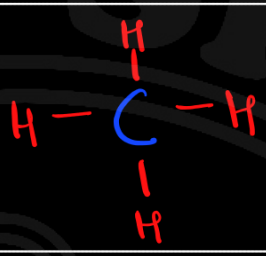
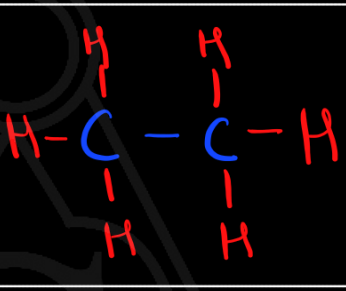
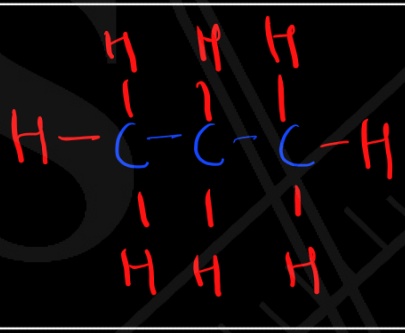
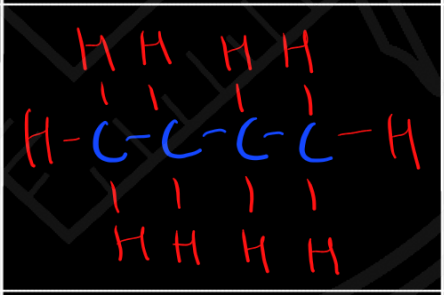
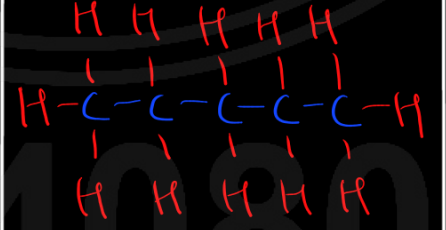
Functional Groups

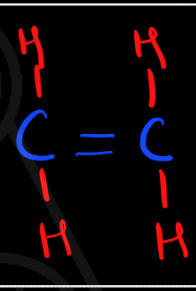
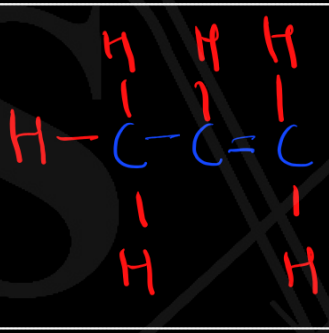
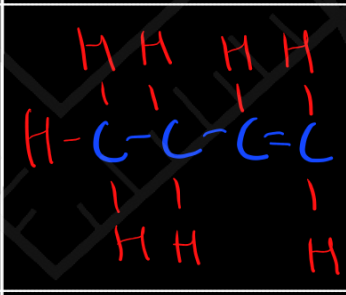
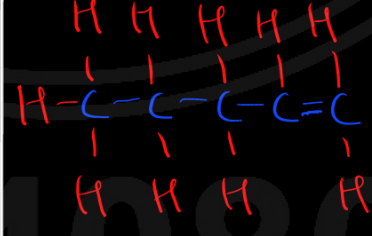
Alkane	$C-C$
Alkene	$C=C$
Alkyne	$C\equiv C$
Haloalkane	$-X$
Alcohols	$-OH$
Aldehyde	$-CHO$
Ketone	$-CO-$
Carboxylic Acids	$-COOH$
Ether	$-O-$
Ester	$-COO-$
Amines	$-NH_2$

