



# CHEMISTRY

## BOOKS - R SHARMA CHEMISTRY (HINGLISH)

### PURIFICATION AND CHARACTERIZATION OF ORGANIC COMPOUNDS

**Example**

1. Hydrocarbons, obtained from coal and coal tar and from oil and gas wells, are organic compounds composed entirely of  $C$  and  $H$ . A  $0.1647g$  sample of a pure hydrocarbon was burned in a  $C - H$  combustion train to produce  $0.4931g$  of  $CO_2$  and  $0.2691g$  of  $H_2O$ . Determine the masses of  $C$  and  $H$  in the sample and the percentages of these elements in the hydrocarbon.

Strategy:

Step 1. Use the observed mass of  $CO_2$  to determine the mass of  $C$  in the original

sample using the information that there is  $1\text{mol}$  of  $C$  atoms in each mole of  $CO_2$ .

Step 2. Use the observed mass of  $H_2O$  to calculate the mass of  $H$  in the original sample using the fact that there are  $2\text{mol}$  of  $H$  atoms in each mole of  $H_2O$ . (We can also calculate the mass of  $H$  by subtracting the mass of  $C$  from the mass of sample. However, it is good experimental practice, when possible, to base both on experimental measurements as this would help to check for errors in the analysis of calculation.)

step 3. Calculate the percentages by mass of

each element in turn, using the relationship

$$\% \text{ Element} = \frac{\text{Gram of element}}{\text{Gram of sample}} \times 100 \%$$



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2. Glucose, a simple sugar, is the main component of intravenous feeding liquids. Its common name is dextrose. It is also one of the products of carbohydrate metabolism. An elemental analysis showed that glucose contains only *C*, *H*, and *O*. A 0.1014g sample of purified glucose was burned in a *C* – *H*

combustion system to produce  $0.1486g$  of  $CO_2$  and  $0.0609g$  of  $H_2O$ . Determine the masses of  $C$ ,  $H$ , and  $O$  in the sample and the percentages of these elements in glucose.

Strategy:

Step 1. and 2. First calculate the masses of  $C$  and  $H$  as illustrated in Example 13.1.

Step 3. The rest of the sample must be  $O$  as glucose has been shown to contain only  $C$ ,  $H$ , and  $O$ . Therefore, subtract the masses of  $C$  and  $H$  from the total mass of sample.

Step 4. Calculate the percentage by mass for each element.



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3. In Dumas' method for estimation of nitrogen,  $0.3g$  of an organic compound released  $50mL$  of nitrogen gas collected under  $715mmHg$  and at  $300K$ . If aqueous tension at  $300K$  is  $15mmHg$ , calculate the percentage composition of nitrogen in the organic compound.

Strategy:

Step 1. Calculate the volume of  $N_2$  gas at  $STP / NTP$  using combined gas equation.

Step 2. Find the number of moles of  $N_2$  gas:

$$n_{N_2} = \frac{\text{Volume of } N_2 \text{ gas at } NTP}{22400 \text{ mL mol}^{-1}}$$

Step 3. Find the mass of  $N_2$  gas:

$$m_{N_2} = n_{N_2} \times \text{Molar mass of } N_2$$

Step 4. Find the % of  $N_2$  gas

$$\% N = \frac{\text{Mass of nitrogen}}{\text{Mass of organic compound}} \times 100 \%$$

or use Eq. (13.7) where steps (2) to (4) are combined.



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4. A sample of  $0.50\text{g}$  of an organic compound was treated according to Kjeldahl's method. The ammonia evolved was absorbed in  $50\text{mL}$  of  $0.5\text{M}\text{H}_2\text{SO}_4$ . The residual acid required  $60\text{mL}$  of  $0.5\text{M}$  solution of  $\text{NaOH}$  for neutralization. Find the percentage composition of nitrogen in the compound.

Strategy:

Step 1. Convert molarity into normality using the relation

$$\text{Normality } (N) = n \times \text{Molarity}(M)$$

where  $n$  factor is either the acidity of base or



basicity of acid.

Step 2. Calculate the milliequivalents of  $NaOH$  which is equal to the milliequivalents of unreacted  $H_2SO_4$ .

Step 3. Calculate the milliequivalents of total  $H_2SO_4$  and subtract the milliequivalents of unreacted  $H_2SO_4$  to get the milliequivalents of  $NH_3$  evolved.

Step 4. Calculate the equivalents of  $NH_3$ , moles of  $NH_3$ , and moles of  $N$ .

