1 Which of the following does **not** apply to the reaction between methane and chlorine?

The reaction

A is exothermic

B involves free radicals

C involves heterolytic fission

D involves homolytic fission.

2 Ethanoic acid is allowed to react with PCl_5 forming an organic compound X. On allowing X to react with sodium ethanoate the main organic product is

A ethyl ethanoate

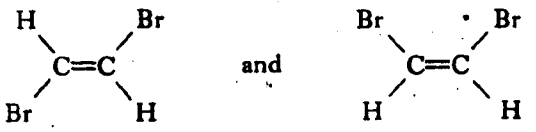
B ethanoic acid

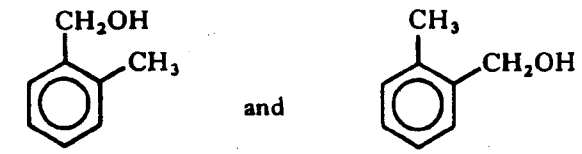
C ethanoic anhydride

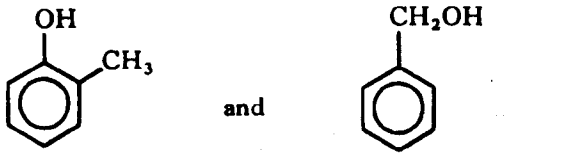
D ethoxyethane.

3 Which of the following have the same physical and chemical properties?

A $CH_2{=}CHCH_2CH_3$ and $CH_3CH{=}CHCH_3$

B  and

C 

D 

4 A colourless liquid did not react with ammoniacal silver (I) nitrate solution but gave a brightly coloured crystalline solid when treated with 2,4-dinitrophenylhydrazine solution.

Which of the following could be the liquid?

A C_2H_5CHO

B $C_2H_5OC_2H_5$

C C_2H_5OH

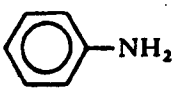
D $C_2H_5COC_2H_5$

5 Which of the following is the strongest base?

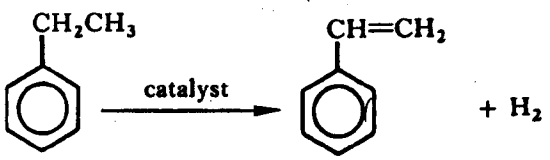
A NH_3

B CH_3CONH_2

C $CH_3CH_2NH_2$

D 

6 Phenylethene can be produced by the dehydrogenation of ethylbenzene.



ΔH°_{298} is positive

The reaction is carried out in the gaseous state. The conditions which should give the highest yield of phenylethene are

A high temperature and low pressure

B high temperature and high pressure

C low temperature and low pressure

D low temperature and high pressure.

[Turn over

7 Which of the following formulae represents 2-methylpentan-3-ol?

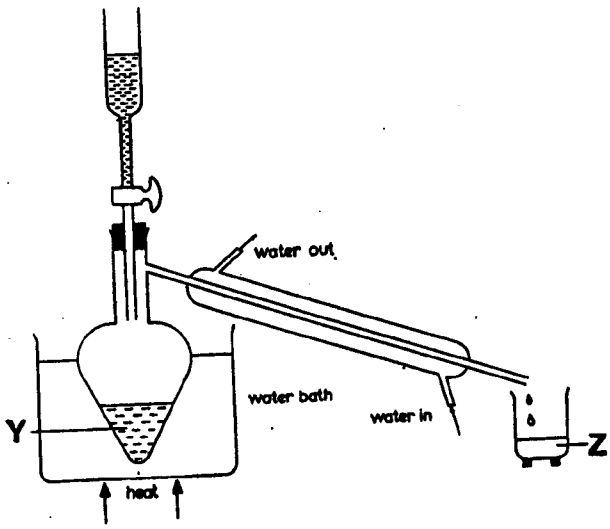
A $CH_3CH(CH_3)CHOHCH_2CH_3$

B $CH_3CHOHCH(CH_3)CH_2CH_3$

C $CH_3CH(CH_3)CHOHCH_3$

D $CH_3CH_2C(CH_3)_2CH_2CH_2OH$

Questions 37 and 38 refer to the diagram below.