From: Sai Sir

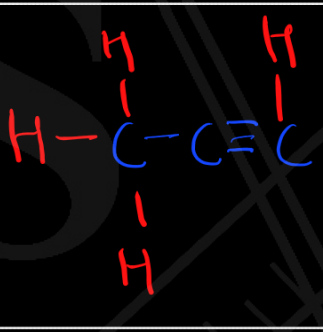
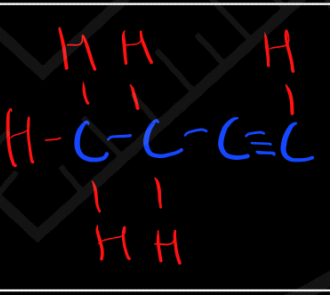
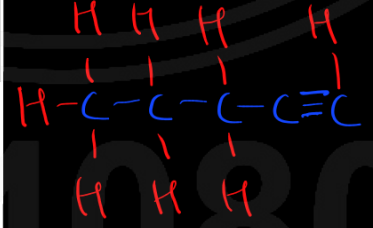
Alkane (C–C) $[C_nH_{2n+2}]$

n	Name	Molecular Formula	Structural formula	Condense Structural formula
1	Methane	CH_4		CH_4
2	Ethane	C_2H_6		CH_3-CH_3
3	Propane	C_3H_8		$CH_3-CH_2-CH_3$
4	Butane	C_4H_{10}		$CH_3-CH_2-CH_2-CH_3$
5	Pentane	C_5H_{12}		$CH_3-CH_2-CH_2-CH_2-CH_3$

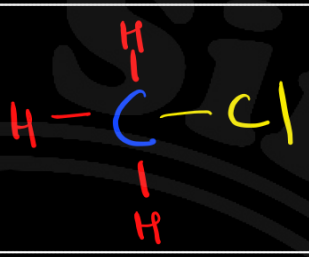
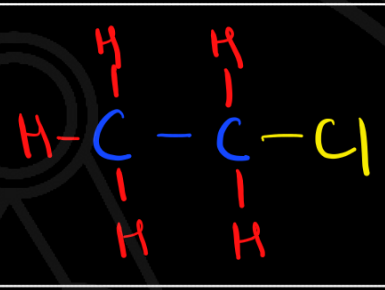
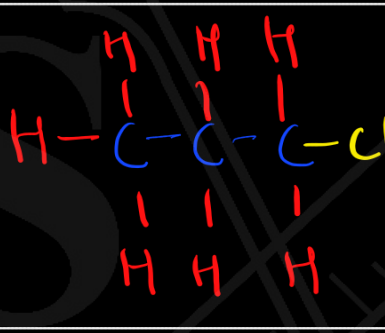
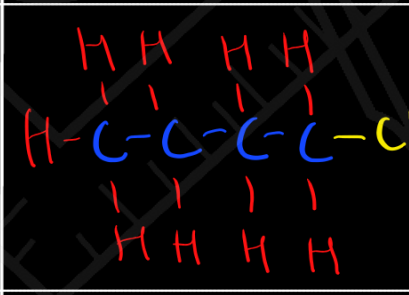
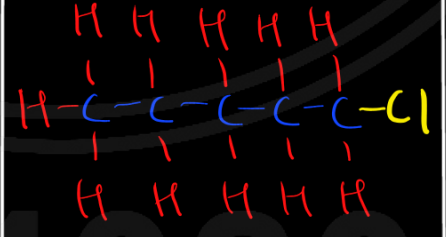
Alkene (C=C) [C_nH_{2n}]

n	Name	Molecular Formula	Structural formula	Condense Structural formula
1	X	X	X	X
2	Ethene	C_2H_4		$CH_2=CH_2$
3	Propene	C_3H_6		$CH_3-CH=CH_2$
4	Butene	C_4H_8		$CH_3-CH_2-CH=CH_2$
5	Pentene	C_5H_{10}		$CH_3-CH_2-CH_2-CH=CH_2$

Alkyne ($C \equiv C$) [C_nH_{2n-2}]

n	Name	Molecular Formula	Structural formula	Condense Structural formula
1	×	×	×	×
2	Ethyne	C_2H_2	$H-C \equiv C-H$	$CH \equiv CH$
3	Propyne	C_3H_4		$CH_3-C \equiv CH$
4	Butyne	C_4H_6		$CH_3-CH_2-C \equiv CH$
5	Pentyne	C_5H_8		$CH_3-CH_2-CH_2-C \equiv CH$

