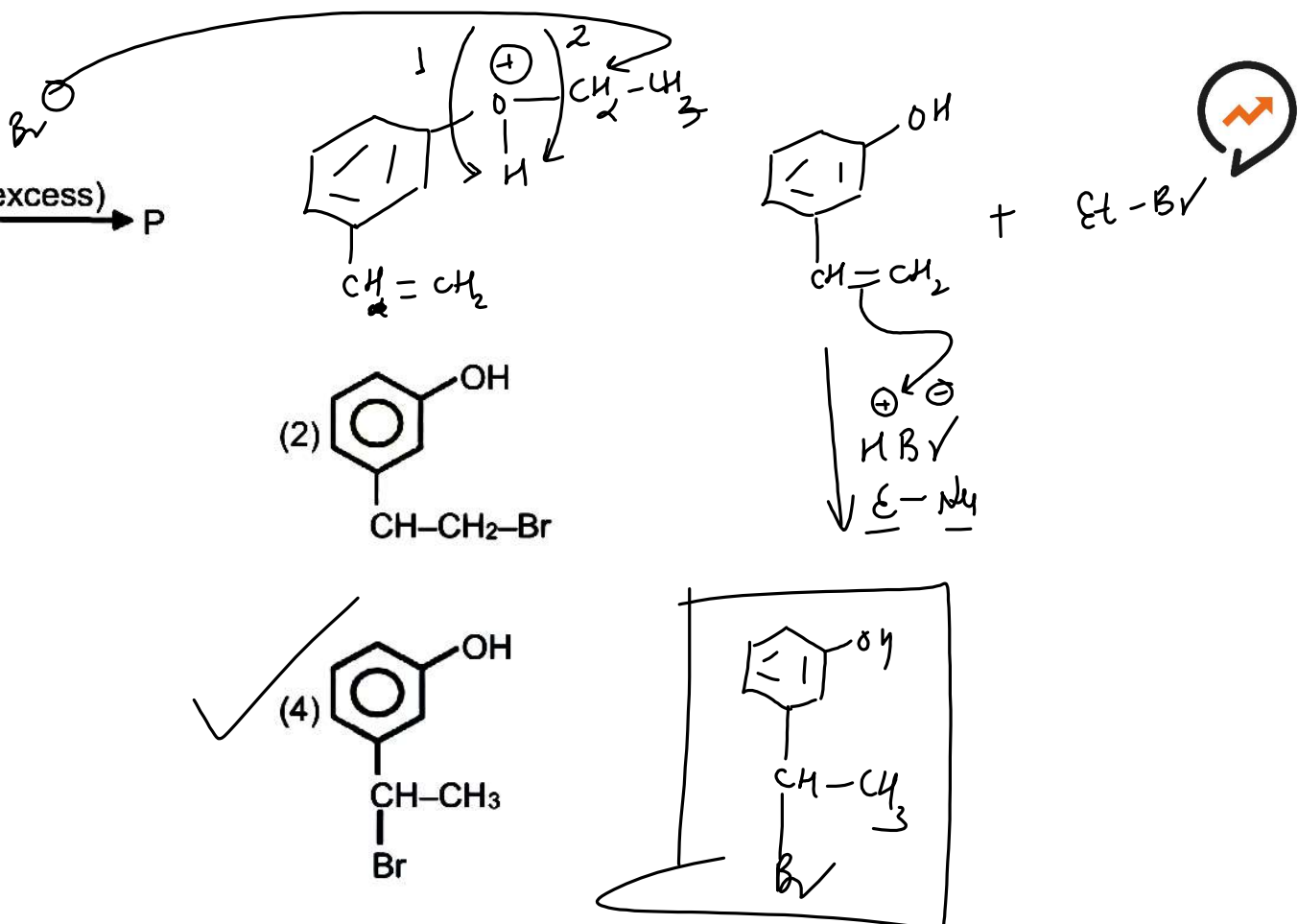
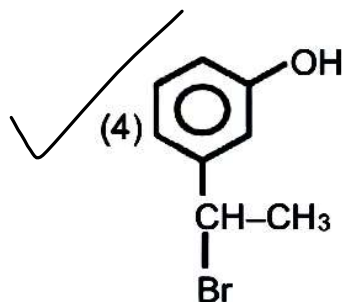
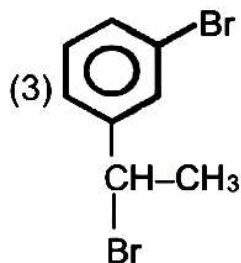
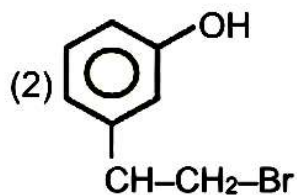
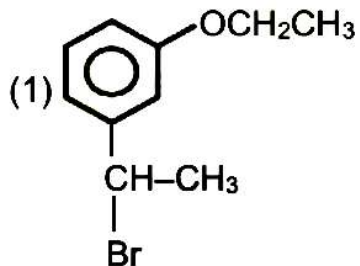
10.



