1. Among the following the number of compounds which will give positive iodoform reaction is _____.

(a) 1-Phenylbutan-2-one

(b) 2-Methylbutan-2-ol

(c) 3-Methylbutan-2-ol

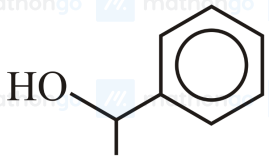
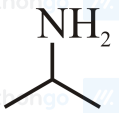
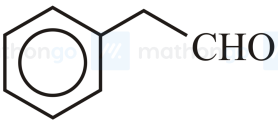
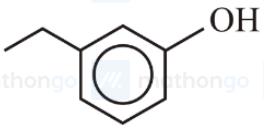
(d) 1-Phenylethanol

(e) 3, 3-dimethylbutan-2-one

(f) 1-Phenylpropan-2-ol

[2023 (06 Apr Shift 2)]

2. . Match List I with List II :

List I (Reagents used)		List II (Compound with Functional group detected)	
A.	Alkaline solution of copper sulphate and sodium citrate	I.	
B.	Neutral $FeCl_3$ solution	II.	
C.	Alkaline chloroform solution	III.	
D.	Potassium iodide and sodium hypochloride	IV	

Choose the correct answer from the options given below :

[2023 (08 Apr Shift 1)]

(1) A-III, B-IV, C-I, D-II

(2) A-III, B-IV, C-II, D-I

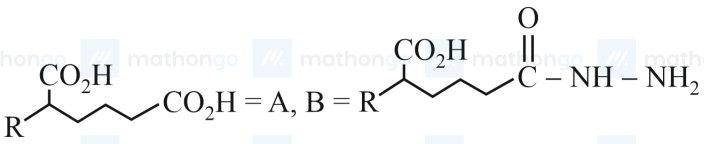
(3) A-IV, B-I, C-II, D-III

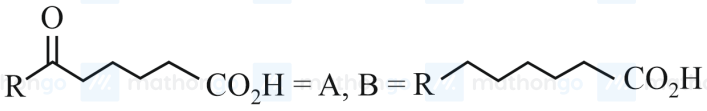
(4) A-II, B-IV, C-III, D–I

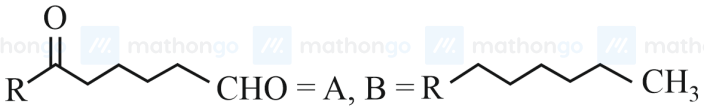
3. 

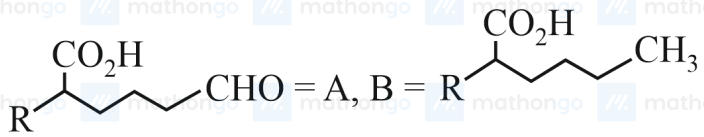
'A' and 'B' in the above reactions are:

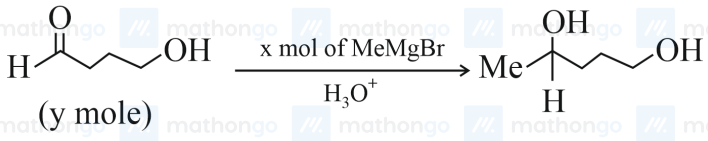
[2023 (11 Apr Shift 1)]

(1) 

(2) 

(3) 

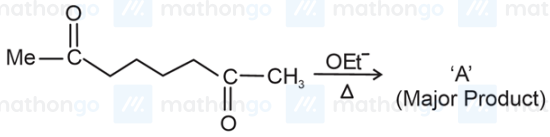
(4) 

4. 

The ratio x/y on completion of the above reaction is _____ .

[2023 (11 Apr Shift 1)]

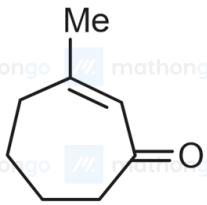
5.



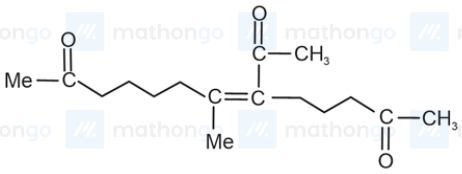
A in the above reaction is :

[2023 (12 Apr Shift 1)]

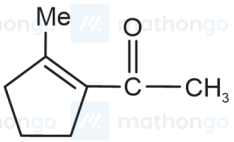
(1)



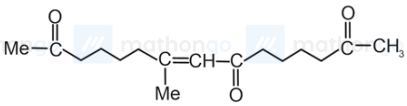
(2)



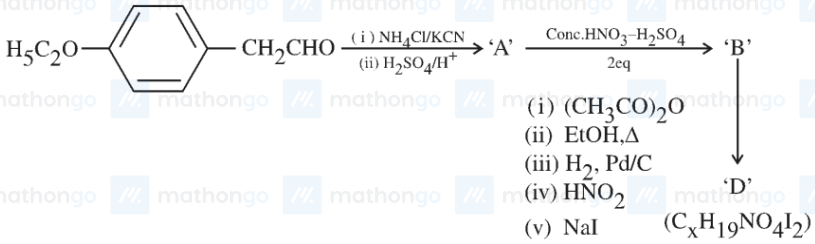
(3)



(4)



6.



