1 Propene can be made by the dehydration of propan-2-ol.

What is the percentage yield when 30 g of propene (M_r = 42.0) are formed from 50 g of propan-2-ol (M_r = 60.0)?

A 60% ⬭

B 67% ⬭

C 81% ⬭

D 86% ⬭

(Total 1 mark)

2 Which statement about ethanal is correct?

A It reacts with Tollens' reagent to form silver. ⬭

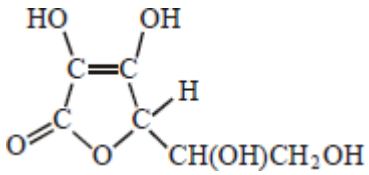
B It has a higher boiling point than ethanol. ⬭

C Its empirical and molecular formulas are different. ⬭

D It belongs to a homologous series with general formula $C_nH_{2n+1}O$ ⬭

(Total 1 mark)

3 Which one of the following is **not** a correct statement about vitamin C, shown below?



A It is a cyclic ester.

B It can form a carboxylic acid on oxidation.

C It decolourises a solution of bromine in water.

D It is a planar molecule.

(Total 1 mark)

4 Which one of the following reactions will produce an organic compound that has optical isomers?

A dehydration of butan-2-ol by heating with concentrated sulphuric acid

B reduction of pentan-3-one by warming with $NaBH_4$

C addition of Br_2 to 3-bromopropene

D reduction of 2,3-dimethylpent-2-ene with H_2 in the presence of a nickel catalyst

(Total 1 mark)

5 Which one of the following is **not** a correct general formula for the non-cyclic compounds listed?

A alcohols $C_nH_{2n+2}O$

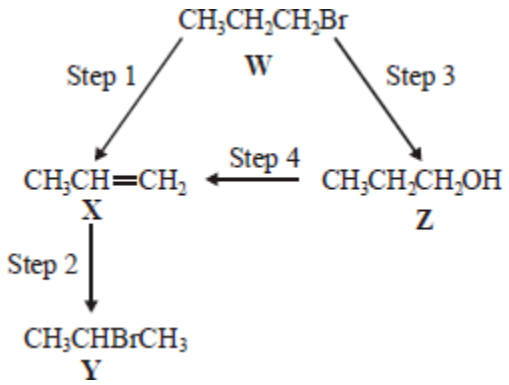
B aldehydes $C_nH_{2n+1}O$

C esters $C_nH_{2n}O_2$

C primary amines $C_nH_{2n+3}N$

(Total 1 mark)

6 For this question refer to the reaction scheme below.



Which one of the following statements is **not** correct?

A Reaction of **W** with sodium cyanide followed by hydrolysis of the resulting product gives propanoic acid.

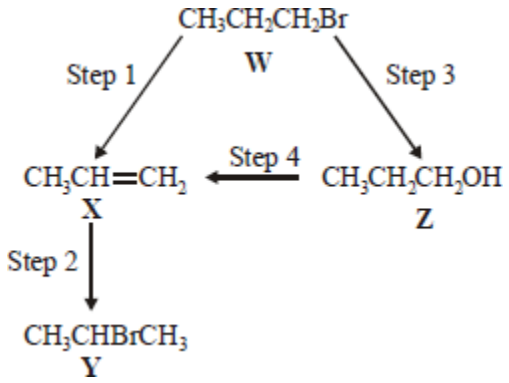
B Mild oxidation of **Z** produces a compound that reacts with Tollens' reagent, forming a silver mirror.

C **Z** reacts with ethanoic acid to produce the ester propyl ethanoate.

C **W** undergoes addition polymerisation to form poly(propene).

(Total 1 mark)

7 For this question refer to the reaction scheme below.



Which one of the following reagents would **not** bring about the reaction indicated?

A Step 1 : alcoholic KOH

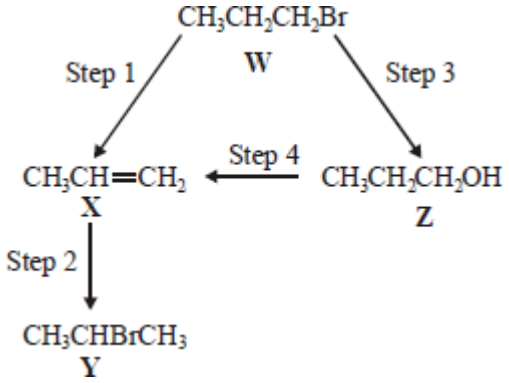
B Step 2 : aqueous Br_2

C Step 3 : aqueous NaOH

C Step 4 : concentrated H_2SO_4

(Total 1 mark)

8 For this question refer to the reaction scheme below.



Which one of the following statements is **not** correct?

A **W** and **Y** are structural isomers.

B **Z** is a primary alcohol.

C **Y** gives two peaks in its proton n.m.r. spectrum.

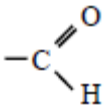
C **X** has geometrical isomers.

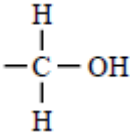
(Total 1 mark)

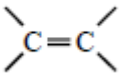
9 Certain chemical tests were performed on the pain-relief drug ibuprofen. The results of these tests are given in the table below.

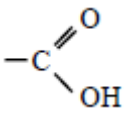
Test	**Result**
Aqueous sodium carbonate	Effervescence
Bromine water	Remained orange
Acidified potassium dichromate(VI) and heat	Remained orange
Fehling's solution and heat	Remained blue

Which one of the following functional groups do these results suggest that ibuprofen contains?