11.



Product P is:

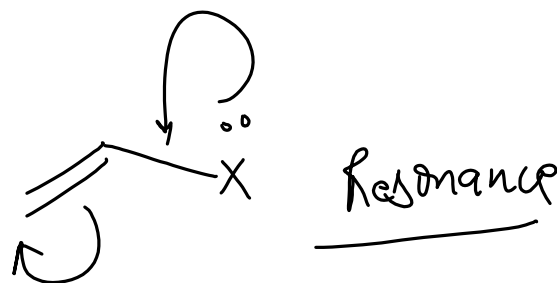




12. What effect is observed in which Interaction occurs between π -bond & lone pair of electrons on adjacent atoms.

- (1) Resonance
- (3) Inductive effect

- (2) Hyper conjugate
- (4) Electronic effect





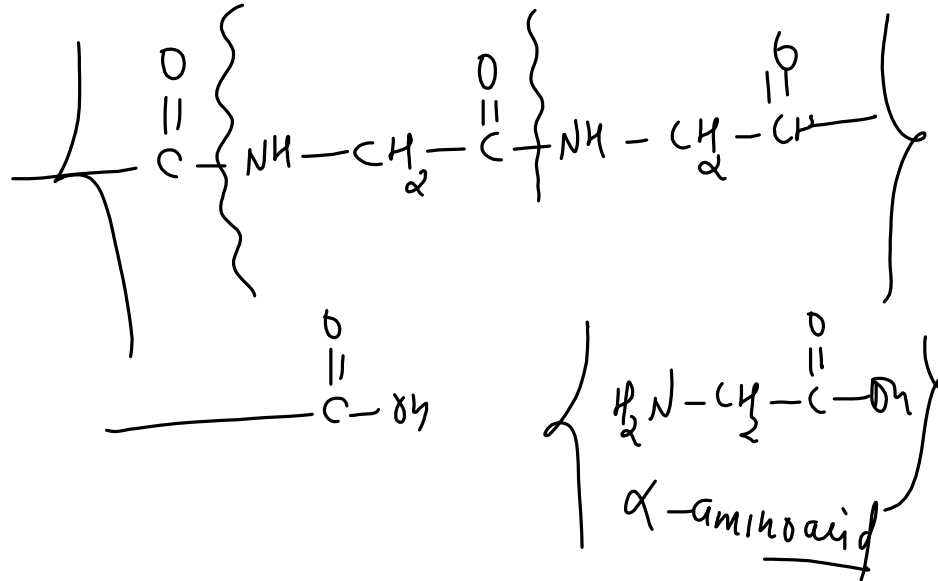
13. Type of amino acid obtained on hydrolysis of proteins.

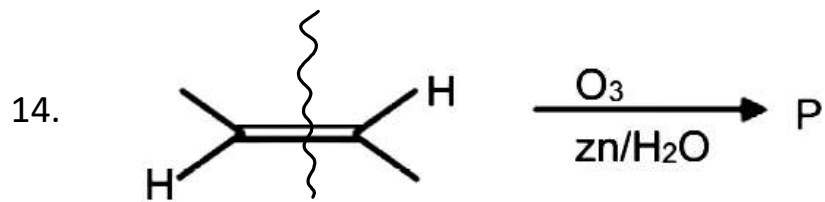
(1) α - Amino acid

(2) γ - Amino acid

(3) β - Amino acid

(4) δ - Amino acid





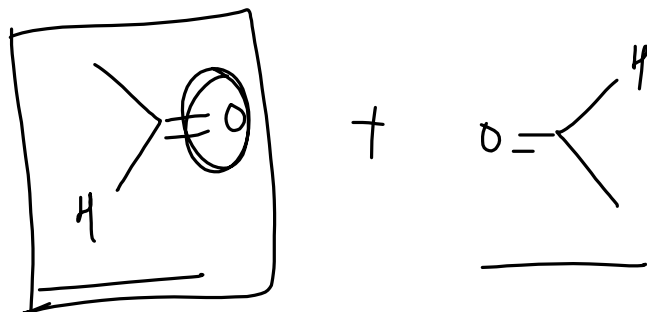
the no. of oxygen atom per molecule in product P is.

