# **9**

# **Organic Chemistry**

# **SYNOPSIS**

- Unique features of carbon which are responsible for properties of organic compounds are catenation and multiple bond formation.
- Degree of unsaturation in a hydrocarbon increases with decrease in the number of hydrogens attached to carbons.
- O Chain isomerism is exhibited by all classes of organic compounds.
- O A hydrocarbon should possess at least 4 carbon atoms to exhibit chain isomerism.
- O Isoalkanes also possess position isomers.
- O Alkenes and alkynes exhibit both chain isomerism and position isomerism.
- O Decarboxylation involves reduction in number of carbon atoms from the parent compound.
- O An alkane with 'n' carbon atoms can be prepared from a carboxylic acid with (n + 1) carbon atoms.
- O Strong C C bond in alkanes makes the addition reactions not favourable in them.
- O The efficiency of a fossil fuel depends on the factors.
  - (a) Length of carbon chain in the hydrocarbon.
  - (b) Calorific value of fuel.
  - (c) Amount of  $CO_2$  produced per gram.
  - (d) Presence of other impurities in the fuel.

- O Lower fractions of petroleum refining are used as drying oils whereas higher fractions are used as lubricating oils. This depends on their boiling points.
- O Branched chain hydrocarbons undergo degradation at a slower rate than straight chain hydrocarbons.
- Carbon forms large number of compounds due to the characteristic properties of catenation, multiple bond formation and isomerism.
- In the IUPAC nomenclature, functional group always gets priority over multiple bond or substituent.
- Chain isomers of alkanes differ with respect to the length of carbon chain whereas position isomers have same length of carbon chain with difference in the position of alkyl side chain or multiple bond or functional group.
- The carbon atom of -CHO group and -COOH group are given first position in their compounds. Hence they do not have position isomers.
- O Alcohols and ethers are functional isomers and general molecular formula is  $C_n H_{2n+2} O$ .
- O Aldehydes and ketones are functional isomers and general molecular formula is  $C_n H_{2n} O$ .
- O Carboxylic acids and esters are functional isomers and general molecular formula is  $C_n H_{2n} O_2$ .
- Ethers, ketones and esters exhibit metamerism due to the presence of divalent functional groups.

- O Alkanes give substitution reactions while alkenes and alkynes give addition reactions.
- O Both alkenes and alkynes give decolourization with alkaline  $KMnO_4$  or  $Br_2$ . But only 1 Alkynes give the characteristic reaction of acetylide formation.
- Aldehydes upon oxidation give carboxylic acids with same number of carbon atoms whereas ketones give carboxylic acids with less number of carbon atoms.
- Alcohols on dehydrogenation give aldehydes in presence of Cu at 300°C and give acids in presence of alk KMnO<sub>4</sub>.
- Carboxylic acids and alcohols react to give esters with fruity smell. The reaction is called esterification. Esters on hydrolysis in presence of acid or base gives the corresponding parent compounds.

O The compounds with structure

(R = H or alkyl group) only give iodoform reaction.

- Carbohydrates and proteins hydrolyse in the biological systems to form simple substances namely glucose and amino acids respectively.
- The characteristic reactions in organic chemistry require different types of reagents. The product sometimes depends on temperature also.

Type of reaction	Reagent	Product
Decarboxylation of sodium salts of fatty acid	Soda lime (NaOH + CaO)	Alkane with one carbon less than the parent compound
Dehydration of alcohols	Conc $H_2SO_4$ at (i) 170°C (ii) 140°C $Al_2O_3$ at (i) 350°C (ii) 250°C	<ul><li>(i) Alkene (ii) Ethers</li><li>(i) Alkene (ii) Ethers</li></ul>
Dehalogenation of (i) dihaloalkane (ii) tetrahaloalkane	Zinc dust	(i) Alkene (ii) Alkyne
Hydrogenation	Nickel/H <sub>2</sub>	Saturated hydrocarbons
Hydroxylation of (oxidation) of alkenes	Alkaline KMnO <sub>4</sub>	Glycols
Hydration (i) alkenes (ii) alkynes	H <sub>2</sub> O/H <sup>+</sup> H <sub>2</sub> O/HgSO <sub>4</sub>	<ul><li>(i) Alcohol</li><li>(ii) Aldehydes or ketones</li></ul>

#### Solved Examples

**1.** Write the IUPAC names of the following compounds.

(a)

$$CH_3 - CH_2 - CH - CH_2 - CH_2 - CH_3$$

CH<sub>3</sub>

$$CH_3 - CH_2 - CH - CH_2 - CH_2 - CH_2 - CH_3$$
  
(c)  $CH_3 - CH_2 - CH - CH_2 - CH_3$ 

 $C_{2}H_{5}$ 

- (d)  $CH_3 C_2H_5$ | |  $CH_3 - CH - CH - CH_3 - CH_3$
- ♂ **Solution:** (a) 3 Methyl hexane
  - (b) 3 Methyl heptane
  - (c) 3 Ethyl pentane
  - (d) 3, 4 Dimethyl hexane
- 2. Two compounds A and B are functional isomers. A has fruity smell and undergoes hydrolysis in presence of acid or base to give C and D, C has same functional group as B. C and B are

simultaneously treated with sodium hydroxide. The compounds obtained are treated with soda lime to give two successive homologues E and F which are the first two members of the series. Identify A, B, C, D, E and F.

