Unit 17: Carbonyl compounds

Subunit 17.1: Aldehydes and ketones

Topical Question No: 1

39 Which compounds react with alkaline aqueous iodine to give a pale yellow precipitate of tri-iodomethane?

1 butanone

2 ethanal

3 propan-2-ol

Topical Question No: 2

23 Which compound reacts with 2,4-dinitrophenylhydrazine reagent but does **not** react with Tollens' reagent?

A CH_3COCO_2H

B $CH_3CH(OH)CHO$

C CH_3COCHO

D $CH_3CH(OH)CH_3$

Topical Question No: 3

26 Compound X produces a carboxylic acid when heated under reflux with acidified potassium dichromate(VI). Compound X does not react with sodium metal.

What could be the identity of compound X?

A propanal

B propanone

C propan-1-ol

D propan-2-ol

Topical Question No: 4

39 Propanal reacts with hydrogen cyanide to form 2-hydroxybutanenitrile. A suitable catalyst for this reaction is sodium cyanide.

$$CH_3CH_2CHO + HCN \overset{NaCN}{\rightleftharpoons} CH_3CH_2CH(OH)CN$$

Which statements about the reaction of propanal with hydrogen cyanide are correct?

1 HCN is a weaker nucleophile than the nucleophile provided by NaCN.

2 The reaction mechanism involves two steps.

3 The product of the reaction has a chiral carbon atom.

Topical Question No: 5

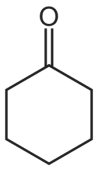
28 When compound X is heated with $Cr_2O_7^{2-}/H^+$, a colour change from orange to green is observed.

Two tests are carried out on the organic product of this reaction.

test	result
Tollens' reagent	no change
2,4-dinitrophenylhydrazine	orange precipitate

What could be compound X?

A



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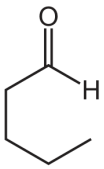

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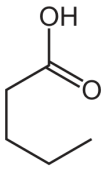

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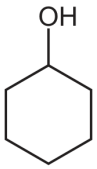


Topical Question No: 6

25 $CH_3COCH_2CH_2OH$ *W* CH_3COCH_2CHO *X* $CH_3CH(OH)CH_2CH_3$ *Y* $CH_3CH_2CH_2CHO$ *Z*

Which of these compounds can be oxidised by acidified dichromate(VI) solution and also gives a positive response to Tollens' reagent?

A *W* and *X* only

B *W* and *Y* only

C *X* and *Z* only

D *Y* and *Z* only

Topical Question No: 7

38 In which reactions is the organic compound oxidised by the given reagent?

1 CH_3CH_2CHO + Fehling's reagent

2 $CH_3CH_2CH_2CHO$ + Tollens' reagent

3 CH_3CHO + 2,4-dinitrophenylhydrazine reagent

Topical Question No: 8

27 Which carbonyl compound reacts with hydrogen cyanide to form a product that has **no** chiral carbon atom?

A butanone

B ethanal

C propanal

D propanone

Topical Question No: 9

28 How many of the following compounds produce a carboxylic acid on heating under reflux with hot acidified $K_2Cr_2O_7$?

CH_3CH_2CHO

CH_3COCH_3

$CH_3CH_2CH_2OH$

$CH_3CHOHCH_3$

A 1 **B** 2 **C** 3 **D** 4

Topical Question No: 10

39 The M_r of compound X is 72. The composition by mass of X is 66.7 % carbon, 11.1 % hydrogen and 22.2 % oxygen. X gives an orange precipitate with 2,4-dinitrophenylhydrazine reagent. X does **not** react with Fehling's reagent.

What can be deduced from this information?

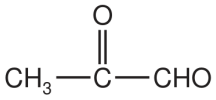
1 X is a carbonyl compound.

2 X is a ketone.

3 X is butanone.

Topical Question No: 11

23 Burnt sugar has a characteristic smell caused partly by the following compound.



This compound contains two functional groups.

Which reagent will react with **both** functional groups?

A acidified potassium dichromate(VI)

B Fehling's solution

C hydrogen cyanide

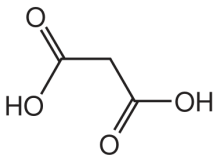
D sodium hydroxide

Topical Question No: 12

21 Hydroxyethanal, $HOCH_2CHO$, is heated under reflux with an excess of acidified potassium dichromate(VI) until no further oxidation takes place.

What is the skeletal formula of the organic product?

A



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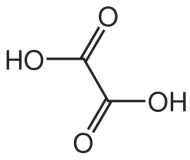

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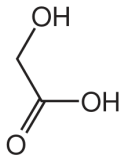

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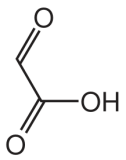

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