CHAPTER
9

Practical Organic Chemistry

Question Bank

LEVEL 1

1. Sodium nitroprusside $Na_2[Fe(CN)_5NO]$ is used as reagent for detection of _____ and the compound formed is ____.

(a) Sulphur, $Na_4[Fe(CN)_5NOS]$ (b) Nitrogen, $Na_4[Fe(CN)_6]$

(c) Sulphur, $Na_2[Fe(CN)_4NOS]$ (d) Sulphur, $Na_2[Fe(CN)_5NOS]$

2. The prussian blue colouration obtained in the test for nitrogen in the organic compound is

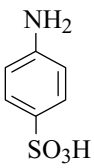
(a) $K_4[Fe(CN)]_6$ (b) $Fe_4[Fe(CN)_6]_3$ (c) $Fe[Fe(CN)_6]$ (d) $Fe_3[Fe(CN)_6]_2$

3. If N and S both are present in an organic compound during Lassaigne's test, both will change into

(a) Na_2S and NaCN (b) NaSCN

(c) Na_2SO_3 and NaCN (d) Na_2S and NaCNO

4. Which of the following will not give test for 'N' in sodium extract?

(a) $C_6H_5NHNH_2$ (b) NH_2CONH_2 (c) $NH_2–NH_2$ (d) 

5. Which of the following will be blood red colour with $FeCl_3$ in sodium extract (Lassaigne extract)?

(a) NH_2CONH_2 (b) NH_2CSNH_2 (c) $C_6H_5NHNH_2$ (d) $CH_3C{\equiv}N$

6. A mixture of acetone and CCl_4 can be separated by
(a) Azeotropic distillation (b) Fractional distillation
(c) Steam distillation (d) vacuum distillation

7. Phenol and benzoic acid can be separated by
(a) $NaHCO_3$ (b) NaOH solution
(c) $FeCl_3$ solution (d) All of these

8. Anthracene can be purified by
(a) Distillation (b) Sublimation
(c) Filtration (d) Fractional distillation

9. KOH can be used as a drying agent for
(a) amines (b) phenols (c) acids (d) esters

10. Silver salt method is used to determine molecular weight of
(a) organic acids (b) organic bases
(c) both acids and bases (d) none of these

11. Which of the following observations is correct and is used in the identification of carboxylic acids?
(a) Carboxylic acids liberate CO_2 gas from $NaHCO_3$ solution.
(b) They produce fruity smell of esters when heated with alcohol in presence of Conc. H_2SO_4.
(c) Both (a) and (b)
(d) Iodoform test

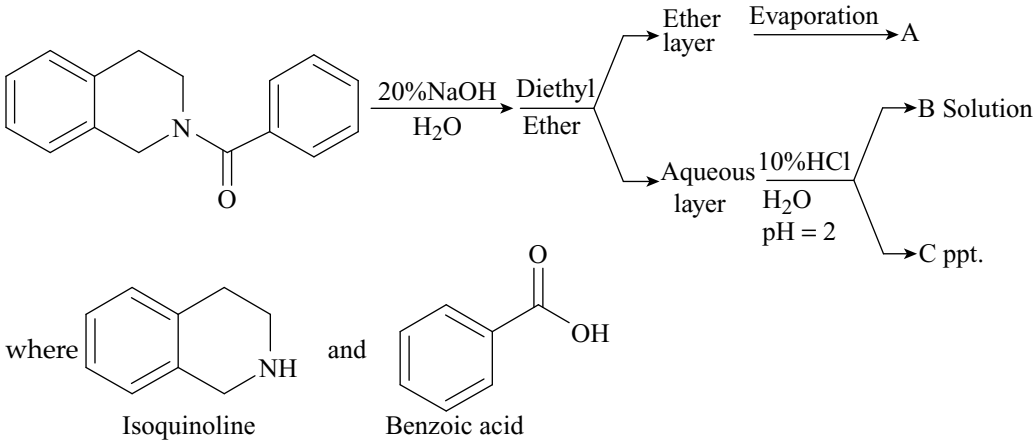
12. An organic compound is heated with HNO_2 at 0°C and then the resulting solution is added to a solution of β-naphthol whereby a brilliant red dye is produced. The observations indicate that the compound possesses
(a) $–NO_2$ group (b) $–CONH_2$ group
(c) aromatic NH_2 group (d) aliphatic NH_2 group