Step 5. Calculate the mass of  $N$  in the organic compound.

Step 6. Finally, calculate % of  $N$  or directly

apply Eq. (13.8) or (13.9) to get the % of  $N$  in the organic compound.



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5. In the Carius method of estimation of halogen,  $0.0811g$  of an organic compound gave  $0.2368g$  of  $AgCl$ . Find the percentage of chlorine in the compound.

Strategy: Find the molar mass of  $AgCl$  to calculate the moles of  $AgCl$  which is also equal to the moles of  $Cl$ , according to the

formula. Using molar mass of  $Cl$ , find its mass to calculate its percentage.



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6. In the Carius method of estimation of sulphur,  $0.36g$  of an organic compound gave  $0.2330gBaSO_4$ . What is the percentage of sulphur in the organic compound?

Strategy: Using the atomic masses, find the molar mass of  $BaSO_4$ . Calculate the moles of  $BaSO_4$  which is also equal to the moles of  $S$ .

Using molar mass of  $S$ , find the mass of  $S$  to calculate the % of  $S$  in the organic compound.



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7. In the Carius method of estimation (a gravimetric determination) of phosphorus,  $0.248g$  of an organic compound gave a precipitate of  $Mg_2NH_4PO_4$  which on ignition yielded  $0.444g$  of  $Mg_2P_2O_7$ . What is the percentage of phosphorus in the compound?

Strategy: Find the molar mass of  $Mg_2P_2O_7$  through atomic masses. Calculate the moles of  $Mg_2P_2O_7$  to get the moles of  $P$  and finally find the mass of  $P$  to get the percentage in the *o. c.*



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## Follow Up Test 1

1. A mixture containing urea and naphthalene can be separated by

A. filtration

B. sublimation

C. both (1) and (2)

D. none of these

**Answer: A**



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2. Which of the following solvents is used to separated benzoic acid and anthracene by the process of filtration ?

A. Cold water

B. Hot water

C. Ether

D. Benzene

**Answer: B**



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**3. Which of the following organic compounds can be purified by sublimation ?**

A. Naphthalene

B. Anthracene

C. Camphor

D. Hexachloroethane

**Answer: A**



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**Follow Up Test 2**



1. By the process of crystallization, we convert an impure compound into its crystals. The choice of the solvent is very crucial in this operations. Which of the following conditions must be fulfilled by the selected solvent?

(i) It should not react chemically with the impure organic compound.

(ii) It should be the one in which the solid organic compound is very soluble at room temperature.

(iii) The impurities should not dissolve at all in the solvent.

(iv) If the impurities dissolve, they should be soluble to such an extent that they remain in the filtrate (mother liquor) upon crystallization.

A. (i), (iii), (iv)

B. (i), (ii), (iii)

C. (i), (ii), (iv)

D. (i), (ii), (iii), (iv)

**Answer: D**



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## Follow Up Test 3

1. The solvent for crystallization is usually selected by trial and error using small samples. The commonest solvents are water, alcohol or methylated spirits, glacial acetic acid, etc. Which of the following solvents are least desirable ?

(i) Ether

(ii) Acetone

(iii) Benzene

(iv) Petrol

A. (ii), (iii)

B. (i), (iv)

C. (i), (iii)

D. (iii), (iv)

**Answer: B**



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2. Simple distribution can be used to separate liquids such as chloroform and aniline which differ in their boiling points at least by

A.  $30^{\circ} C$

B.  $50^{\circ} C$

C.  $40^{\circ} C$

D.  $60^{\circ} C$

**Answer: A**



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## Follow Up Test 4

1. During the process of crystallization, the funnel is usually preheated by passing through it just beforehand a little bit of hot pure solvent. This is done in order to

(i) prevent undue cooling

(ii) bring about the crystallization of most of the solute

(iii) remove traces of impurity adhering to the crystals

(iv) premature crystallization during filtration

A. (i), (ii)

B. (ii), (iii)

C. (i), (iv)

D. (i), (iii)

**Answer: C**



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2. When two volatile liquids of similar boiling points, e.g., acetone ( $56^{\circ}C$ ) and methanol

( $65^{\circ}C$ ), are to be separated, then.....is employed.

