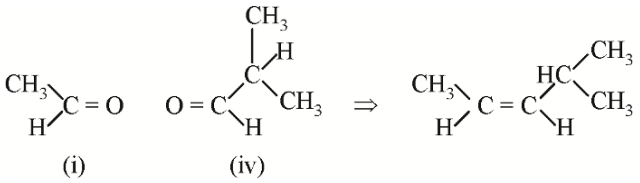
16. $\underset{\text{Acetylene}}{CH \equiv CH} \xrightarrow[Hg^{2+}]{H_2SO_4} CH_3CHO \xrightarrow[\text{(Oxi)}]{KMnO_4} CH_3COOH \xrightarrow{Ca(OH)_2} (CH_3COO)_2Ca \xrightarrow{\text{distil}} \underset{\text{Acetone}}{(CH_3)_2CO}$

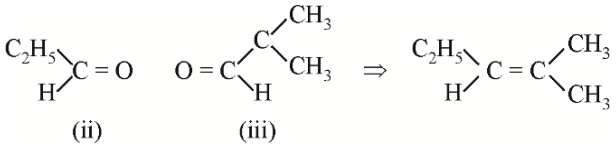
17.(C) Methyl ketones and alcohols having formula similar to $CH_3-CH(OH)R$ form iodoform on treatment with alkali and iodine.

18. White ppt $\xleftarrow{AgNO_3}$ $\underset{C_6H_{13}Cl}{(A)} \xrightarrow[KOH]{\text{hot alc.}} \underset{\text{(Isomeric alkenes, } C_6H_{12})}{(B) + (C)} \xrightarrow{O_3}$

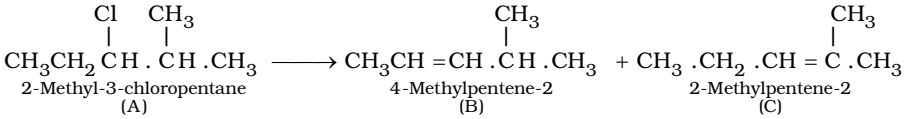
$\underset{\text{(i)}}{CH_3CHO} + \underset{\text{(ii)}}{C_2H_5CHO} + \underset{\text{(iii)}}{CH_3COCH_3} + \underset{\text{(iv)}}{(CH_3)_2CHCHO}$

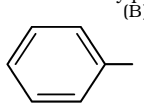
With the help of structures of the four carbonyl compounds, (i) to (iv), we may write the structures of the two isomeric olefins (B) and (C). The two carbonyl compounds should be joined in such a way that the parent olefin has 6 carbon atoms. Two such possibilities are the combination of carbonyl compounds having 2 + 4 carbon atom [i.e.(i) + (iv) and 3 + 3 carbon atom [i.e., (ii) + (iii)].

(1) 

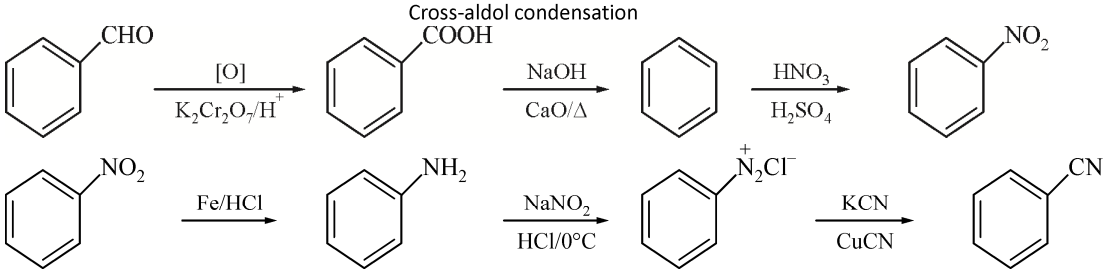
(2) 

Thus the compound (A) should be a chloride that can eliminate a molecule of HCl to give B as well as C.