13. An organic compound contains C, H, N, S and Cl. For the detection of chlorine, the sodium extarct of the compound is first heated with a few drops of concentrated HNO_3 and then $AgNO_3$ is added to get a white ppt. of AgCl. The digestion with HNO_3 before the addition of $AgNO_3$ is
(a) to prevent the formation of NO_2
(b) to create a common ion effect
(c) to convert CN^- and S^{2-} to volatile HCN and H_2S, or else they will interfere with the test forming AgCN or Ag_2S
(d) to prevent the hydrolysis of NaCN and Na_2S

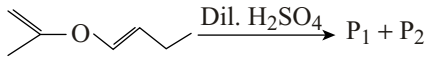
14. Rectified spirit contains
(a) 95.6 per cent ethanol and 4.4 per cent methanol
(b) 100 per cent ethanol
(c) 95.6 per cent ethanol and 4.4 per cent water
(d) 95.6 per cent ethanol and 4.4 per cent benzene

15. Aniline can be separated from phenol using
(a) $NaHCO_3$ (b) $NaNO_2$ + HCl at 0°C
(c) NaCl (d) Acidified $KMnO_4$

16. Identify correct statement for A, B and C in the following sequence.



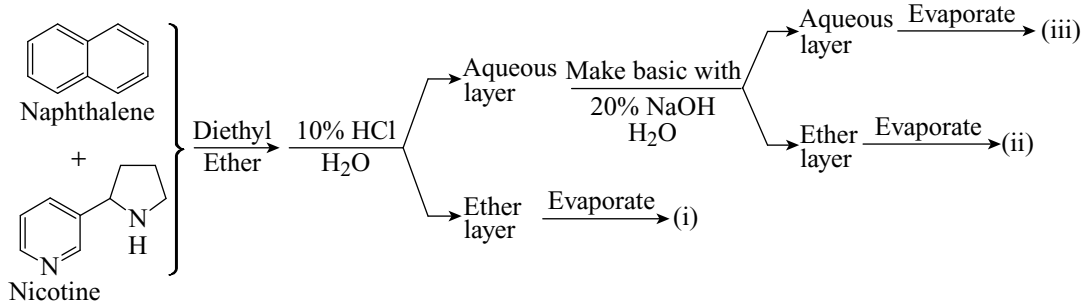
(a) A = benzoic acid, B = sodium chloride and C = isoquinoline
(b) A = isoquinoline, B = benzoic acid and C = sodium chloride
(c) A = isoquinoline, B = sodium chloride and C = benzoic acid
(d) A = sodium chloride, B = isoquinoline and C = benzoic acid

17. 

P_1 and P_2 products are identify by

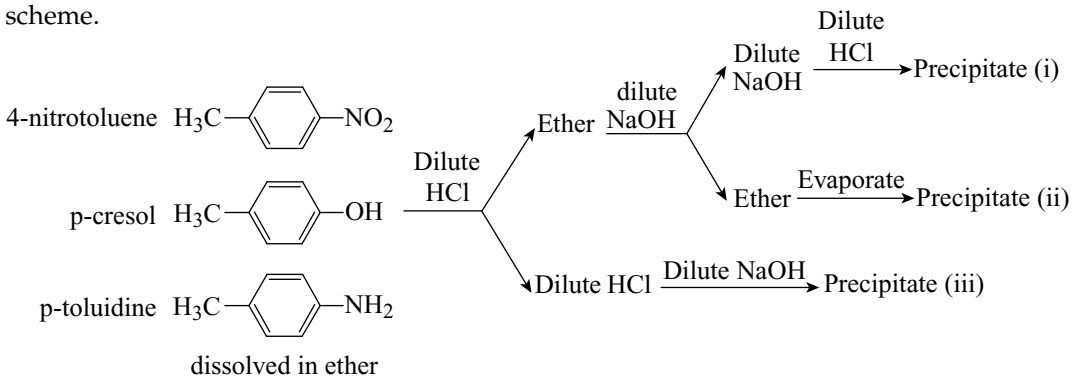
(a) Tollen's reagent
(b) Iodoform test
(c) $Br_2 + H_2O$ test
(d) 1 per cent alkaline $KMnO_4$