#### **Solution:**

 $\begin{array}{c} \text{CH}_{3}\text{COOCH}_{3} \text{ and } \text{CH}_{3}\text{CH}_{2}\text{COOH} \rightarrow \text{functional} \\ \text{(A)} \qquad \text{(B)} \qquad \text{isomers} \end{array}$ 

$$\begin{array}{c} CH_{3}COOCH_{3} + H_{2}O \xrightarrow{\text{NaOH or}} CH_{3}COOH + CH_{3}OH \\ (A) & (C) & (D) \end{array}$$

'C' has same functional group as 'B'

$$CH_{3}COOH + NaOH \rightarrow CH_{3}COONa + H_{2}O$$
(C)
$$CH_{3}CH_{2}COOH + NaOH \rightarrow CH_{3}CH_{2}COONa + H_{2}O$$



 $CH_4$  and  $C_2H_6$  are first two members of alkanes.

- **3.** The first homologue of the series with general formula C<sub>n</sub>H<sub>2n</sub> on oxidation with alkaline KMnO<sub>4</sub> gives a compound which is added to water used as a coolant in automobiles. Identify the compound and explain the purpose of its addition to water.
- $\bigcirc$  **Solution:** The first homologue of the series with general formula  $C_n H_{2n}$  is ethene.

$$H_{2}C = CH_{2} + [O] \xrightarrow{KMnO_{4}} CH_{2}OH$$

$$|$$

$$CH_{2}OH$$

$$Ethene glycol$$

Water is used as a coolant in automobiles because it can absorb large amount of heat from the engine due to high specific heat. However, in cold countries, the water may freeze to ice due to very low temperature. Similarly, in summer season water may tend to boil as it absorbs heat. Ethylene glycol is added to water which can prevent freezing as well as boiling. This is because addition of ethylene glycol to water leads to depression in freezing point as well as elevation in boiling point. As a result, water can maintain liquid range over a wide range of temperature.

- **4.** Which reagents oxidize ethyl alcohol to acetaldehyde and acetic acid respectively? Why are two different reagents required for these conversions?
- $\bigcirc$  **Solution:** Alkaline KMnO<sub>4</sub> oxidizes ethyl alcohol to acetic acid and copper at 300°C oxidizes ethyl alcohol to acetaldehyde.

Copper at high temperature removes molecule of hydrogen from ethyl alcohol to form acetaldehyde. It involves only dehydrogenation. Alkaline  $KMnO_4$  produces nascent oxygen and oxidizes ethyl alcohol to acetic acid.

- 5. Why does starch form a thick paste when it is boiled with water?
- Solution: Starch is composed of two units namely amylose unit and amylopectin unit. Amylose is water soluble and amylopectin is water insoluble. On heating with water, amylose dissolves and amylopectin remains as such. Therefore starch becomes partially soluble and forms paste.
- **6.** The vapour density of unsaturated acyclic aliphatic compound X is 35. Mention the chain isomers of alcohol with same number of carbon atoms as in X.
- **Solution:** The molecular mass of unsaturated acyclic aliphatic compound =  $2 \times$  Vapour density  $= 2 \times 35 = 70$ If X is alkene:  $(C_n H_{2n})$ Molecular mass of X = 70 $\Rightarrow$  (n × 12) + (2n × 1) = 70  $\Rightarrow 14n = 70 \Rightarrow n = 5$ Alcohol with 5 carbon atoms is  $C_5H_{12}O$ . The chain isomers of  $C_5 H_{12}$  O are given below. (a)  $CH_3 - CH_2 - CH_2 - CH_2 - CH_2 - OH \Rightarrow 1$ -pentanol (b)  $CH_3 - CH - CH_2 - CH_2 - OH \Rightarrow 3$ -Methyl-1 -butanol CH, CH<sub>2</sub> (c)  $H_{3}C - C - CH_{2} - OH \Rightarrow 2$ , 2- Dimethyl -1 | - propanol CH.
- A hydrocarbon X decolourizes bromine water and its vapour density is 49. Identify the hydrocarbon X.

