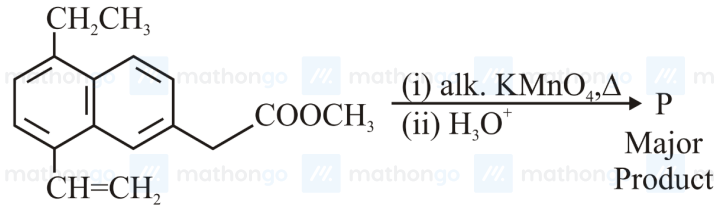
1. Number of bromo derivatives obtained on treating ethane with excess of Br_2 in diffused sunlight is _____

[2023 (06 Apr Shift 1)]

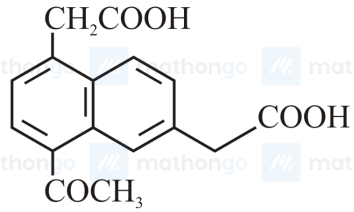
2. Molar mass of the hydrocarbon (X) which on ozonolysis consumes one mole of O_3 per mole of (X) and gives one mole each of ethanal and propanone is _____ g mol^{-1} (Molar mass of C : 12 g mol^{-1} , H : 1 g mol^{-1})

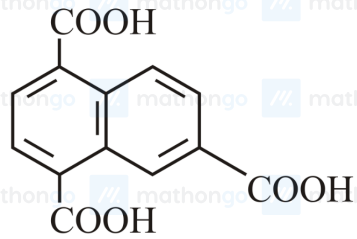
[2023 (08 Apr Shift 1)]

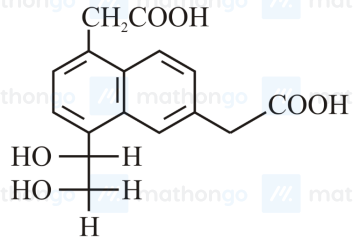
3. The major product 'P' formed in the given reaction is

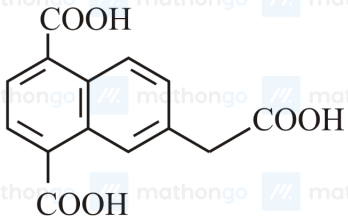


[2023 (10 Apr Shift 1)]

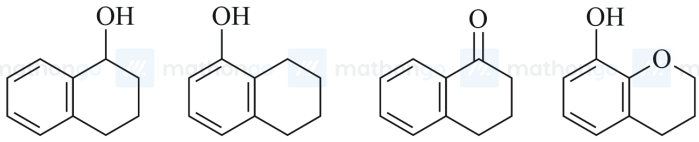
(1)


(2)


(3)


(4)


4. Arrange the following compounds in increasing order of rate of aromatic electrophilic substitution reaction.



a b c d

[2023 (11 Apr Shift 1)]

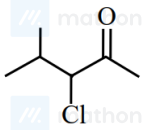
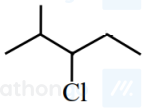
(1) d, b, c, a

(2) d, b, a, c

(3) b, c, a, d

(4) c, a, b, d

5. Given below are two statements, one is labelled as Assertion **A** and the other is labelled as Reason **R**.

Assertion **A**:  can be subjected to Wolff-Kishner reduction to give 

Reason **R**: Wolff-Kishner reduction is used to convert  into 

In the light of the above statements, choose the correct answer from the options given below:

[2023 (11 Apr Shift 2)]

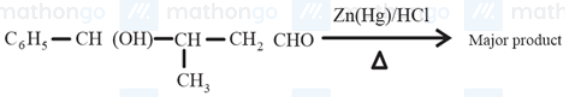
(1) **A** is true but **R** is false

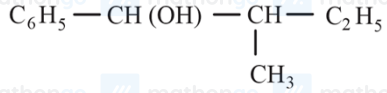
(2) **A** is false but **R** is true

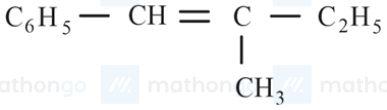
(3) Both **A** and **R** are true and **R** is the correct explanation of **A**

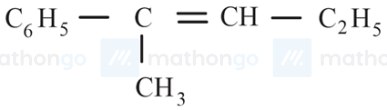
(4) Both **A** and **R** are true and **R** is NOT the correct explanation of **A**

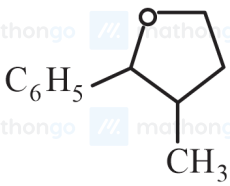
6. The major product formed in the following reaction is



A. 