- A. steam distillation
- B. vacuum distillation
- C. fractional distillation
- D. distillation under reduced pressure

**Answer: C**



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3. Solvent extraction or differential extraction is used to separated an organic compound from its solution in

A. water

B. alcohol

C. benzene

D. ether

**Answer: A**



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## Follow Up Test 5

1. In case the difference in solubility of the two substances in the solvent is not very marked, ....., involving a series of repeated crystallizations, is carried out.

- A. fractional crystallization
- B. vacuum crystallization
- C. ultra crystallization
- D. multiple crystallization

**Answer: A**



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2. Rectified spirit contains about 95 % alcohol (b.p.  $351K$ ) and 5 % water (b.p.  $373K$ ). The two components can be separated by

- A. simple distillation
- B. azeotropic distillation
- C. fractional distillation
- D. steam distillation

**Answer: B**



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3. The most modern and versatile method called chromatography, first discovered by Tswett, a Russian botanist, is based on the general principle of phase distribution as it takes advantage of the different degrees to which the components of a mixture undergo

(i) ion-exchange

(ii) partition

(iii) distribution

(iv) adsorption

A. (ii), (iv)

B. (iii), (iv)

C. (ii), (iii), (iv)

D. (i), (ii), (iii), (iv)

**Answer: D**



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4. Carbon and hydrogen are normally detected by strongly heating the organic compound with



**Answer: C**



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## Follow Up Test 6

1. If the crystals of a pure organic compound do not appear even after cooling the hot solution after a long time, then it may be necessary to scratch the sides of the dish with glass rod or to treat the hot solution with a small crystal of the same substance. This provides tiny fragments of glass or small particles of the inducing crystallization. This process of inducing crystallization by adding a

crystal of the pure substance into its saturated solution is called

A. feeding

B. seeding

C. impfing

D. both (2) and (3)

**Answer: D**



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2. Which of the following organic liquids can be purified by steam distillation ?

(i) Aniline

(ii) Turpentine oil

(iii) Essential oils

(iv) Glycerine

A. (i), (ii), (iii), (iv)

B. (ii), (iii), (iv)

C. (ii), (i), (iv)

D. (i), (ii), (iii)

**Answer: D**



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**3. Which of the following is used to separated two immiscible liquids ?**

- A. Buchner funnel
- B. Vacuum funnel
- C. Separating funnel
- D. Fluted funnel

**Answer: C**



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4. Which of the following elements present in an organic compound are detected are Lassaigne's test?

(i) *P*

(ii) *X*

(iii) *S*

(iv) *N*

A. (i), (ii), (iii), (iv)

B. (i), (ii), (iii)

C. (ii), (iii), (iv)

D. (ii), (iii)

**Answer: C**



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5. The estimation of  $C$  and  $H$  in an compound is done by

A. Carius' method

B. Dumas' method

C. Kjeldahl's method

D. Liebig's method

**Answer: D**



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**Follow Up Test 7**

1. Which of the following pairs can be easily separated by using hydrochloric acid (HCl, aq.) as the solvent for crystallization ?

(i) Naphthalene and oxalic acid

(ii) Naphthalene and p-toluidine

(iii) Aniline and nitrobenzene

(iv) Benzene acid and naphthalene

A. (i), (iv)

B. (iii), (iv)

C. (i), (ii)

D. (ii), (iii)

**Answer: D**



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2. Which of the following compounds are steam volatile ?

(i) para-Hydroxyacetophenone

(ii) ortho-Nitrophenol

(iii) ortho-Hydroxyacetophenone

(iv) para-Nitrophenol

A. (ii), (iii)

B. (i), (iv)

C. (i), (ii)

D. (iii), (iv)

**Answer: A**



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**3.** The separation of the constituents of a mixture by column chromatography is based



on the.....of the various components in the mixture.

- A. differential extraction
- B. differential adsorption
- C. differential partition
- D. differential retention

**Answer: B**



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4. In Lassaigne's test, the elements ( $N$ ,  $S$ , and  $X$ ) present in the organic compound are converted from convalent form into the ionic form by fusing the compound with.....metal.

A.  $Mg$

B.  $Cu$

C.  $Fe$

D.  $Na$

**Answer: D**



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5. In Dumas' method for nitrogen estimation, the element nitrogen is estimated as



**Answer: A**



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## Follow Up Test 8

1. A liquid which is immiscible in water and has a vapor pressure of  $10 - 15\text{mmHg}$  at  $373\text{K}$  can be conveniently purified by

- A. fractional distillation
- B. steam distillation
- C. vacuum distillation
- D. simple distillation

**Answer: B**



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2. Which of the following types of chromatography is referred to as liquid/liquid chromatography?