The value of x in compound 'D' is _____

[2023 (12 Apr Shift 1)]

7. The mass of NH_3 produced when 131.8 kg of cyclohexane carbaldehyde undergoes Tollen's test is _____ kg. (Nearest Integer)

Molar mass of $C = 12\ g/mol$

$N = 14\ g/mol$

$O = 16\ g/mol$

[2023 (12 Apr Shift 1)]

8. $D-(+)-Glyceraldehyde \xrightarrow[ii)\,H_2O/H^+]{i)\,HCN} \xrightarrow[iii)\,HNO_3]{}$

The products formed in the above reaction are

[2023 (13 Apr Shift 1)]

(1) One optically active and one meso product

(2) Two optically inactive products

(3) Two optically active products

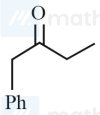
(4) One optically inactive and one meso product

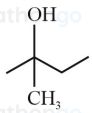
ANSWER KEYS

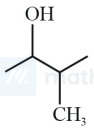
1. (4)	**2.** (2)	**3.** (2)	**4.** (2)	**5.** (3)	**6.** (15)	**7.** (60)	**8.** (1)

1. (4)

Iodoform test is used to check the presence of carbonyl compounds with the structure $R-CO-CH_3$ or alcohols with the structure $R-CH(OH)-CH_3$ in a given unknown substance. The reaction of iodine, a base and a methyl ketone gives a yellow precipitate along with an "antiseptic" smell.

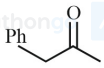
(a) 

(b) 

(c) 

(d) 

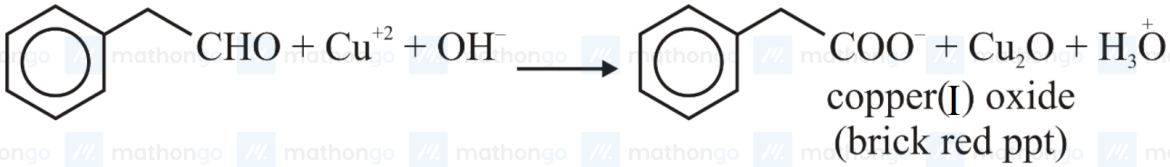
(e) 

(f) 

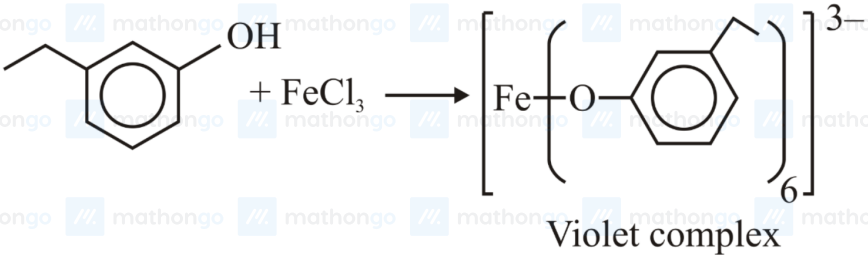
Hence, (c), (d), (e) and (f) give iodoform reaction

2. (2)

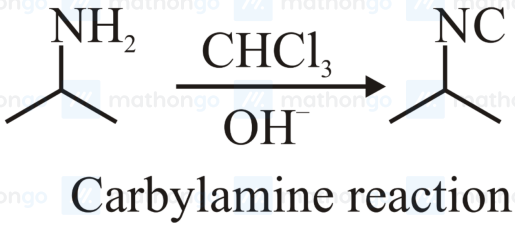
(A) Aldehydes give red precipitate with Fehling's solution.



(B) Phenols give violet colour with neutral ferric chloride solution

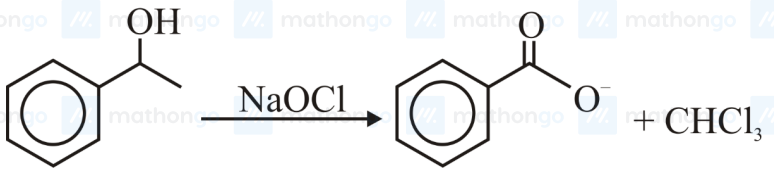


(C) Primary amines give isocyanides with chloroform in the presence of alkali. This reaction known as carbylamine reaction.