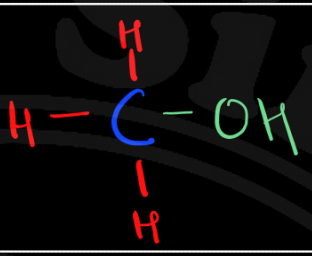
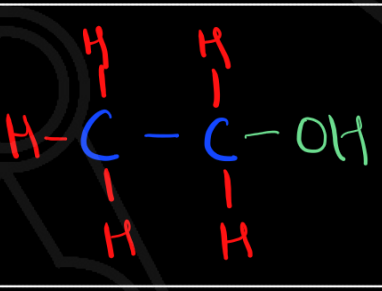
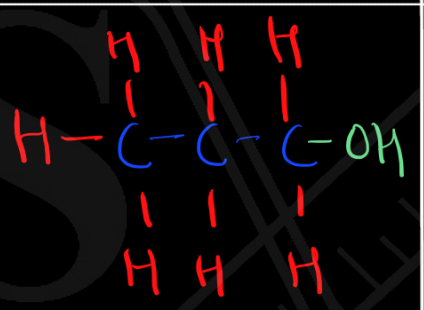
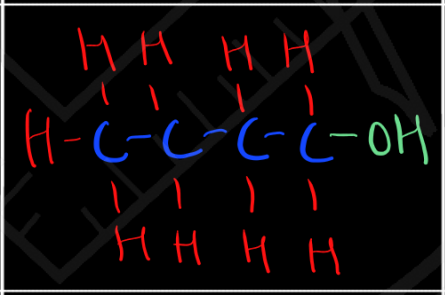
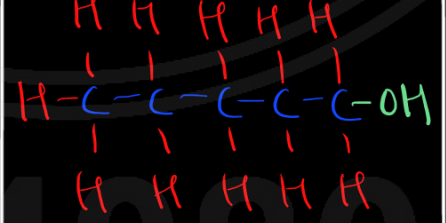
Haloalkane (−X) [X = Cl, Br, I, F] Halogens

n	Name	Molecular Formula	Structural formula	Condense Structural for
1	Chloro Methane	CH_3Cl		CH_3-Cl
2	Chloro Ethane	C_2H_5Cl		CH_3-CH_2-Cl
3	Chloro Propane	C_3H_7Cl		$CH_3-CH_2-CH_2-Cl$
4	Chloro Butane	C_4H_9Cl		$CH_3-CH_2-CH_2-CH_2-Cl$
5	Chloro Pentane	$C_5H_{11}Cl$		$CH_3-CH_2-CH_2-CH_2-CH_2-Cl$

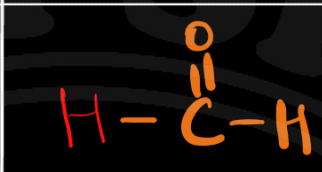
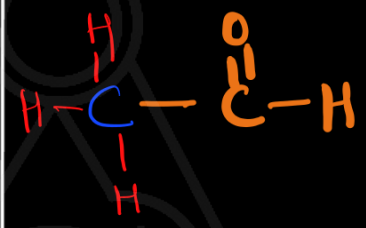
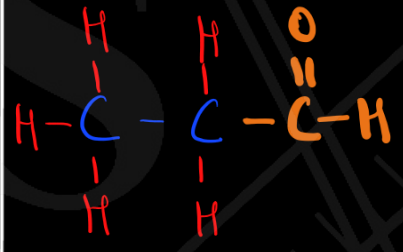
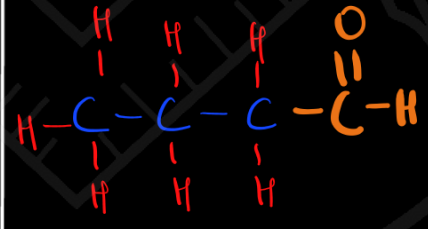
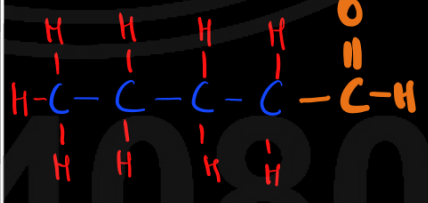
Note: Cl = Chloro, Br = Bromo