- A. Paper chromatography
- B. Gas chromatography
- C. Thin layer chromatography
- D. Column chromatography

**Answer: A**



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3. Which of the following compounds does not give Prussian blue color during Lassaigne's test for the detection of nitrogen?



**Answer: A**



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4. Kjeldahl's method, where  $N$  of the organic compound is estimated as  $NH_3$ , works well for

(i) amines

(ii) amino acids

(iii) proteins

(iv) alkyl nitrites

A. (i), (iv)

B. (i), (ii), (iii)

C. (i), (ii), (iii), (iv)

D. (ii), (iii)

**Answer: B**



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**Follow Up Test 9**



1. Which of the following amounts to repeated distillations?

A. Vacuum distillation

B. Steam distillation

C. Fractional distillation

D. Simple distillation

**Answer: C**



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2. Chromatography technique has proved useful for the isolation and detection of

(i) amino acids

(ii) sugars

(iii) plant pigments

(iv) nonvolatile liquids

A. (i), (ii), (iii), (iv)

B. (i), (ii)

C. (ii), (iii)

D. (i), (ii), (iii)

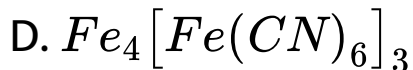
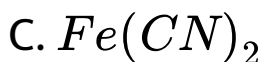
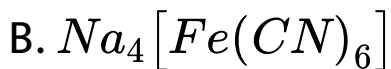
**Answer: D**



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3. During Lassaigne's test for nitrogen, the sodium fusion extract is heated to boiling with ferrous sulphate crystals and then acidified with dilute sulphuric acid. If  $N$  is present, Prussian blue appears due to the formation of

A.  $NaCN$



**Answer: D**



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4. In Dumas' method ,  $N_2$  gas obtained from the organic compounds is collected over an aqueous solution of

A.  $CuO$

B.  $AgNO_3$

C.  $KOH$

D.  $CuSO$

**Answer: C**



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**Follow Up Test 10**

1. Which type of chromatography has been applied with great success for the separation of lanthanoids and actinoids?

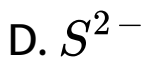
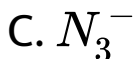
- A. Partition type
- B. Ion-exchange type
- C. Adsorption type
- D. Absorption type

**Answer: B**



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2. Which of the following ionic species cannot be present in the sodium fusion extract used in Lassaigne's test?



**Answer: C**



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3. In Kjeldahl's method, the amount of standard  $H_2SO_4$  neutralized by  $NH_3$  is estimated by

- A. back titration
- B. redox titration
- C. conductometric titration
- D. precipitation titration

**Answer: A**



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## Follow Up Test 11

1. Which of the following types of chromatography enables us to make accurate quantitative analysis of the mixtures of gases, liquids, and volatile solids?

- A. Paper chromatography
- B. Gas chromatography
- C. Thin layer chromatography
- D. Column chromatography

**Answer: B**



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2. In the Beilstein test for halogens, the organic compounds is heated with.....metal.

A. *Fe*

B. *Ag*

C. *Pt*

D. *Cu*

**Answer: D**



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3. In Carius' method to estimate halogens, the mass of halogen is determined by collecting the precipitate of

A.  $NaX$

B.  $CuX$

C.  $PbX_2$

D.  $AgX$

**Answer: D**



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## Follow Up Test 12

1. During the testing for phosphorus in organic compounds, a yellow solution or precipitate is formed due to the formation of

A. ammonium phosphate

B. ammonium molybdate

C. ammonium phosphomolybdate

D. sodium phosphate

**Answer: C**



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2. In Carius method, sulphur present in an organic compound is estimated as

A.  $PbS$

B.  $Ag_2S$

C.  $BaSO_4$

D.  $H_2S$

**Answer: C**

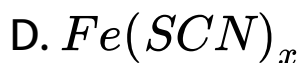
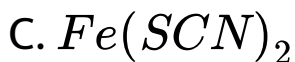


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**Follow Up Test 13**

1. If sulphur is also present along with  $N$  and sodium thiocyanate is formed during sodium fusion, then a blood red coloration will appear

on heating with ferrous sulphate due to the formation of

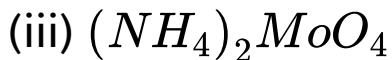
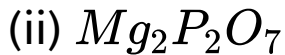


**Answer: A**



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2. In Carius, method, phosphorous present in an organic compound is quantitatively precipitated as