18. In the following extraction procedure, choose the number where nicotine would be found.



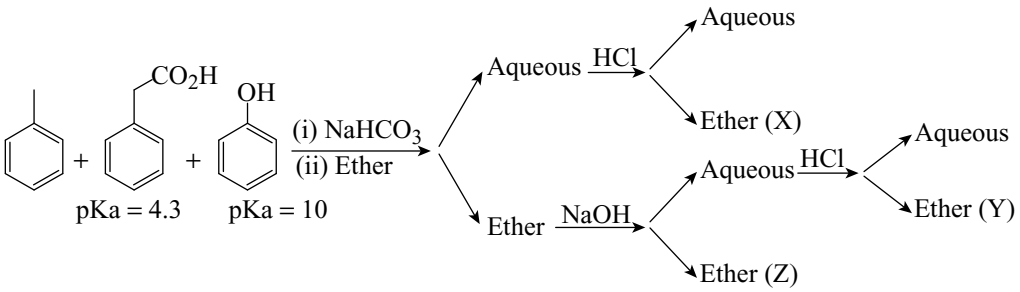
(a) i = Nicotine (b) i + iii = Nicotine (c) ii = Nicotine (d) ii + iii = Nicotine

19. Choose the answer that has the following compounds located correctly in the separation scheme.



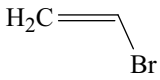
(a) i = 4-nitrotoluene, ii = p-cresol, iii = p-toluidine
(b) i = 4-nitrotoluene, ii = p-toluidine, iii = p-cresol
(c) i = p-toluidine, ii = 4-nitrotoluene, iii = p-cresol
(d) i = p-cresol, ii = 4-nitrotoluene, iii = p-toluidine

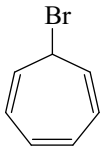
20. Choose the answer that has the following compounds located correctly in the separation scheme.

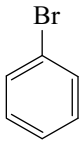


(a) toluene is in (Y); phenylacetic acid is in (Y); phenol is in (Z)
(b) toluene is in (Y); phenylacetic acid is in (X); phenol is in (Z)
(c) toluene is in (Z); phenylacetic acid is in (Y); phenol is in (X)
(d) toluene is in (Z); phenylacetic acid is in (X); phenol is in (Y)

21. Among the following which compound gives precipitate with $AgNO_3$ solution?

(a) 

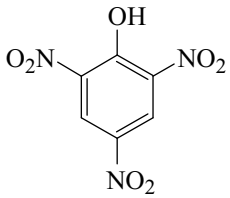
(b) 

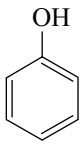
(c) 

(d) None of these

22. Disodium pentacyanonitrosyl ferrate reagent gives purple colour when which of the following element is present?
(a) N (b) Cl (c) F (d) S

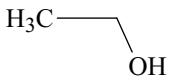
23. Which of the following compound can liberate CO_2 when treated with $NaHCO_3$?

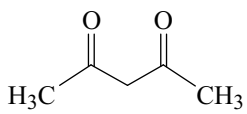
(a) 

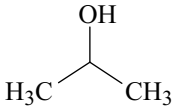
(b) CH_3CO_2H
(c) HCO_2H
(d) 

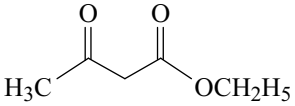
24. Phenol + Phthalic anhydride $\xrightarrow[\text{fusion}]{\text{Conc. } H_2SO_4}$ B. B gives which of the following colour in alkaline medium?
(a) Yellow (b) Colourless (c) Pink (d) Violet

25. Among the following, which will respond to iodoform test?

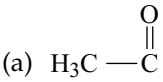
(a) 

(b) 

(c) 

(d) 