I = Iodo, F = fluoro

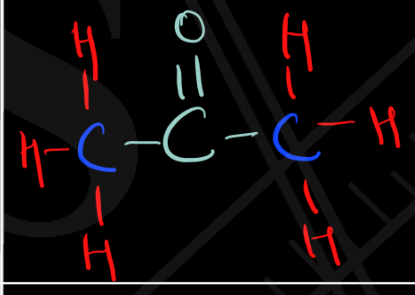
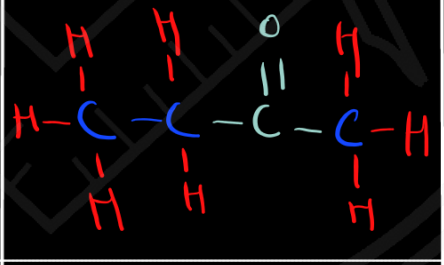
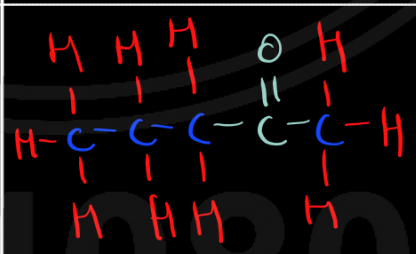
Alcohols (-OH)

n	Name	Molecular Formula	Structural formula	Condense Structural formula
1	Methanol	CH_3OH		CH_3-OH
2	Ethanol	C_2H_5OH		CH_3-CH_2-OH
3	Propanol	C_3H_7OH		$CH_3-CH_2-CH_2-OH$
4	Butanol	C_4H_9OH		$CH_3-CH_2-CH_2-CH_2-OH$
5	Pentanol	$C_5H_{11}OH$		$CH_3-CH_2-CH_2-CH_2-CH_2-OH$

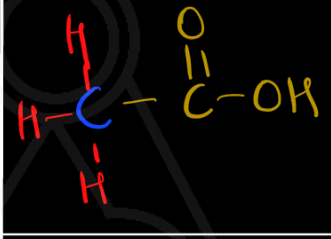
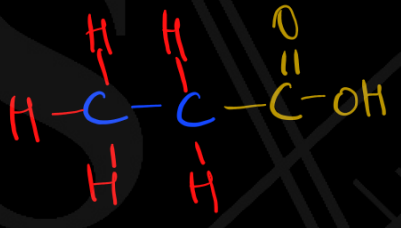
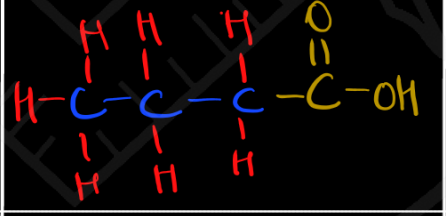
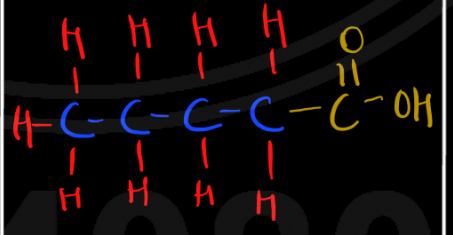
Aldehyde $(-\overset{\overset{O}{\|}}{C}-H)$ / $(-CHO)$

n	Name	Molecular Formula	Structural formula	Condense Structural formula
1	Methanal	$H-CHO$		$H-CHO$
2	Ethanal	CH_3CHO		CH_3-CHO
3	Propanal	C_2H_5CHO		CH_3-CH_2-CHO
4	Butanal	C_3H_7CHO		$CH_3-CH_2-CH_2-CHO$
5	Pentanal	C_4H_9CHO		$CH_3-CH_2-CH_2-CH_2-CHO$