A. (i), (iii)

B. (ii), (iv)

C. (i), (ii)



D. (iii), (iv)

**Answer: B**



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## Follow Up Test 14

1. Acetic acid and not sulphuric acid is essential for acidification of sodium extract for testing sulphur by lead acetate test because

A. sulphuric acid is stronger acid

B. lead acetate is oxidized by sulphuric acid

C. sulphuric acid is expensive

D. lead acetate will react with  $H_2SO_4$  to form white ppt. of lead sulphate which will interfere with the test

**Answer: D**



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2. The percentage of oxygen in an organic compound can be determined by converting  $O$  of the compound quantitatively into

(i)  $CO_2$

(ii)  $I_2O_5$

(iii)  $I_2$

(iv)  $CO$

A. (ii), (iv)

B. (i), (ii)

C. (iii), (iv)

D. (i), (iii)

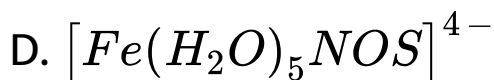
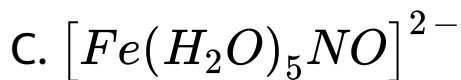
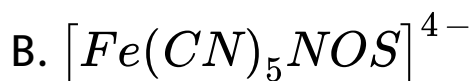
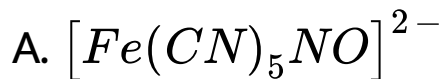
**Answer: D**



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**Follow Up Test 15**

1. For detecting sulphur, Lassaigne's solution is treated with sodium nitroprusside solution, which contains the ion



**Answer: A**



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**Follow Up Test 16**

1. Nitric acid is added to sodium fusion extract and the solution is boiled before adding silver nitrate for testing halogens because

A. the extract is alkaline and thus must be neutralized.

B. nitric acid decomposes sodium cyanide or sodium sulphide (if present) to hydrogen cyanide and hydrogen sulphide gases, respectively.

C. nitric acid oxidizes halogen to halide ion.

D. nitric acid dissolves silver nitrate.

**Answer: B**



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## Question Bank

1. Fractional distillation is a process by which the separation of different from a liquid mixture is carried out by making use of difference of

A. solubility

B. boiling point

C. melting point

D. density

**Answer: B**



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2. Nitrogen is estimated in organic compounds by



A. Liebig's method

B. Carius' method

C. Dumas' method

D. Lassaigne's method

**Answer: C**



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**3.** A mixture contains four solid organic compounds *A*, *B*, *C* and *D*. On heating, only

$C$  changes from solid to vapor state.  $C$  can be separated from the rest in the mixture by

- A. sublimation
- B. distillation
- C. crystallization
- D. differential extraction

**Answer: A**



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1. Which of the following process is suitable for the purification of aniline?

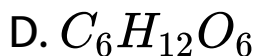
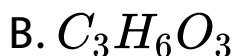
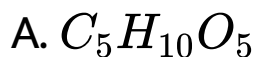
- A. Fractional distillation
- B. Fractional crystallization
- C. Steam distillation
- D. Simple distillation

**Answer: C**



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2.  $0.1\text{mol}$  of a carbohydrate with empirical formula  $\text{CH}_2\text{O}$  contains  $1\text{g}$  of hydrogen. What is its molecular formula?



**Answer: A**



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3. An organic compound which produces a bluish green colored flame on heating in the presence of copper is

A. benzoic acid

B. chlorobenzene

C. benzaldehyde

D. aniline

**Answer: B**



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4. How much sulphur is present in an organic compound, if  $0.53g$  compound gave  $1.158g$  of  $BaSO_4$  on analysis?

A. 25 %

B. 20 %

C. 30 %

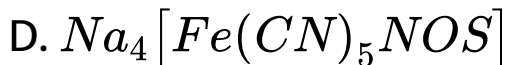
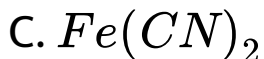
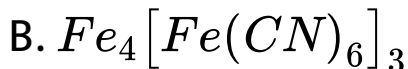
D. 15 %

**Answer: C**



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5. The compound formed in the positive test for nitrogen with Lassaigne's solution of an organic compound is

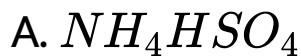


**Answer: B**



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6. In Kjeldahl's method, the nitrogen present in the organic compound is estimated as



**Answer: C**



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7. Liebig's method is used for the estimation of