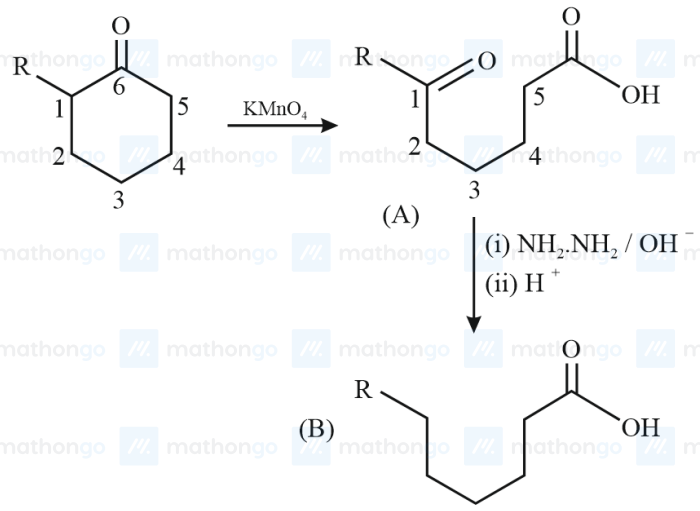
Carbylamine reaction

(D) 1-phenylethanol give haloform reaction with sodium hypochlorite. The products are benzoate and chloroform.



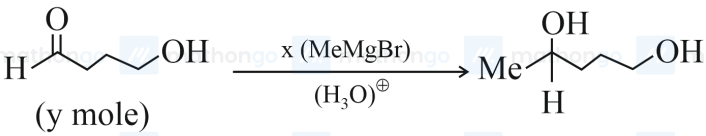
3. (2)

Oxidation of this substituted ketone will give a ketone and a carboxylic acid. This reaction takes place by the cleavage of carbon atoms near the carbonyl carbon and the nearby carbons. This cleavage can be from both the sides of carbonyl carbon thus producing two different carboxylic acids and ketones. The ketone formed converts to hydrocarbon in the presence hydrazine in alkaline medium. The overall reaction is shown below.



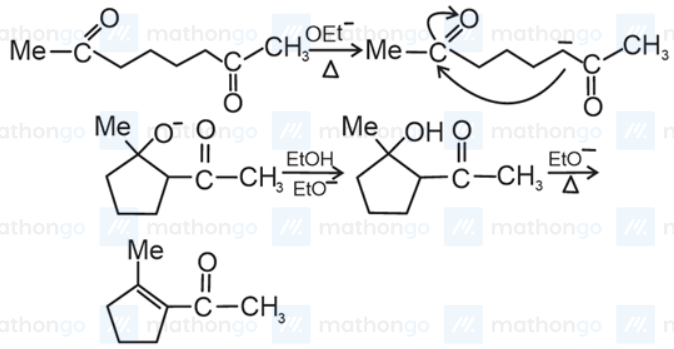
4. (2)

Acid-base reactions are faster than nucleophilic addition reaction. So, in the first step acid-base reaction takes place between alcoholic functional group and Grignard reagent. Now, the second mole of Grignard reagent to react with aldehyde functional group. Hence, at the end of the reaction a diol is produced on acidification.



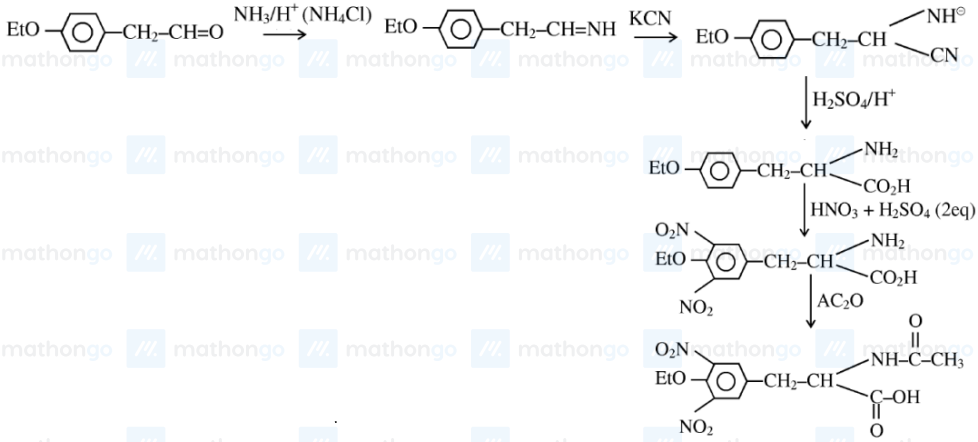
5. (3)

Intramolecular Aldol condensations happen when a single molecule contains two aldehyde/ketone groups. When the alpha carbon of one group attacks the other, the molecule attacks itself forming a ring structure. The reaction is shown below.