A 

B 

C 

D 

(Total 1 mark)

10 Which one of the following mechanisms is **not** involved in the reaction sequence below?

$CH_3CH_3 \rightarrow CH_3CH_2Cl \rightarrow CH_3CH_2OH \rightarrow CH_2{=}CH_2 \rightarrow CH_3CH_2Br$

A electrophilic addition

B electrophilic substitution

C nucleophilic substitution

D free-radical substitution

(Total 1 mark)

11 Which one of the following alcohols forms a mixture of alkenes when dehydrated?

A propan-1-ol

B propan-2-ol

C pentan-1-ol

D pentan-2-ol

(Total 1 mark)

12 Which one of the following isomers is not oxidised under mild reaction conditions?

A $(CH_3)_2CHCH(OH)COCH_3$

B $(CH_3)_2C(OH)CH_2COCH_3$

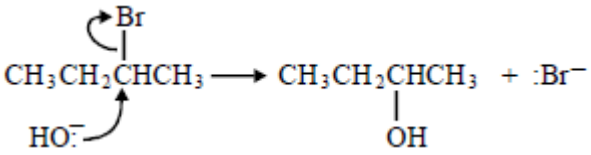
C $(CH_3)_2CHCH(OH)CH_2CHO$

D $(CH_3)_2C(OH)CH_2CH_2CHO$

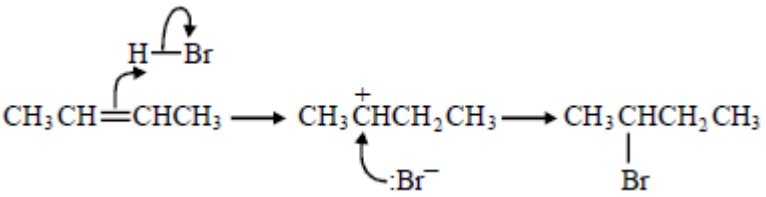
(Total 1 mark)

13 In which of the following is a curly arrow used incorrectly?

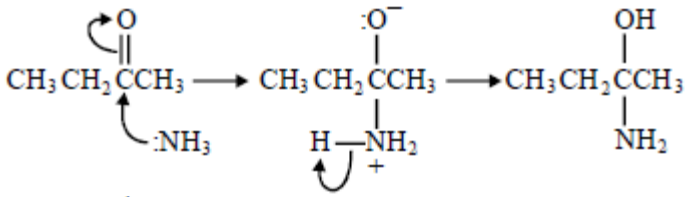
A



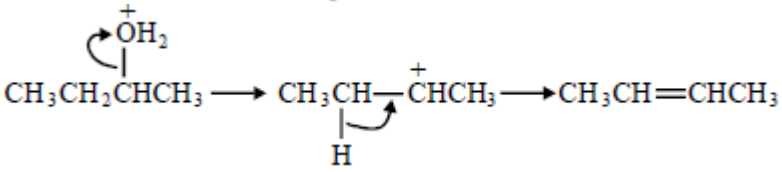
B



C



D



(Total 1 mark)

14 CH_2O is the empirical formula of

A methanol

B methyl methanoate

C ethane-1,2-diol

D butanal

(Total 1 mark)

15 Which one of the following does **not** represent an oxidation?

A propene → propane

B propan-l-ol → propanal

C propan-l-ol → propanoic acid

D propanal → propanoic acid

(Total 1 mark)

16 Which one of the following is **not** a suitable method for the preparation of ethanol?

A oxidation of ethane

B hydration of ethene

C reduction of ethanal

D hydrolysis of bromoethane

(Total 1 mark)

17 Which one of the following **cannot** be produced by oxidation of propan-l-ol?

A carbon dioxide

B propanone

C propanal

D propanoic acid

(Total 1 mark)

18 Which of the following compounds would form an orange-red precipitate when heated with Fehling's solution?

A CH_3CH_2CN ⬭

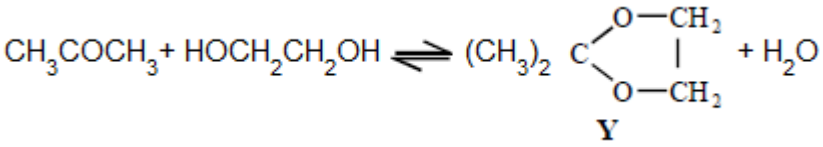
B CH_3CH_2COOH ⬭

C CH_3CHO ⬭

D CH_3COCH_3 ⬭

(Total 1 mark)

19 This question is about the reaction between propanone and an excess of ethane-1,2-diol, the equation for which is given below.



Y

In a typical procedure, a mixture of 1.00 g of propanone, 5.00 g of ethane-1,2-diol and 0.100 g of benzenesulphonic acid, $C_6H_5SO_3H$, is heated under reflux in an inert solvent. Benzenesulphonic acid is a strong acid.

The products would **not** have an absorption in the infra-red at

A 1050 cm^{-1}

B 1720 cm^{-1}

C 2950 cm^{-1}

D 3400 cm^{-1}

(Total 1 mark)

20 Which one of the following statements about but-2-enal, $CH_3CH{=}CHCHO$, is **not** true?

A It has stereoisomers.

B It shows a strong absorption in the infra-red at about 1700 cm^{-1}.

C It will turn an acidified solution of potassium dichromate(VI) green.

D It can be dehydrated by concentrated sulphuric acid.

(Total 1 mark)

Mark schemes

1 D [1]

2 A [1]

3 D [1]

4 D [1]

5 B [1]

6 A [1]

7 B [1]

8 D [1]

9 D [1]

10 B [1]

11 D [1]

12 B [1]

13 C [1]

14 B [1]

15 A [1]

16 A [1]

17 B [1]

18 C [1]

19 B **[1]**

20 D **[1]**