A.  $N, S$

B.  $X, P$

C.  $N, S, X$

D.  $C, H$

**Answer: D**



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8. If  $0.32\text{g}$  of an organic compound containing sulphur produces  $0.233\text{g}$  of  $\text{BaSO}_4$ , the percentage of sulphur in the compound is

A. 15

B. 10

C. 20

D. 25

**Answer: B**



**Watch Video Solution**

9. Anthracene is purified by

A. filtration

B. crystallization

C. sublimation

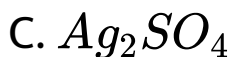
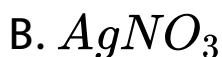
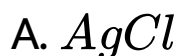
D. distillation

**Answer: C**



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10. In Carius tube, the compound  $ClCH_2COOH$  was heated with fuming  $HNO_3$  and  $AgNO_3$ . After filtration and washing, a white precipitate was formed. The precipitate is of



**Answer: A**



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11. Acetanilide ( $C_6H_5NHCOCH_3$ ) is sparingly soluble in cold water but readily soluble in boiling water. It is usually purified by

A. chromatography

B. crystallization

C. sublimation

D. distillation

**Answer: B**



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Level iii

1. An organic compound made up of  $C$ ,  $H$ , and  $N$  contains 20%  $N$ . The molecular mass of the organic compound is

A.  $100u$

B.  $65u$

C.  $140u$

D.  $70u$

**Answer: D**



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2.  $0.1914g$  of an organic acid is dissolved in about  $20mL$  of water.  $25mL$  of  $0.12N NaOH$  is required for complete neutralization of the acid solution. The equivalent mass of the acid is

A.  $65.0$

B. 64.0

C. 62.5

D. 63.8

**Answer: D**



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**3.** Which of the following compounds gives positive Lassaigne's test for nitrogen?

(i) Urea

(ii) Hydrazine



(iii) Phenylhydrazine

(iv) Azobenzene

A. (i), (ii), (iii), (iv)

B. (i), (iii), (iv)

C. (i), (ii), (iii)

D. (ii), (iii), (iv)

**Answer: B**



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4. The product of the Reimer-Tiemann reaction is a mixture of *o*-hydroxybenzaldehyde (major product) and *p*-hydroxybenzaldehyde (minor product). The constituents of the mixture are best separated by

A. crystallization

B. distillation

C. Steam distillation

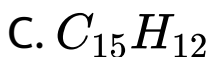
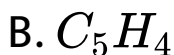
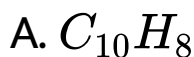
D. sublimation

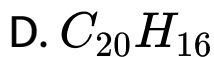
**Answer: C**



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5. An aromatic hydrocarbon with empirical formula  $C_5H_4$  on sulphonation gave a monosulphonic acid.  $0.104g$  of this acid required  $10mL$  of  $NaOH$  for complete neutralization. The molecular formula of the acid is





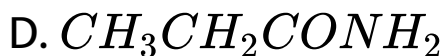
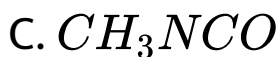
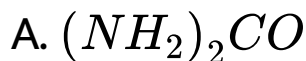
**Answer: A**



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6. An organic compound having molecular mass 60 is found to contain  $C = 20\%$ ,  $H = 6.67\%$ , and  $N = 46.67\%$ , while rest is oxygen. On heating, it gives  $NH_3$  along with a solid residue. The solid residue

gives violet color with alkaline copper sulphate solution. The compound is



**Answer: A**



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7. The ammonia evolved from the treatment of  $0.30\text{g}$  of an organic compound for the estimation of nitrogen was passed in  $100\text{mL}$  of  $0.1\text{M}$  sulphuric acid. The excess of acid required  $20\text{mL}$  of  $0.5\text{M}$  sodium hydroxide solution for complete neutralization. The organic compound is

A. thiourea

B. benzamide

C. urea

D. acetamide

**Answer: C**



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**Archives**

1. Which of the following compound gives blood red colouration when its Lassigne's extract is treated with alkali and ferric chloride ?