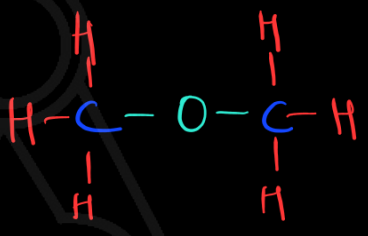
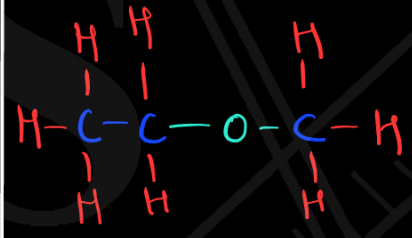
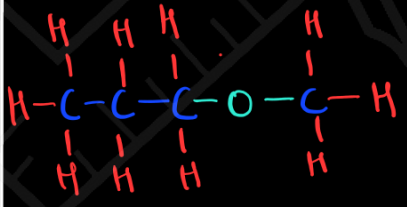
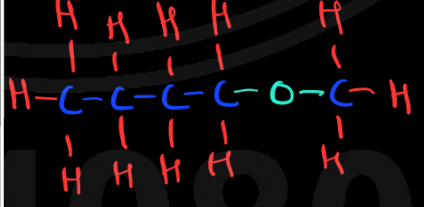
Ketones $(-\overset{\overset{O}{\|}}{C}-)$ / $(-CO-)$

n	Name	Molecular Formula	Structural formula	Condense Structural formula
1	X	X	X	X
2	X	X	X	X
3	Propanone	CH_3COCH_3		$CH_3-CO-CH_3$
4	Butanone	$C_2H_5COCH_3$		$CH_3-CH_2-CO-CH_3$
5	Pentanone	$C_3H_7COCH_3$		$CH_3-CH_2-CH_2-CO-CH_3$

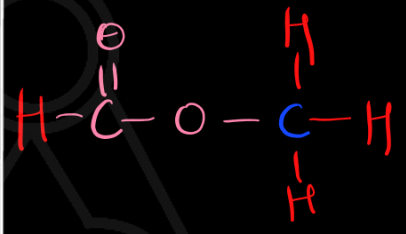
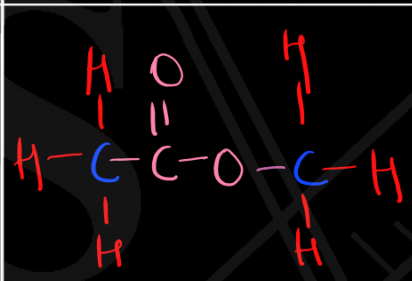
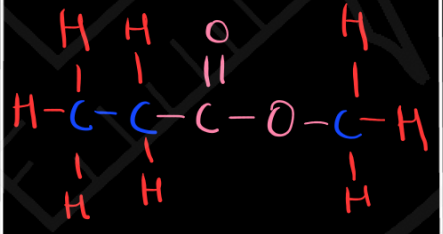
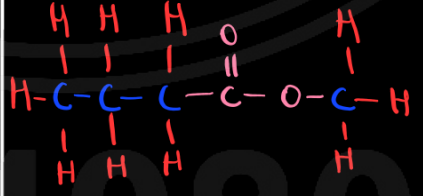
Carboxylic Acids ($-\overset{O}{\overset{\|}{C}}-OH$) / ($-COOH$)

n	Name	Molecular Formula	Structural formula	Condense Structural formula
1	Methanoic Acid (Formic Acid)	$HCOOH$		$H-COOH$
2	Ethanoic Acid (Acetic Acid)	CH_3COOH		CH_3-COOH
3	Propanoic Acid	C_2H_5COOH		CH_3-CH_2-COOH
4	Butanoic Acid	C_3H_7COOH		$CH_3-CH_2-CH_2-COOH$
5	Pentanoic Acid	C_4H_9COOH		$CH_3-CH_2-CH_2-CH_2-COOH$