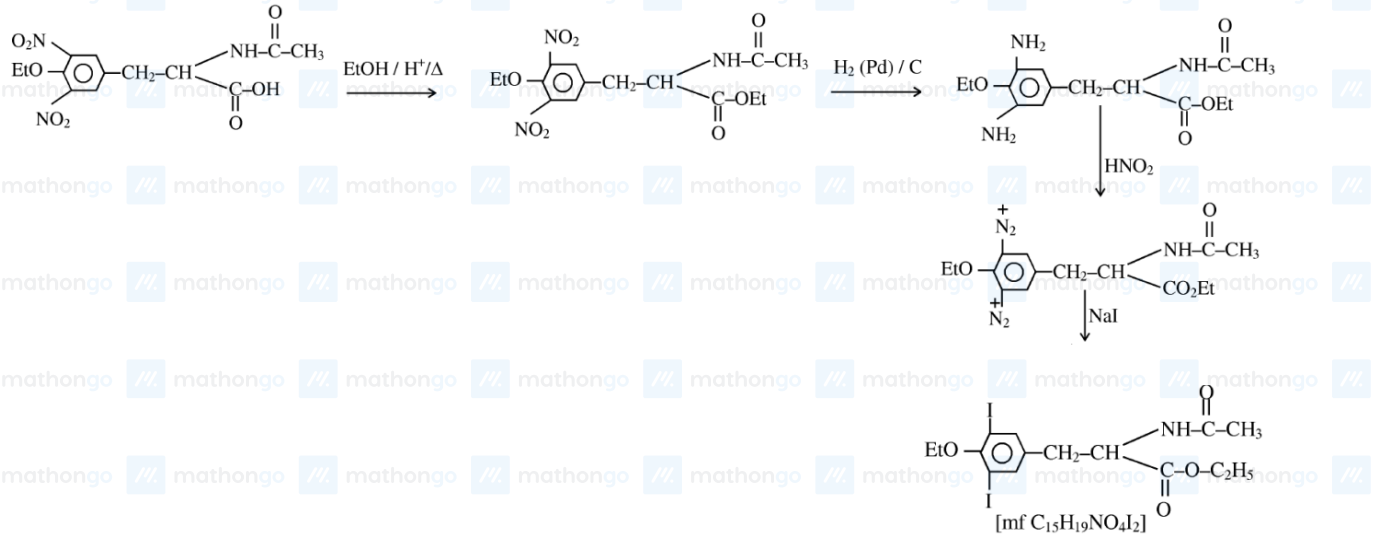


6. (15)

The reaction of aldehydes and ketones with ammonia forms imine derivatives, also known as Schiff bases (compounds having a C=N function). Imines can undergo nucleophilic addition reaction with KCN. Now, nitration takes place on benzene ring. Then amine group under acetylation reaction with acetic anhydride.



Now, the carboxylic acid group undergo esterification reaction with ethyl alcohol in acidic medium. Now, the nitro groups present on benzene undergo reduction to amines with H_2/Pd. Now, the amino groups undergo diazotization with nitrous acid. Then substitution of iodine takes place at diazonium groups upon reaction with NaI.



$\therefore\ x = 15$

7. (60)

$RCHO + 2\left[Ag(NH_3)_2\right]OH \rightarrow RCOONH_4 + 2Ag + 3NH_3 + H_2O$

The RCHO is cyclohexane carbaldehyde ($C_6H_{11}CHO$). The molar mass is112g.

The number of moles of cyclohexane carbaldehyde$= \frac{131.8\times10^3}{112} = 1.176\times10^3$ mol

1 mole of aldehyde produces 3 moles of NH_3

1.176×10^3 mol aldehyde will produce

$= 3\times1.176\times10^3$ moles of NH_3

Mass of NH_3 produced $= 3\times1.176\times10^3\times17$

$= 59.97\times10^3$ g

$\approx$ 60 kg

8. (1)

The aldehyde group of glyceraldehyde reacts with hydrogen cyanide give cyanohydrin. Two isomers formed in the above step, because aldehyde is planar and changed to tetrahedral centre. On hydrolysis cyanide group convert to carboxylic acid. Upon reaction with nitric acid, the primary alcoholic group undergo oxidation to carboxylic acid group. One compound is meso compound, optically inactive and other compound is optically active.