A. Benzamide

B. Thiourea

C. Diphenyl sulphide

D. Phenylhydrazine

**Answer: B**



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2. An organic compound contains  $C$ ,  $H$ , and  $O$ . Its elemental analysis gave  $C(38.71\%)$  and



$H(9.67\%)$ . The empirical formula of the compound will be



**Answer: B**



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3. An organic compound weighing  $0.31g$  gave  $0.444g$  of magnesium pyrophosphate in the estimation of phosphorus by the Carius method. The percentage of  $P$  in the compound is

A. 30

B. 15

C. 60

D. 40

**Answer: D**



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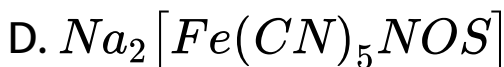
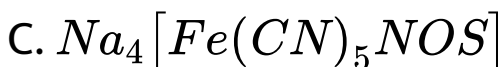
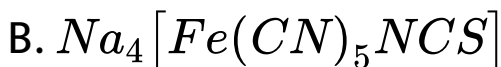
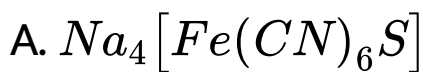
4. For the purification of organic compounds, the latest technique followed is

- A. steam distillation
- B. chromatography
- C. fractional crystallization
- D. sublimation

**Answer: B**



5. The formula of the compound which gives violet color in Lassaigne's test for sulphur with sodium nitroprusside is

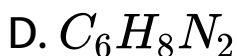
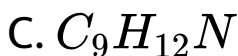
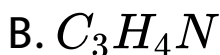
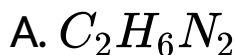


**Answer: C**



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6. In a compound  $C$ ,  $H$ ,  $N$  atoms are present in 9:1:3.5 by weight. Molecular weight of compound is 108. Its molecular formula is:



**Answer: D**



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7. A mixture of camphor and benzoic acid can be separated by

- A. sublimation
- B. fractional distillation
- C. chemical method
- D. extraction with a solvent

**Answer: C**



8. Sodium nitroprusside when added to an alkaline solution of sulphide ions produces

A. purple coloration

B. blue coloration

C. brown coloration

D. red coloration

**Answer: A**



9. How will you separate a solution (miscible) of benzene and chloroform?

- A. Sublimation
- B. Distillation
- C. Filtration
- D. Crystallization

**Answer: B**



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10. The best method for the separation of naphthalene and benzoic acid from their mixture is

A. distillation

B. chromatography

C. sublimation

D. Crystallization

**Answer: D**



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11.  $116\text{mg}$  of a compound on vaporisation in a Victor – Meyer's apparatus displaced  $44.8\text{mL}$  of air measured at *S.T.P.* The molecular mass of the compound is

A.  $116u$

B.  $232u$

C.  $58u$

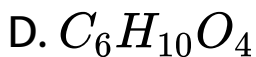
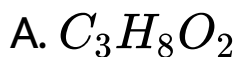
D.  $45u$

**Answer: C**



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12. An organic compound contains 49.3 % carbon 6.84 % hydrogen and its vapour density is 73 . Molecular formula of the compound is



**Answer: D**



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**13.** Which of the following fertilizers has the highest nitrogen percentage?

A. Ammonium sulphate

B. Urea

C. Calcium cyanamide

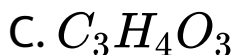
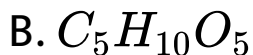
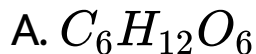
D. Ammonium nitrate

**Answer: B**



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14. 0.0833mol of carbohydrate of empirical formula  $CH_2O$  contain 1g of hydrogen. The molecular formula of the carbohydrate is

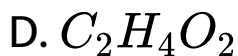


**Answer: A**



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**15.**  $60g$  of a compound on analysis produced  $24g$  C,  $4gH$ , and  $32gO$ . The empirical formula of the compound is



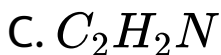
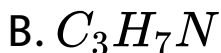
**Answer: C**



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**16.** An organic compound contains  $C = 40\%$ ,  $H = 13.33\%$ , and  $N = 46.67\%$ .

Its empirical formula will be

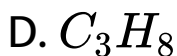
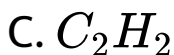
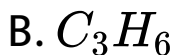


**Answer: D**



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17. The empirical formula of a compound is  $CH_2$ . If one mole of the compound has a mass of  $42g$ , its molecular formula is





**Answer: B**



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**18.** If  $0.765g$  of an acid gives  $0.535g$  of  $CO_2$  and  $0.138g$  of  $H_2O$ , then the ratio of the percentage of  $C$  to  $H$  is

A. 19:2

B. 18:11

C. 20:17

D. 1:7

**Answer: A**



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**19.** Percentage of *Se* (atomic mass =  $78.4u$ ) in peroxidase anhydrase enzyme is  $0.5\%$  by mass. The minimum molecular mass of peroxidase anhydrase enzyme is