(1) 1

(2) 2

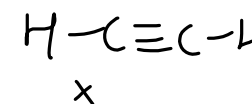
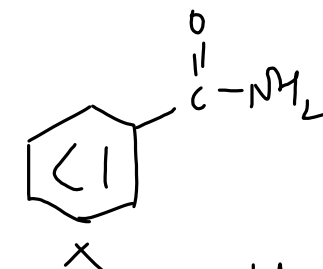
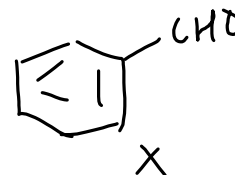
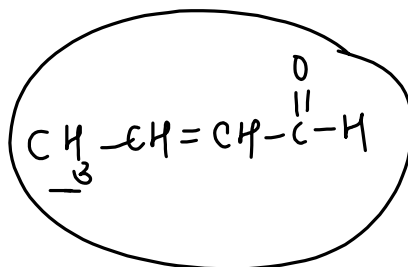
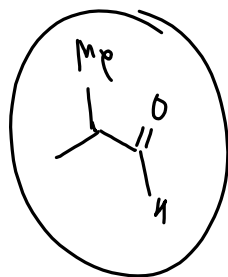
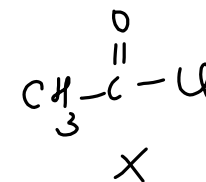
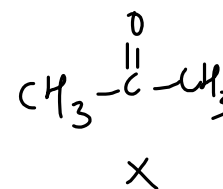
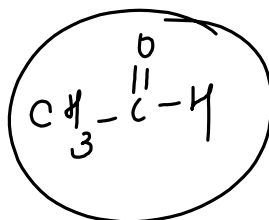
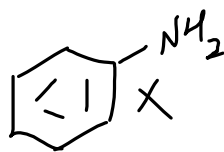
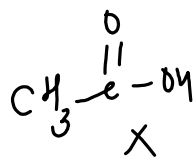
(3) 3