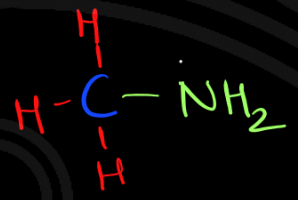
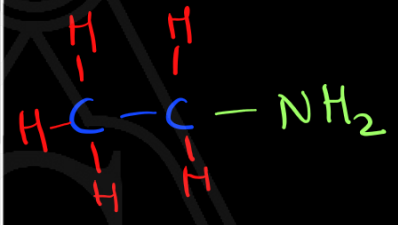
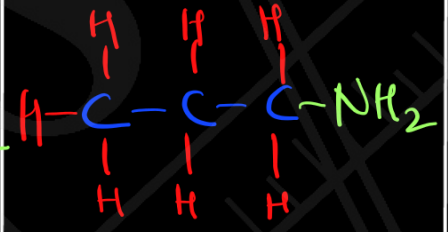
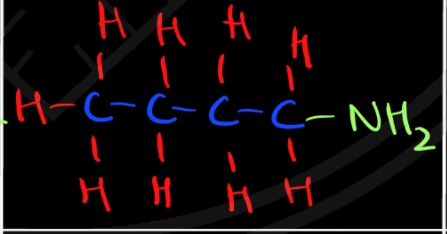
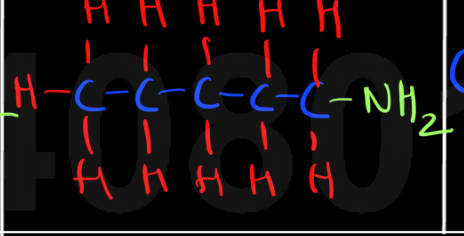
Ethers (–O–)

n	Name	Molecular Formula	Structural formula	Condense Structural formula
1	X	X	X	X
2	Methoxy Methane	CH_3OCH_3		CH_3-O-CH_3
3	Methoxy Ethane	$C_2H_5OCH_3$		$CH_3-CH_2-O-CH_3$
4	Methoxy Propane	$C_3H_7OCH_3$		$CH_3-CH_2-CH_2-O-CH_3$
5	Methoxy Butane	$C_4H_9OCH_3$		$CH_3-CH_2-CH_2-CH_2-O-CH_3$

Ester $(-\overset{O}{\overset{\|}{C}}-O-)$ / $(-COO-)$

n	Name	Molecular Formula	Structural formula	Condense Structural formula
1	X	X	X	X
2	Methyl Methanoate	$HCOOCH_3$		$H-COO-CH_3$
3	Methyl Ethanoate	CH_3COOCH_3		$CH_3-COO-CH_3$
4	Methyl Propanoate	$C_2H_5COOCH_3$		$CH_3-CH_2-COO-CH_3$
5	Methyl Butanoate	$C_3H_7COOCH_3$		$CH_3-CH_2-CH_2-COO-CH_3$

Amines ($-NH_2$)

n	Name	Molecular Formula	Structural formula	Condense Structural formula
1	Methanamine	CH_3NH_2		CH_3-NH_2
2	Ethanamine	$C_2H_5NH_2$		$CH_3-CH_2-NH_2$
3	Propanamine	$C_3H_7NH_2$		$CH_3-CH_2-CH_2-NH_2$
4	Butanamine	$C_4H_9NH_2$		$CH_3-CH_2-CH_2-CH_2-NH_2$
5	Pentanamine	$C_5H_{10}NH_2$		$CH_3-CH_2-CH_2-CH_2-CH_2-NH_2$