19. $C_6H_5CHO + CH_3CHO \xrightarrow{NaOH}$  $CH = CH - CHO$

Cross-aldol condensation

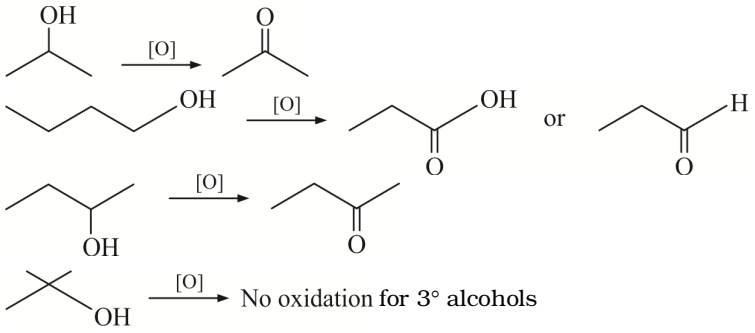
20. 

21. $R-\underset{\displaystyle O}{\overset{\displaystyle \|}{C}}-R + PhNHNH_2 \longrightarrow \underset{R}{\overset{R}{>}}C = N - NHPh$

Hydrazone

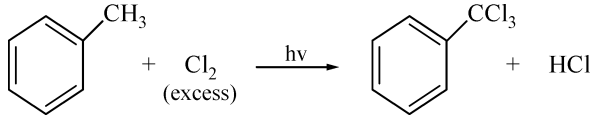
In strong acidic medium, lone pair over NH_2 group in hydrazine reacts with H^+ ions to form salt and hydrazone is hydrolysed back to aldehyde/ketone. So pH of this reaction is kept around 4-5 (a weakly acidic) for protonating of carbonyl group only.

22.(C)



23. **(i)** Tollen's reagent gives silver white precipitate of Ag with acetaldehyde, but not with acetone.

(ii)



Benzotrichloride

24. (i) Empirical formula can be calculated as

Element	Percentage	Relative number of moles	Simplest ratio of moles
C	69.77	$\frac{69.77}{12} = 5.81$	5
H	11.63	$\frac{11.63}{1} = 11.63$	10
O	18.60	$\frac{18.60}{16} = 1.16$	1

$\therefore$ Empirical formula of compound is $C_5H_{10}O$ and empirical formula weight = 86

Also molecular weight = 86

$\therefore$ Molecular formula of compound is $C_5H_{10}O$

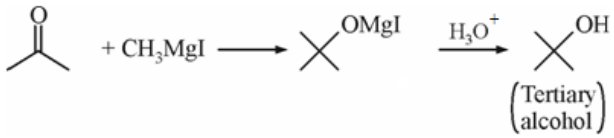
(ii) Compound forms bisulphite addition compound and thus has carbonyl group. i.e., aldehyde or ketone.

(iii) It does not reduce Fehling solution and thus it is not an aldehyde but a ketone.

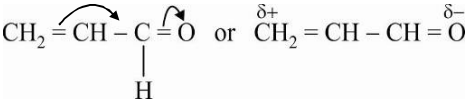
(iv) It gives positive iodoform test and thus it has $CH_3-\underset{\underset{O}{\|}}{C}-$group

(v) Above facts reveal that the compound is: $\underset{\text{pentan-2-one}}{CH_3CH_2CH_2COCH_3}$ or $\underset{\text{2-Methylbutan-2-one}}{(CH_3)_2CHCOCH_3}$

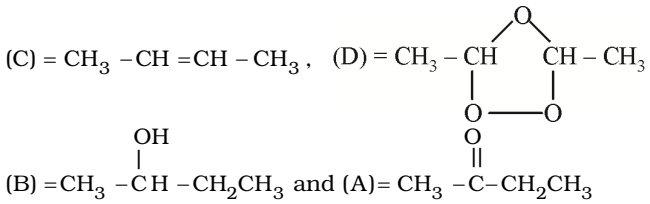
25.(F)



26.(D) $-CHO$ produces $-R(-M)$ effect i.e. it withdraws electrons from the double bond or from a conjugated system towards itself.



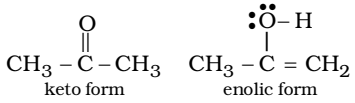
27. $D \xrightarrow[H_2O]{Zn} CH_3CHO$ (only)



28.(AB) C is Cannizzaro's reaction, D is mixed Cannizzaro's reaction

HCHO and C_6H_5CHO cannot undergo aldol condensation due to absence of α-H.

29. Sodium potassium tartarate

30.(A) 

Number of σ bonds in enolic form : $3+1+1+1+1+2=9$

Number of π bonds in enolic form : 1

Number of lone pair of electrons in enolic form = 2