A student set up this apparatus in an attempt to prepare a few ml of reasonably pure propanoic acid by the oxidation of propan-1-ol. The latter was slowly introduced into the hot solution Y. The following information is available:

Compound	Formula	Boiling Point (°C)
propan-1-ol	C_3H_7OH	97
propanal	C_2H_5CHO	49
propanoic acid	C_2H_5COOH	140
propan-2-one	$(CH_3)_2C{=}O$	56
propyl propanoate	$C_2H_5COOC_3H_7$	123

8 What should solution Y be?

A Aqueous copper(II) solution

B Aqueous iron(II) chloride solution

C Acidified aqueous chromium(III) solution

D Acidified aqueous chromium (VI) solution

9 The substance Z, which was collected, was not propanoic acid. Which of the following was the most likely product?

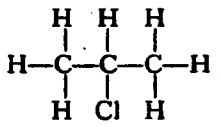
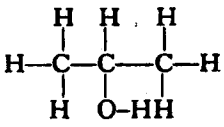
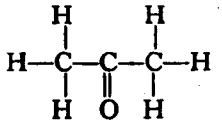
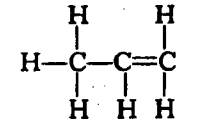
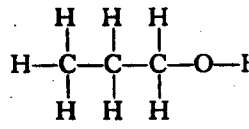
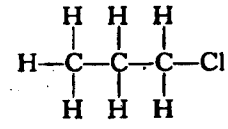
A Propanal

B Propan-1-ol

C Propan-2-one

D Propyl propanoate

Questions 25 and 26 refer to the following grid.

 1	 2
 3	 4
 5	 6

10 Which compound will react with aqueous sodium hydroxide solution to give an isomer of the compound in box 5?

A 1
B 3
C 4
D 6

11 The following reaction sequence was performed:

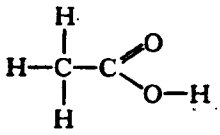
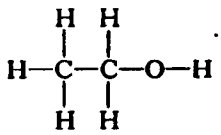
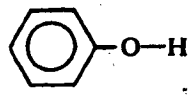
reduction; then dehydration; then reaction with HCl.

To which of the following could this sequence be applied?

A 3 → 2 → 4 → 1
B 2 → 3 → 4 → 1
C 4 → 6 → 2 → 1
D 3 → 2 → 1 → 6

12 Which of the following could react together under mild conditions to produce ethanoic anhydride, $(CH_3CO)_2O$?

A CH_3COOH and CH_3COONa
B CH_3COCl and CH_3COONa
C CH_3COCl and CH_3OH
D CH_3COOH and CH_3COCl

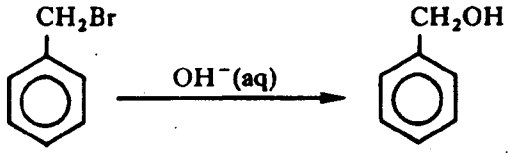
13   

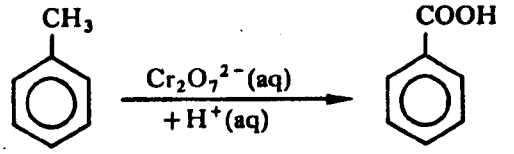
X Y Z

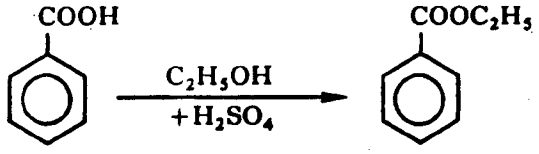
Which of the following lists the above in **ascending** order of K_a value?