26. Among the following, which statement is not correct?

(a)  will not respond to haloform test

(b) Schiff 's regent and Schiff 's base are different compounds

(c) Fehling's solution is a good reagent to detect aromatic aldehydes

(d) Both aldehyde and ketone can react with 2, 4-dinitrophenylhydrazise reagent

27. To separate a mixture of amines from each other, one should follow

(a) Beckmann's method (b) Hinsberg's method

(c) Zeisel's method (d) Victor Meyer's Method

28. Phenol can be distiguished from ethanol by

(a) Tollen's reagent (b) Benedict's reagent

(c) $FeCl_3$ (d) Schiff 's base

29. p-Cl — $C_6H_4NH_2$ and $PhNH_3{}^+Cl^-$ can be distinguished by

(a) NaOH (b) $AgNO_2$ (c) $LiAlH_4$ (d) Zn

LEVEL 2

Single and Multiple-choice Type

1. In Lassaigne's test, the organic compound is first fused with sodium metal. The sodium metal is used because
(a) The melting point of sodium metal is low.
(b) Sodium metal reacts with elements present in organic compounds to form inorganic compounds.
(c) All sodium salts are soluble in water.
(d) All sodium salts are not soluble in water.

2. Molecular weight of acids can be detemined by
(a) Silver salt method
(b) Volumetric method
(c) Plants chloride method
(d) Victor Meyer's method

3. Ethanol and ethanal are distinguished by
(a) Fehling's solution test
(b) Tollen's reagent test
(c) Iodoform test
(d) Cerric ammonium nitrate

4. Which of the following statements are correct?
(a) An organic compound is pure if mixed melting point is same.
(b) Ethanol and water can be separated by azeotropic distillation because it forms azeotrope.
(c) Impure aniline is purified by steam distillation as it is steam volatile.
(d) Glycerol is purified by vaccuum distillation because it decomposes at its normal boiling point.

5. Which of the following will respond to iodoform test?

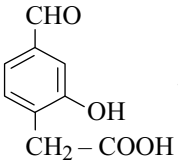
(a) $CH_3-\overset{\overset{O}{\|}}{C}-COOH$
(b) $CH_3-\overset{\overset{OH}{|}}{CH}-COOH$
(c) $CH_3-\overset{\overset{OH}{|}}{CH}-CH_3$
(d) CH_3CH_2OH

6. Which of the following will not show iodoform test?

(a) $CH_3-\overset{\overset{O}{\|}}{C}-CH_3$ (b) $CH_3-\overset{\overset{O}{\|}}{C}-Cl$ (c) $CH_3-\overset{\overset{O}{\|}}{C}-NH_2$ (d) CH_3–COOH

7. HCOOH and CH_3COOH can be distinguished by
(a) Tollen's reagent
(b) Fehling's solution
(c) $KMnO_4$
(d) $NaHCO_3$

8. The desiccants used for absorbing water during Liebig's method for estimation of carbon and hydrogen are
(a) anhydrous $CaCl_2$
(b) anhydrous Na_2SO_4
(c) $Mg(ClO_4)_2$
(d) $MgSO_4 \cdot 7H_2O$

9. An organic compound has the structure 

. It will give

(a) cerric ammonium nitrate test
(b) brick effervescence with sodium bicarbonate
(c) a characteristic colouration with neutral ferric chloride after decarboxylation and reduction by Clemenson's method
(d) Fehling's test

10. Which of the following organic compounds will give white precipitate with $AgNO_3$?

(a) $C_6H_5NH_3^+Cl^-$ (b) NaCl
(c) 2,4,6-trinitro chlorobenzene (d) Benzyl chloride

11. Which of the following reactions occur during the detection of nitrogen in organic substances by Lassaigne's test?

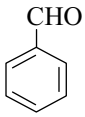
(a) $Na + C + N \longrightarrow NaCN$
(b) $FeSO_4 + 6NaCN \longrightarrow Na_4[Fe(CN)_6] + Na_2SO_4$
(c) $3Na_4[Fe(CN)_6] + 2Fe_2(SO_4)_3 \longrightarrow Fe_4[Fe(CN)_6]_3 + 6Na_2SO_4$
(d) None of these

12. Compound A reacts with $CHCl_3$ and KOH and gives an offensive smelling compound. A can be

(a) Primary aliphatic amine (b) Primary aromatic amine
(c) Secondary amine (d) Tertiary amine

13. HCOOH and HCHO may be distinguished by

(a) Tollen's test (b) Sodium bicarbonate test
(c) 2,4-DNP test (d) Benedict's test

14. 