(4) 4



15. How many of the following gives positive Fehling solution test.

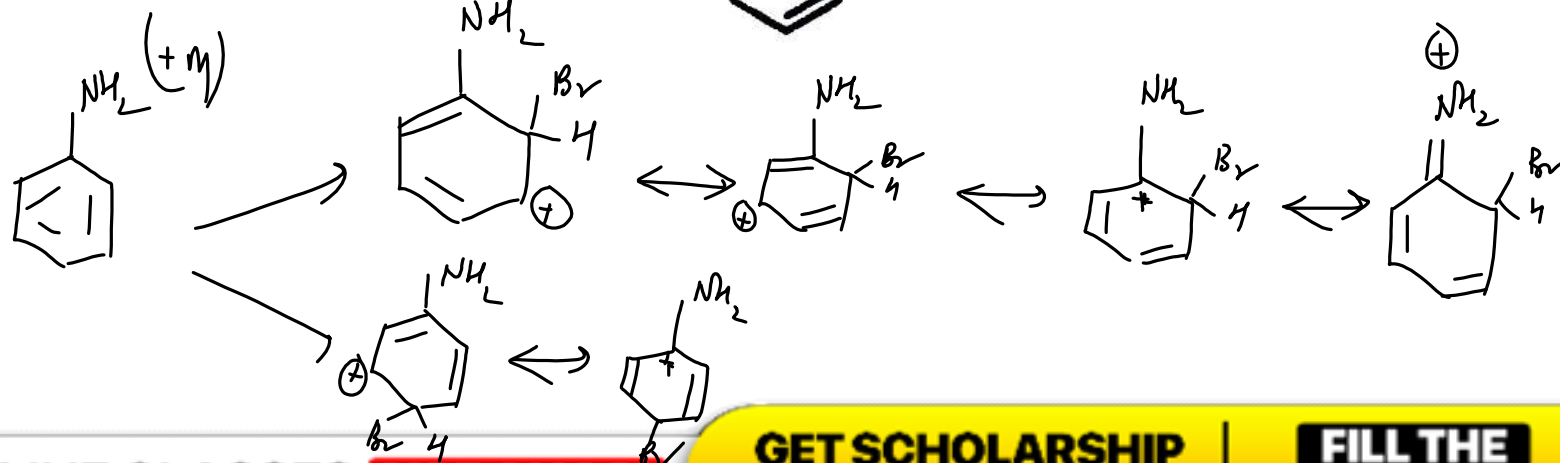
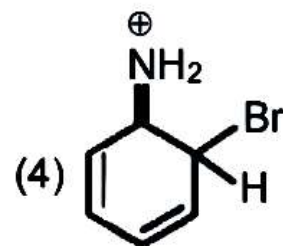
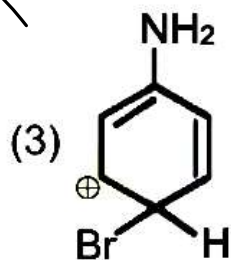
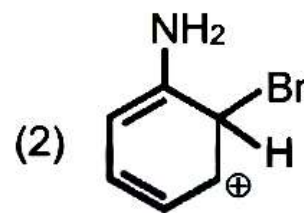
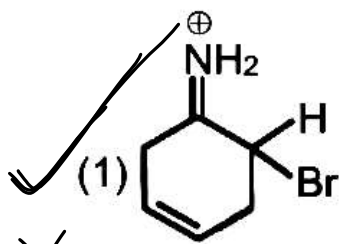
Acetic acid, Aniline, Acetaldehyde, Acetone, Ethanoylchloride, 2-Methylpropanaldehyde, Crotonaldehyde, Benzaldehyde, Benzene carboxamide, Ethyne.



3

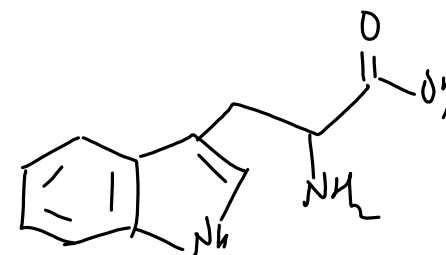
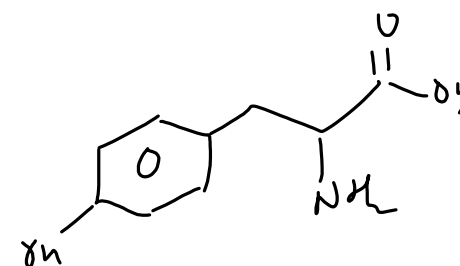
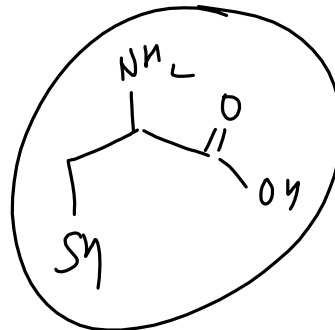
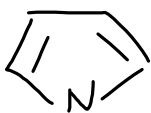
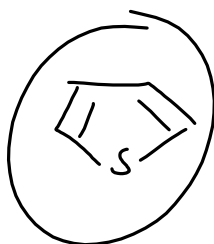
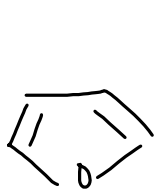


16. Arenium ion, which will not be formed in bromination of aniline.





17. How many of the following have 'S' as heteroatom.
Furan, Thiophene, Pyrrole, Cysteine, Tyrosine, Tryptophan



2



18. Appearance of red colour on treatment with Na fusion extract of an organic compound with FeSO_4 in presence of conc. H_2SO_4 indicate element?

(1) N

(2) Br

(3) S

(4) N & S

Lassaigne's Test

N \longrightarrow Prussian blue

S \longrightarrow Purple

X \longrightarrow C \longrightarrow White

Br \longrightarrow Pale yellow

I \longrightarrow Dark yellow

(N, S)

FeCl_3

(Blood red)



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