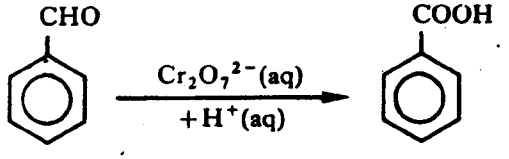
A X Y Z
B Y Z X
C Z X Y
D X Z Y

14 Which of the following reactions is **not** easily carried out with the corresponding aliphatic compound?

A 

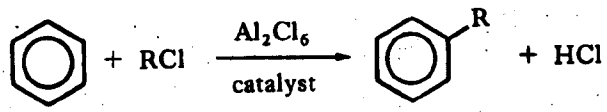
B 

C 

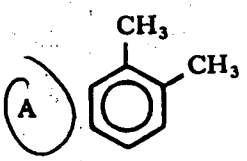
D 

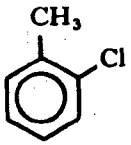
[Turn over

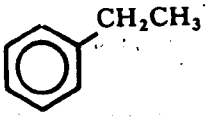
15

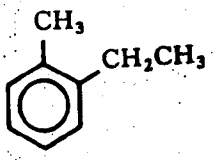


Treatment of methylbenzene with chloromethane will give

A 

B 

C 

D 

16 Which statement about ethanol and its isomeric ether is true?

They

A have similar volatilities

B have the same solubility in water

C produce similar infra-red spectra

D produce the same products when burned in excess oxygen.

17 An organic compound forms an addition product with sodium hydrogensulphite and another with hydrogen in the presence of a nickel catalyst.

It can be said that the compound definitely

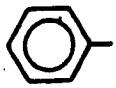
A can be oxidised to an acid

B contains a carbonyl group

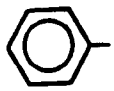
C is an alkene

D is an alkanone.

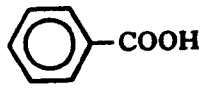
18 In which pair does the first compound have the higher K_a value?

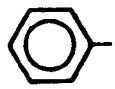
A 

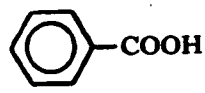
; C_2H_5OH

B 

; CH_3COOH

C C_2H_5OH ; 

D 

; 

19 Which of the following will react together to produce 1-ethoxypropane?

A CH_3CH_2OH and CH_3CH_2COONa

B CH_3CH_2ONa and $CH_3CH_2CH_2I$

C $CH_3CH_2CH_2OH$ and CH_3COONa

D CH_3CH_2ONa and $CH_3CH(I)CH_3$

20. Which of the following statements about benzene is correct?

A Benzene readily attracts nucleophilic reagents.

B The benzene molecule contains carbon–carbon bonds of two different lengths.

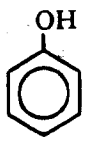
C Benzene does not react with electrophilic reagents.

D The benzene molecule is planar.

21. Which of the following does **not** react with phosphorus pentachloride?

A CH_3CQOH

B C_2H_5OH

C 

D $CH_3COOC_2H_5$

22. Which of the following reacts readily with 2,4-dinitrophenylhydrazine?

A CH_3COCH_3

B CH_3COOCH_3

C CH_3CONH_2

D $CH_3CH(OH)CH_3$

23. Which of the following statements about ethoxyethane is **incorrect**?

A It burns readily in air.

B It is isomeric with butan-2-ol.

C It has a higher boiling point than butan-2-ol.

D It is a very good solvent for many organic compounds.

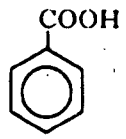
24. A certain compound

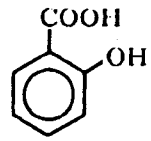
(i) has a pH value of less than 7 when dissolved in water

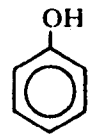
(ii) does not react with aqueous sodium carbonate solution

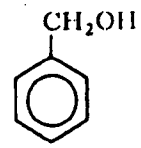
(iii) reacts with sodium, producing hydrogen.

The compound could be

A 

B 

C 

D 

25. Which of the following will **not** react with HCl?

A Aminoethanoic acid

B Triethylamine

C Tetraethylammonium bromide

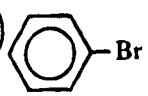
D Diethylamine

26. Which halide will be most resistant to attack by nucleophilic reagents?

A $CH_3C(CH_3)_2Cl$

B CH_3CH_2Br

C $CH_3CH(Cl)CH_3$

D 

[Turn over