and CH_3CHO can be distinguished by

(a) Tollen's test (b) Benedict's test (c) Iodoform test (d) 2,4-DNP test

15. Acetic acid and CH_3COCl can be distinguished by

(a) $NaHCO_3$ test (b) Na metal test
(c) Ester formation test (d) Br_2(aq.) test

Comprehension Type

Passage 1

Steam distillation is used to purify a compound which is steam volatile and insoluble in water. The impurities should not be steam volatile. It is based on the principle that liquid will boil when partial vapour pressure of liquid and partial vapour pressure of steam both become equal to atmospheric pressure, $P = p_1 + p_2$. It reduces the boiling point of a liquid.

$$\frac{\text{Weight of water distilled}}{\text{Wt. of substance distilled}} = \frac{\text{M. Wt. of water} \times \text{VP of steam}}{\text{M. Wt. of substance} \times \text{VP of aniline}}$$

16. Isolation of essential oils from flowers, etc. is done by
(a) Steam disitllation
(b) Distillation
(c) Fractional distillation
(d) Distillation under reduced pressure

17. Which of the following is steam volatile?
(a) o-nitrophenol (b) p-nitrophenol
(c) p-hydroxy benzaldehyde (d) Ethanol

18. Calculate weight of aniline distilled if weight of water distilled is 100 g when $P_{\text{organic compound}} = 100$ mm and $P_{H_2O} = 200$ mm.
(a) 250 g (b) 258 g (c) 100 g (d) 25.8 g

19. Steam distillation is based on
(a) Dalton's law of partial pressures
(b) Graham's law of diffusion
(c) Raoult's law of non-volatile solute
(d) None of these

20. Which of the following cannot be separated by steam distillation?
(a) Nitrobenzene (b) Essential oil (c) Aniline (d) Glycerol

Passage 2

Test (Q). A compound X was fused with Na metal and the extract gave a white precipitate with $AgNO_3$. The Lassaigne's extract gave a red colouration with neutral $FeCl_3$.

Test (R). While compound Y when fused with Na metal and subsequent analysis on its Lassaigne's extract did not give any characteristic test.

Test (S). While compound Y on fusion with fusion mixture (sodium carbonate + potassium nitrate) or Na_2O_2, followed by extraction, followed by addition of Conc. HNO_3 and ammonium molybdate gave a yellow precipitate.

21. Compound X contains
(a) N (b) S (c) N + S (d) P

22. Compound X
(a) will contain halogens (b) may contain halogens
(c) may contain only sulphur (d) will contain only nitrogen

23. Compound Y contain
(a) N (b) S (c) X (d) P

24. The chemical reaction taking place in Y, when it is fused with fusion mixture is
(a) $3Na + P + 4O \longrightarrow Na_3PO_4$
(b) $3Na_2CO_3 + 2P + [O] \longrightarrow 2Na_3PO_4 + 3CO_2$
(c) $3KNO_3 + P + 3O \longrightarrow K_3PO_4 + 3NO_2 + O_2$
(d) None of these

25. The formula of yellow precipitate is
(a) $(NH_4)_3PO_4$ (b) $Mo(PO_4)$
(c) $(NH_4)_3PO_4 \cdot 12Mo_3O_3$ (d) $Mo(PO_4)_2$

Passage 3

The 0.2 g of anhydrous organic acid gave on combustion 0.04 g of water and 0.195 g of CO_2. The acid is a dibasic acid and 0.5 g of its silver salt leaves on ignition 0.355 g of silver.