B. 

C. 

D. 

choose the correct answer from the options Given below:

[2023 (11 Apr Shift 2)]

(1) B only

(2) A only

(3) C only

(4) D only

7. $2-\text{hexene} \xrightarrow[(ii)\ H_2O]{(i)\ O_3} \text{Products}$

The two products formed in above reaction are

[2023 (12 Apr Shift 1)]

(1) Butanal and acetaldehyde

(2) Butanoic acid and acetaldehyde

(3) Butanal and acetic acid

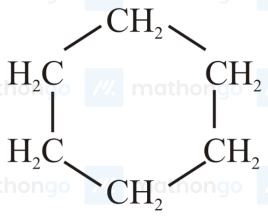
(4) Butanoic acid and acetic acid

8. In the following reaction 'X' is

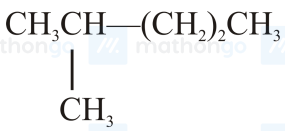
$$CH_3(CH_2)_4CH_3 \xrightarrow[\triangle]{\text{Anhy.}AlCl_3,\ HCl} \underset{\text{major product}}{X}$$

[2023 (13 Apr Shift 1)]

(1)



(2)



(3) $CH_3(CH_2)_4CH_2Cl$

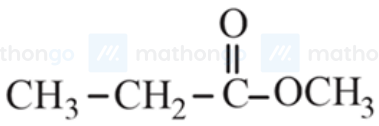
(4) $Cl-CH_2-(CH_2)_4-CH_2-Cl$

9. The product formed in the following multistep reaction is:

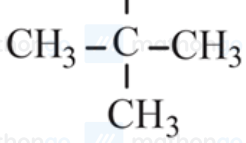
$$CH_3-CH=CH_2 \xrightarrow[\text{iii) PCC}]{\text{i) } B_2H_6,\ \text{ii) } H_2O_2, NaOH,\ \text{iv) } CH_3MgBr}$$

[2023 (15 Apr Shift 1)]

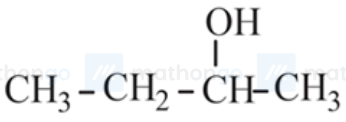
(1)



(2)



(3)



(4)

ANSWER KEYS

1. (9) **2.** (70) **3.** (2) **4.** (4) **5.** (2) **6.** (2) **7.** (4)
9. (3)

1. (9)

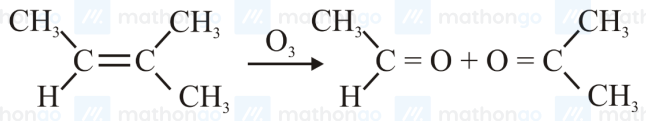
A substitution reaction is a chemical reaction during which one functional group in a chemical compound is replaced by another functional group.The number of dif possible when ethane is allowed to react with bromine in sunlight are 9.

$$CH_3-CH_3+Br_2 \xrightarrow{\text{sunlight}} CH_3-CH_2Br+CH_2Br-CH_2Br+CH_2Br-CHBr_2+CHBr_2-CHBr_2+CBr_3-CBr_3+CH_3-CHBr_2+CH_3-CBr_3+CH$$

6 Bromine atoms: 1 product possible
5 Bromine atoms : 1 product possible
4 Bromine atoms : 2 products possible
3 Bromine atoms : 2 products possible
2 Bromine atoms : 2 products possible
1 Bromine atom : 1 product possible
Total 9 products possible

2. (70)