Q. Write the IUPAC names.

1. $\underset{1}{CH_3}-\underset{2}{CH_2}-\underset{3}{CH_2}-\underset{4}{CH_3}$

Four Carbons with Single bond

$\Rightarrow$ Butane or n-Butane

2. $\underset{1}{CH_3}-\underset{2}{CHOH}-\underset{3}{CH_3}$

(-OH) alcohol group on 2nd Carbon atom

$\Rightarrow$ Propan-2-ol

3. CH_3-CH_2-COOH

3 Carbon atoms & (-COOH) functional group of Carboxylic Acid

$\Rightarrow$ Propanoic Acid

4. $CH_3-CH_2-NH_2$

2 Carbon atoms & ($-NH_2$) functional group of Amines.

$\Rightarrow$ Ethanamine

5. $CH_3 - CHO$

2 Carbon atoms and functional group of aldehyde ($-CHO$)

$\Rightarrow$ Ethanal

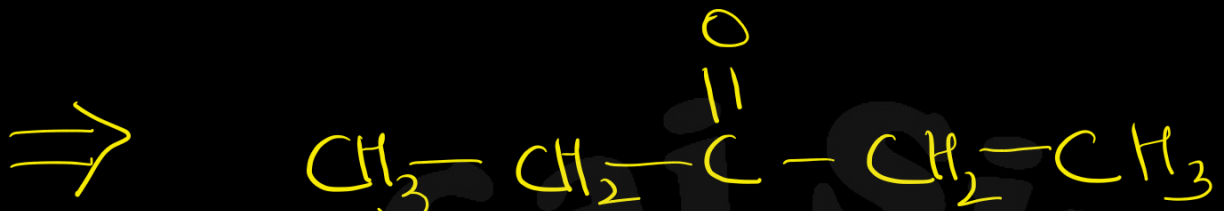
6. $CH_3 - CO - CH_2 - CH_3$

4 Carbon atoms and functional group of Ketone ($-CO$)

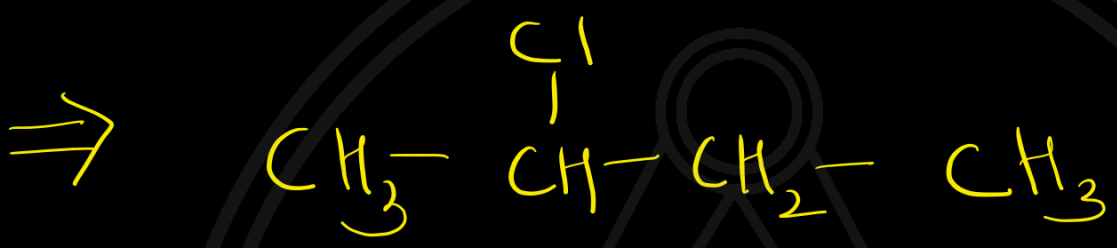
$\Rightarrow$ Butanone or Butan-2-One

Q. Write Structural formula

1. Pentan-2-one



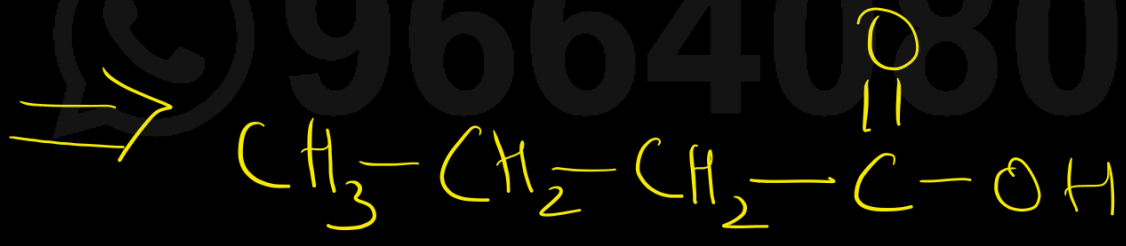
2. 2-chloro butane



3. Propan-2-ol

4. Methanal

5. Butanoic Acid



6. 1-Bromo propane

$\Rightarrow CH_3-CH_2-CH_2-Br$

7. Ethanamine

$\Rightarrow CH_3-CH_2-NH_2$

8. Butanone

$\Rightarrow CH_3-\overset{\overset{O}{\|}}{C}-CH_2-CH_3$