26. The percentage of carbon in the compound is
(a) 50 (b) 52 (c) 26.6 (d) 90

27. The percentage of hydrogen in the compound is
(a) 5.6 (b) 2.22 (c) 4.44 (d) 10

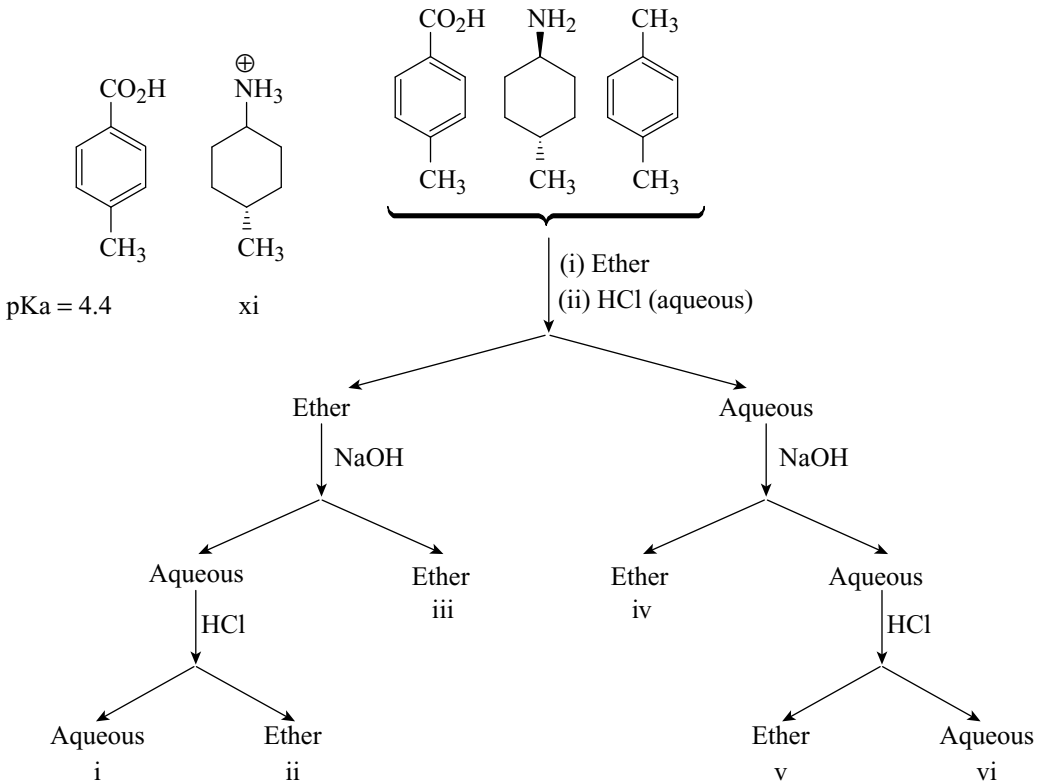
28. The empirical weight of the compound is
(a) 90 (b) 100 (c) 10 (d) 45

29. The molecular weight of the compound is
(a) 90 (b) 100 (c) 10 (d) 45

30. The molecular formula of the compound is
(a) CHO (b) CHO_2 (c) $C_2H_2O_4$ (d) $C_3H_6O_2$

Passage 4

A student in a lab had a mixture of three compounds, 4-methylbenzoic acid, 4-methylcyclohexylamine and 1,4-dimethylbenzene. In order to separate the three compounds the following extraction (separation) scheme was followed. At the end of the procedure the student had six separate flasks containing either an aqueous or an ether solution. Locate each compound by designating the flask expected to contain each compound. Some relevant pK_a data is given.



31. Which flask contains the 4-methylcyclohexylamine?
(a) 1 (b) 2 (c) 3 (d) 4

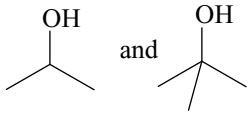
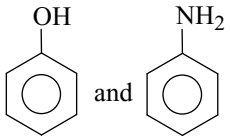
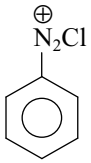
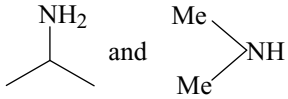
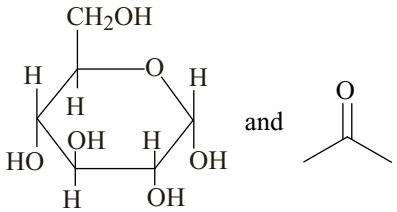
32. Which flask contains the 4-methylbenzoic acid?
(a) 1 (b) 2 (c) 3 (d) 4

33. Which flask contains the 1,4-dimethylbenzene?
(a) 1 (b) 2 (c) 3 (d) 4

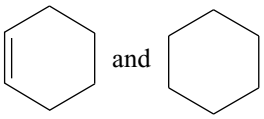
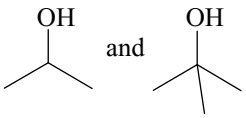
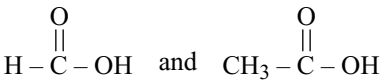
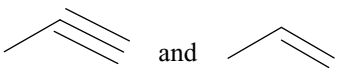
Matrix Type

Match the columns:

34.