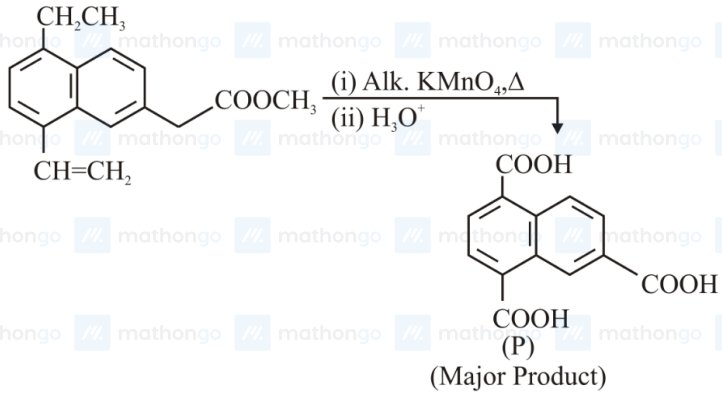
When 2-methyl butene-2 is subjected to ozonolysis and then reduced in presence of dimethyl sulphide or Zn dust, it yields acetone and acetaldehyde. Cycloaddition first and then it is cleaved reductively to give aldehyde and ketone.



M.wt.=70

3. (2)

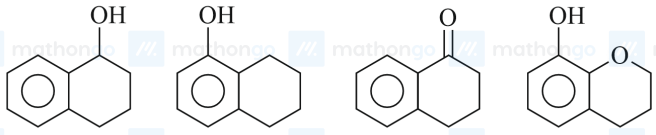
Alkaline potassium permanganate is a strong oxidising agent. In the given molecule alkene part undergo oxidation with alk. $KMnO_4$. The alkene part present in the alkene, hence it converts to carboxylic acid group and carbon dioxide. Finally, ester part in the molecule undergo hydrolysis in acidic water.



(P)
(Major Product)

4. (4)

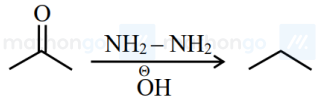
The more nucleophilic group will make ring more prone to aromatic substitution reaction. Benzene becomes more reactive towards Electrophilic Aromatic Substitution wh density.



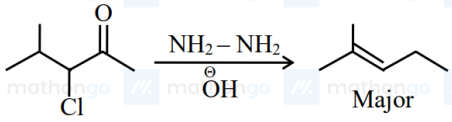
In structure (a) $-CH_2$ group shows +H effect. while in (b) $-OH$ group shows +R effect. In (c) +R effect is shown by functional group and in (d) both $-OH$ and $-($
So Correct increasing order is :
$c < a < b < d$

5. (2)

The reagent hydrazine in alkaline medium is used in the Wolff-Kishner reduction reaction. In this reaction aldehydes and ketone converts to respective alkanes.

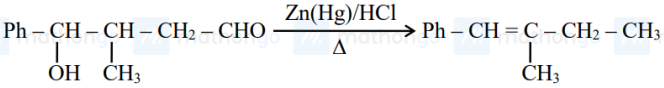


This reaction is not good for base sensitive groups in the carbonyl compounds. The following chloro carbonyl compound give alkene as elimination reaction expected in b



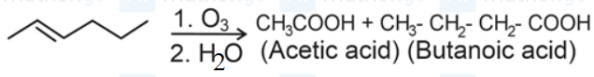
6. (2)

The carbonyl compounds undergo Clemmenson's reduction in the presence of zinc amalgam and concentrated hydrochloric acid to form alkanes. The reagent in the Clem sensitive functional group. In the given reactant hydroxy group undergo dehydration to give alkene as shown below.



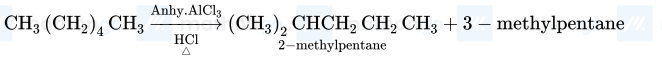
7. (4)

Ozone will cleave carbon-carbon double bonds to give ketones/carboxylic acids after oxidative workup. Here in this reaction Cleavage occurs at unsaturation of hexene an formed.



8. (2)

When n-Hexane is heated with anhydrous $AlCl_3$ and HCl gas at 573K under a pressure of about $30-35$ atm it Isomerises to give a branched chain alkanes.



Major product in the above reaction is 2-methylpentane.

9. (3)

Hydroboration-oxidation of terminal alkenes give primary alcohols. Propene gives propanol. Propanol on oxidation with PCC gives propanal. Propanal undergo nucleophi magnesium bromide give 2-butanol.