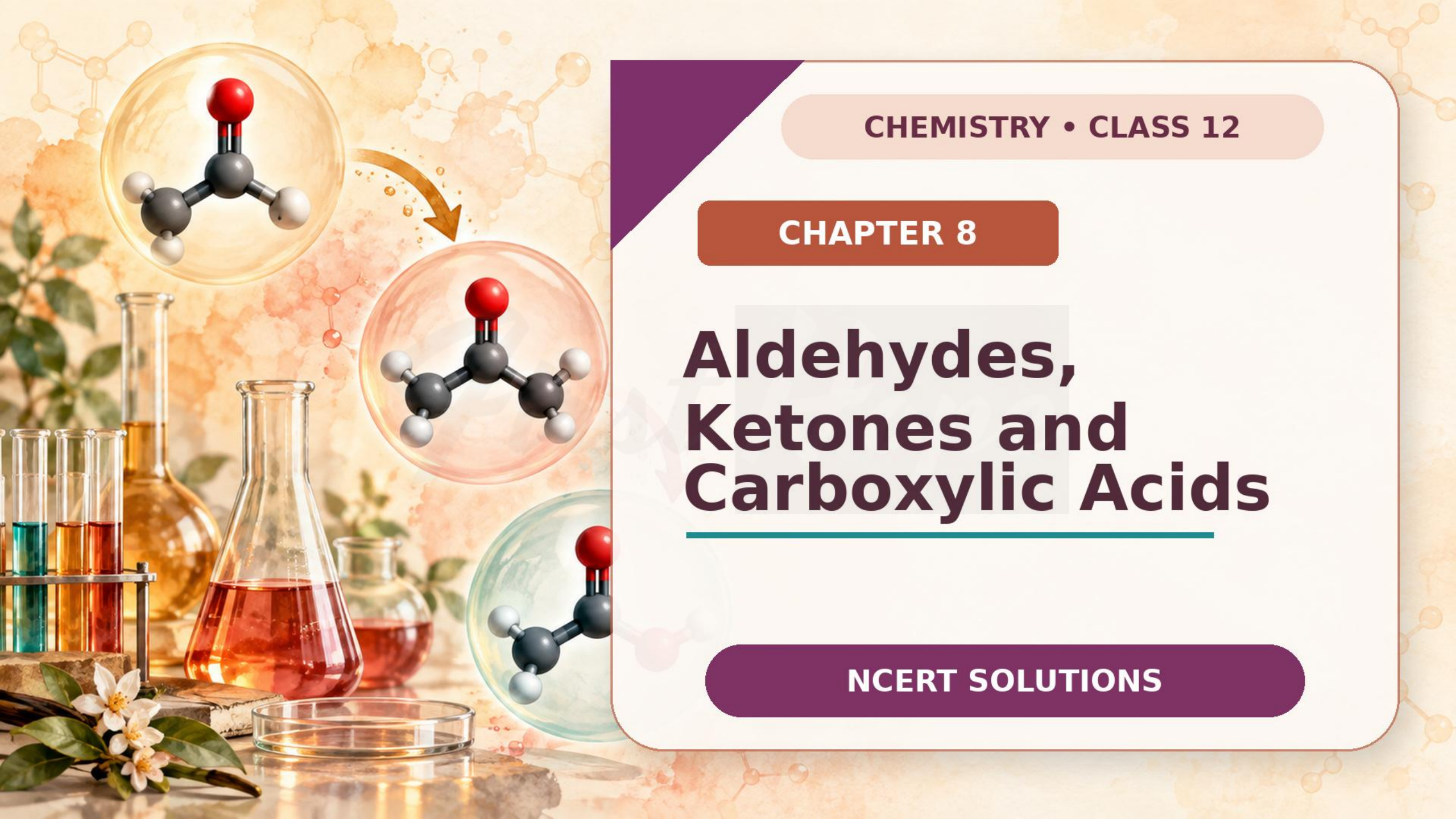


The background features a collage of chemistry-related images. On the left, there are several pieces of laboratory glassware: a rack of test tubes containing liquids of different colors (blue, orange, red), a round-bottom flask with orange liquid, a conical flask with red liquid, and a petri dish. A small white flower with green leaves is in the bottom left corner. On the right, there are three molecular models, each enclosed in a translucent sphere. The top sphere is yellow and contains a trigonal planar molecule (likely formaldehyde, CH2O). An orange arrow points from this sphere to a middle sphere, which is orange and contains a trigonal planar molecule (likely acetaldehyde, CH3CHO). Below the middle sphere is a third sphere, which is light blue and contains a trigonal planar molecule (likely formic acid, HCOOH). The entire scene is set against a warm, orange-toned background with faint molecular structures.