A.  $136 \times 10^4$

B.  $568 \times 10^3$

C. 15.28

D.  $568 \times 10^4$

**Answer: D**



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**20.** In paper chromatography,

A. moving phase is liquid and stationary

phase is solid

B. both moving phase and stationary phase

are solid

C. both moving phase and stationary phase  
are liquid

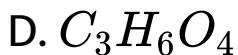
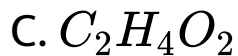
D. moving phase is solid and stationary  
phase is liquid

**Answer: C**



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**21.** The empirical formula of an acid is  $CH_2O_2$ ,  
the probable molecular formula of acid may be



**Answer: B**



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**22.** Which of the following is the scientific method to test the presence of water in a liquid?

A. Smell the liquid

B. Taste the liquid

C. Use of litmus paper

D. Use of anhydrous copper sulphate

**Answer: D**



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**23.** The Beilstein test (or copper wire test) is used to detect .....in organic compounds.

A. nitrogen

B. sulphur

C. carbon

D. halogens

**Answer: D**



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**24. Equivalent mass of an acid is equal to**

A. molecular mass x basicity

B. molecular mass /basicity

C. molecular mass /acidity

D. molecular mass x acidity

**Answer: A**



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**25.**  $0.2g$  of organic compound containing carbon, hydrogen and oxygen on combustion yielded  $0.147gCO_2$  and  $0.12g$  water. What will be the content of oxygen in the substance?



A. 78.45 %

B. 73.295 %

C. 83.23 %

D. 89.50 %

**Answer: B**



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**26.** If  $0.24g$  of a volatile liquid upon vaporization gives  $45ml$  of vapors at *NTP*,

what will be the vapor density of the substance? (Density of  $H_2 = 0.089 \text{ g L}^{-1}$ )

A. 112

B. 37.3

C. 59.9

D. 56

**Answer: C**



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27. Absolute alcohol is prepared by

A. fractional distillation

B. vacuum distillation

C. Steam distillation

D. azeotropic distillation

**Answer: D**



**Watch Video Solution**

28. The compound that does not give a blue color in Lassaigne's test is

A. glycine

B. hydrazine

C. urea

D. aniline

**Answer: B**



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29. Which of the following is not used for the purification of solid impurities?

- A. Distillation
- B. Sublimation
- C. Crystallization
- D. none of these

**Answer: D**



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30. The best method to separate the mixture of ortho and para nitrophenol (1 : 1) is

A. steam distillation

B. crystallization

C. vaporization

D. color spectrum

**Answer: A**



**View Text Solution**

31. Which of the following technique is most suitable for the purification of cyclohexanone from a mixture containing benzoic acid, isoamyl alcohol, cyclohexane, and cyclohexanone?

- A. Crystallization
- B. Sublimation
- C. Gas chromatography
- D. *IR* spectrography

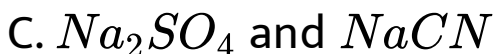
**Answer: C**





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32. During Lassaigne's test ,  $N$  and  $S$  present in an organic compound change into



**Answer: A**



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**33.** The purity of an organic compound is determined by

A. density

B. melting point

C. mixed melting point

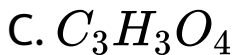
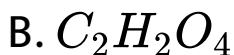
D. molecular mass

**Answer: C**



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34. A dibasic acid containing  $C$ ,  $H$ , and  $O$  was found to contain  $C = 26.7\%$  and  $H = 2.2\%$ . The vapor density of diethyl ester was found to be 73. What is the molecular formula of the acid?



**Answer: B**



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**35.** Impure glycerine is purified by

- A. steam distillation
- B. vacuum distillation
- C. simple distillation
- D. none of these

**Answer: B**



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**36.** Simple distillation (or distillation) is used to separate liquids which differ in their boiling point by

A.  $5^{\circ} C$

B.  $15^{\circ} C$

C.  $10^{\circ} C$

D.  $30^{\circ} C$  to  $50^{\circ} C$

**Answer: D**



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37. In Dumas' method, the gas (or vapor) which is collected in the nitrometer is



**Answer: A**



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38. If on adding  $FeCl_3$  solution to acidified Lassaigne's solution a blood red coloration is produced, it indicates the presence of

A.  $S$

B.  $N$

C.  $N$  and  $S$

D.  $S$  and  $Cl$

**Answer: C**



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