Column I (pair of compounds)	**Column II (test to distinguish)**
(a) 	(p) Libermann nitroso test
(b) 	(q)  (Dye test)
(c) 	(r) Iodoform
(d) 	(s) Lucas
	(t) $NaHSO_3$

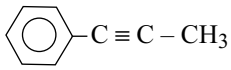
35.

Column I (pair of compounds)	**Column II (identification test)**
(a) 	(p) Tollen's reagent test
(b) 	(q) $Br_2 + H_2O$ test
(c) 	(r) Lucas test
(d) 	(s) Iodoform test
	(t) Ammonical Cu_2Cl_2 test

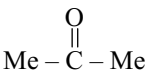
36. Column I (reagents) **Column II**

(a) Product of reaction of propyne with 1 per cent $HgSO_4$ and Dil. H_2SO_4 — (p) Me–CH=CH–Me

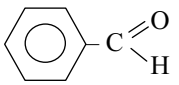
(b) Br_2 water test given by — (q) Me–C≡C–H

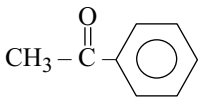
(c) Addition of HBr can be with — (r) 

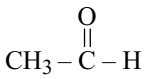
(d) Tollen's reagent give white ppt. with — (s) Me–CH=CH_2

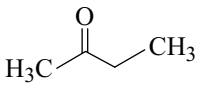
(t) 

37. Column I (compound) **Column II (tests)**

(a)  — (p) 2,4-DNP test

(b)  — (q) Yellow ppt. with NaOH + I_2

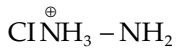
(c)  — (r) Red ppt. with Fehling's solution

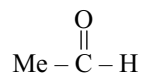
(d)  — (s) Silver mirror with Tollen's reagent

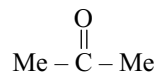
38. Column I (reagents) **Column II**

(a) Tollen's reagent give white ppt. with — (p) Me–CH=CH–Me

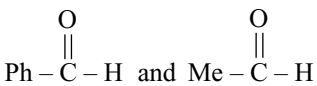
(b) $Br_2 + H_2O$ test given by — (q) Me–C≡C–H

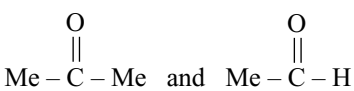
(c) Product of reaction of acetylene with 1 per cent $HgSO_4$ and Dil. H_2SO_4 — (r) 

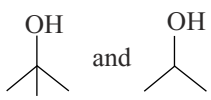
(d) Pd/H_2 reacts with — (s) 

(t) 

39. Column I (pair of compounds) **Column II (test of identification)**

(a)  — (p) Tollen's reagent

(b)  — (q) Fehling's reagent

(c)  — (r) Iodoform test

(d) Me – C ≡ C – H and Me – C ≡ C – Me — (s) Victor Meyer's test

(t) Lucas test

Answer Keys

LEVEL 1

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
a	b	b	c	b	b	a	b	a	a	c	c	c	c	b
16	17	18	19	20	21	22	23	24	25	26	27	28	29	
b	ab	c	d	d	b	d	abc	c	abcd	c	b	c	b	

LEVEL 2

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
abc	ab	abd	abcd	abcd	bcd	abc	ac	abc	abcd	abc	ab	bc	bc	ab
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
a	a	b	a	d	c	b	d	bc	c	c	b	d	a	c
31	32	33	34(a)	34(b)	34(c)	34(d)	35(a)	35(b)	35(c)	35(d)	36(a)	36(b)	36(c)	36(d)
d	b	c	rs	pq	p	rt	q	rs	p	pt	t	pqrs	pqrs	q
37(a)	37(b)	37(c)	37(d)	38(a)	38(b)	38(c)	38(d)	39(a)	39(b)	39(c)	39(d)			
ps	pq	pqrs	pq	qr	pq	s	pqst	qr	pq	rst	p			