CHEMISTRY • CLASS 12

CHAPTER 8

Aldehydes, Ketones and Carboxylic Acids

NCERT SOLUTIONS

CARBONYL DERIVATIVES: CYANOHYDRIN TO ALDOL

Q. Define and illustrate: (i) cyanohydrin, (ii) acetal, (iii) semicarbazone, (iv) aldol.

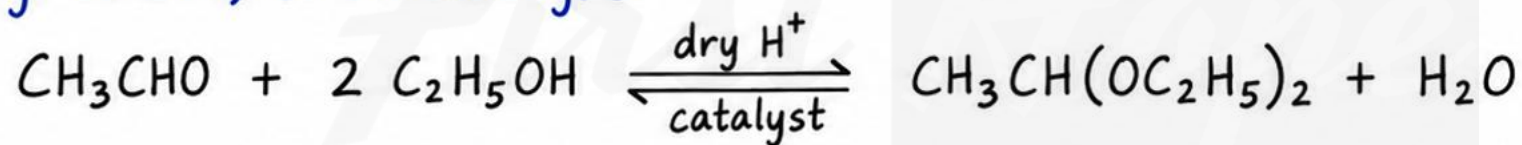
(i) Cyanohydrin:

A cyanohydrin means that $-OH$ and $-CN$ groups attach to the former carbonyl carbon of an aldehyde or ketone.



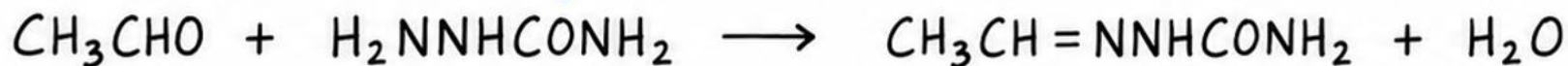
(ii) Acetal:

An acetal means that two $-OR$ groups are attached to the same carbon (the former carbonyl carbon) of an aldehyde.



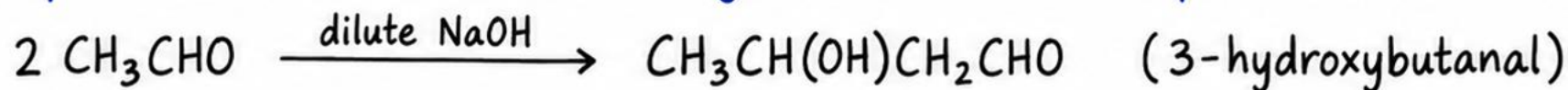
(iii) Semicarbazone:

A semicarbazone is a carbonyl derivative of semicarbazide.



(iv) Aldol:

An aldol is a beta-hydroxy ALDEHYDE. A beta-hydroxy ketone is called a KETOL. For example, two molecules of ethanal give an aldol in the presence of dilute NaOH.

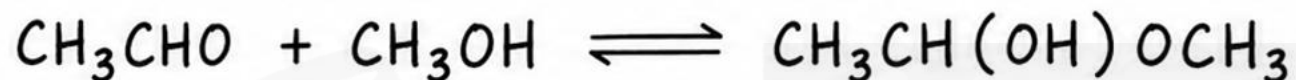


HEMIACETAL, OXIME, KETAL AND IMINE

Define and illustrate: (v) hemiacetal, (vi) oxime, (vii) ketal, (viii) imine.

Solution:

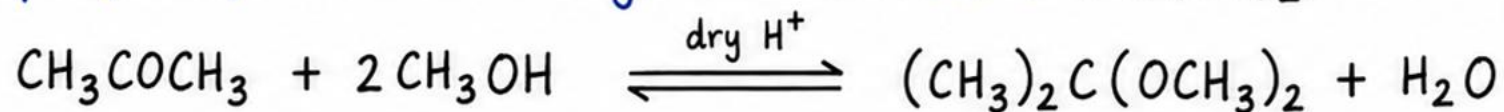
(v) Hemiacetal: A hemiacetal is a compound in which the same carbon atom is bonded to both a hydroxyl group ($-OH$) and an alkoxy group ($-OR$).



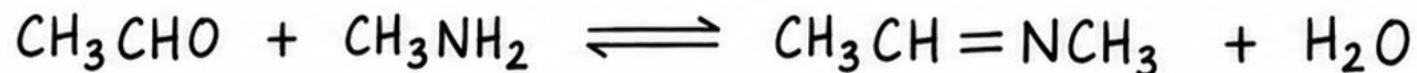
(vi) Oxime: An oxime is a compound containing the $>C=NOH$ functional group, formed by the reaction of an aldehyde or ketone with hydroxylamine.



(vii) Ketal: A ketal is a compound in which a ketone carbon is bonded to two alkoxy groups ($-OR$) and has the general structure $>C(OR)_2$.



(viii) Imine: An imine is a compound containing the $>C=NR$ functional group, formed by the condensation of an aldehyde or ketone with a primary amine.



2,4-DNP DERIVATIVE AND SCHIFF BASE

Define and show one reaction for (ix) a 2,4-DNP derivative and (x) Schiff base.

Solution:

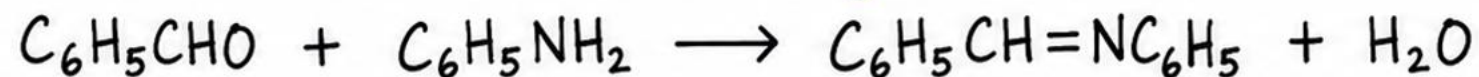
(ix) 2,4-DNP derivative:

A 2,4-DNP derivative is the 2,4-dinitrophenylhydrazone formed when an aldehyde or ketone reacts with 2,4-dinitrophenylhydrazine (Brady's reagent). It gives a yellow or orange coloured precipitate.



(x) Schiff base:

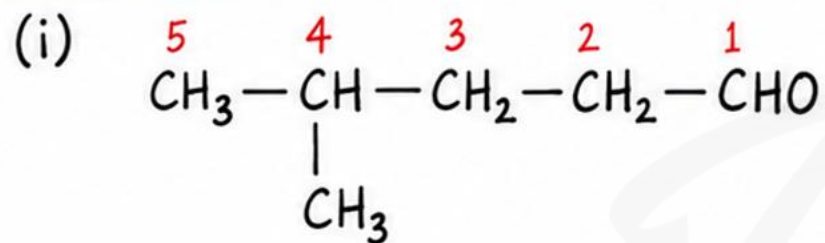
A Schiff base is an imine formed by the condensation of an aldehyde or ketone with a primary amine. It has the general formula $\text{R}_2\text{C}=\text{NR}$, where R may be an alkyl or aryl group. Schiff base and imine refer to the same class of compounds. It should not be confused with Schiff reagent test.



IUPAC NAMES: EXERCISE 8.2 I-IV

Give IUPAC names of: (i) $\text{CH}_3\text{CH}(\text{CH}_3)\text{CH}_2\text{CH}_2\text{CHO}$; (ii) $\text{CH}_3\text{CH}_2\text{COCH}(\text{C}_2\text{H}_5)\text{CH}_2\text{CH}_2\text{Cl}$; (iii) $\text{CH}_3\text{CH}=\text{CHCHO}$; (iv) $\text{CH}_3\text{COCH}_2\text{COCH}_3$.

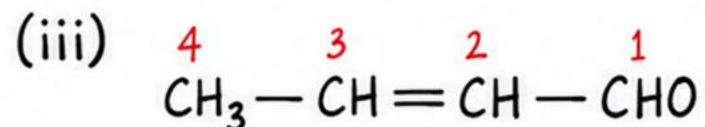
Solution:



Aldehyde carbon is numbered as C_1 .

There is a methyl group at C_4 .

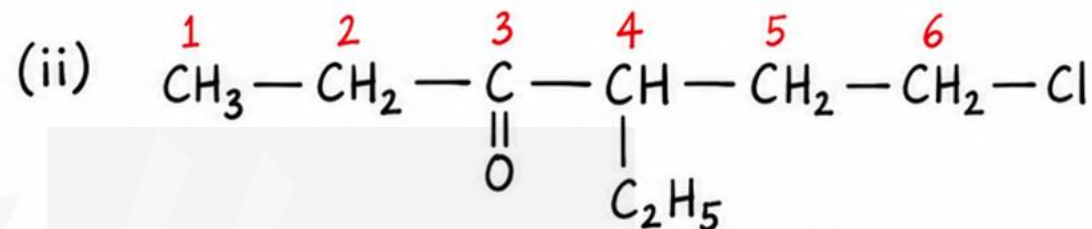
IUPAC name: 4-methylpentanal.



Aldehyde carbon is numbered as C_1 .

The double bond is between C_2 and C_3 .

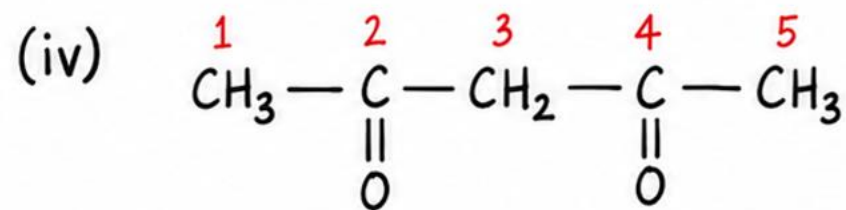
IUPAC name: but-2-enal.



Choose the six-carbon chain and number from the left so that the carbonyl carbon gets the lowest number (3). There is an ethyl group at C_4 and a chloro group at C_6 .

IUPAC name: 6-chloro-4-ethylhexan-3-one.

(If numbered from the right, carbonyl gets 4, so not preferred.)



Five-carbon chain with two keto groups at C_2 and C_4 .

IUPAC name: pentane-2,4-dione.



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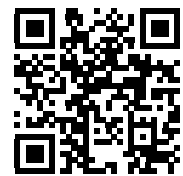


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