 $\bigcirc$  **Solution:** Since 'X' decolourises bromine water, it is either alkene or alkyne. The molecular weight of X = 2 × vapour density = 2 × 49 = 98

If X is alkene	If X is alkyne
The molecular weight = 98	The molecular weight = 98
$C_{n}H_{2n} = 98$	$C_n H_{2n-2} = 98$
12n + 2n = 98	$12 \times n + 2n - 2 = 98$
$n = \frac{98}{14} = 7$	$14n = 100 \Longrightarrow n = \frac{100}{14}$
n is a whole number	But n is not a whole number

Х	is	C <sub>7</sub> H <sub>14</sub>
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- 8. A hydrocarbon Y decolourizes bromine water. The saturated compound resulted in this reaction, on treatment with Zn dust gives back hydrocarbon Y. Y when passed through a solution of AgNO<sub>3</sub> dissolved in NH<sub>4</sub>OH gives a white precipitate. The next higher homologue of Y that is X gives ketone A as the product upon addition of water. Identify X, Y, A and give equations.
- **Solution:**



- **9.** Identify the molecular formula of an alkane which has only three chain isomers. Suggest a suitable method of separation of these isomers and draw a comparison of their dipole moments.
- Solution: C<sub>5</sub>H<sub>12</sub> (Pentane) is the molecular formula of alkane which can give three chain isomers. When n-pentane, isopentane and neopentane are

compared, the increase in branching decreases the surface area of the molecule. Therefore, the intermolecular forces of attraction decrease with increase in branching. As a result, the boiling points decrease. n-alkanes have the highest b.pts, iso alkanes have low b.pts and neoalkanes have least b.pts. Therefore, they can be separated by fractional distillation.

$$\begin{array}{c} CH_3 \\ | \\ H_3C-CH_2-CH_2-CH_2-CH_3, H_3C-CH-CH_2-CH_3 \\ n-pentane & isopentane \\ CH_3 \\ | \\ H_3C-C-CH_3 \\ | \\ CH_3 \end{array}$$

neopentane

- **10.** How do you bring about the following conversions?
  - (a) Ethyl alcohol to trichloroacetic acid.
  - (**b**) Ethene from ethanal
  - (c) Ethyne to acetic acid
  - (d) Acetylene to oxalic acid
- *⇔ Solution*:

(a) 
$$CH_3 - CH_2 - OH \xrightarrow{Alk.KMnO_4} CH_3 - COOH$$
  
 $\downarrow Cl_2, P$   
 $CCl_2 - COOH$ 

(b) Ethene from ethanal

$$CH_3CH_2OH \xrightarrow{Conc.H_2SO_4} H_2C = CH_2 + H_2O$$

(c) 
$$HC \equiv CH + 2H_2 \xrightarrow{Pd} H_3C - CH_3$$
  
 $H_3C - CH_3 + Cl_2 \xrightarrow{Sunlight} H_3C - CH_2 - Cl + HCl.$   
 $H_3C - CH_2 - Cl + KOH_{(aq)} \rightarrow CH_3 - CH_2 - OH$   
 $\xrightarrow{Alk.KMnO_{44}} CH_3COOH.$   
(d)  $HC \equiv CH + O_3 \xrightarrow{Zn \ dust} CHO \xrightarrow{Alkaline}_{KMnO_4} COOH$   
 $| \qquad | \qquad | \qquad CH_3 \qquad COOH$ 

Oxalic

acid

# **PRACTICE EXERCISE 9 (A)**

*Directions for questions 1 to 35:* Select the correct alternative from the given choices.

1. Number of hydrogen atoms required to saturate 5 molecules of pentyne is \_\_\_\_\_.

(1)	10	(2)	20
(3)	5	(4)	15

- 2. Preceeding and succeeding homologues of  $C_{10}H_{22}$  respectively are
  - (1)  $C_9H_{20}, C_{11}H_{22}$  (2)  $C_9H_{20}, C_{11}H_{24}$ (3)  $C_{11}H_{24}, C_9H_{20}$  (4)  $C_8H_{18}, C_9H_{20}$
- **3.** The part of IUPAC name which indicates saturation or unstauration is
  - (1) root word (2) primary suffix
  - (3) secondary suffix (4) prefix
- **4.** The various steps for writing IUPAC name of an organic compound are given below. Arrange the steps in the correct order.
  - (a) Numbering of carbon chain
  - (b) Identification of primary suffix
  - (c) Selection of the longest chain
  - (d) Identification of secondary suffix
  - (e) Identification of number and nature of alkyl groups attached to carbon chain
  - $(1) cabde \qquad (2) caebd$
  - $(3) cbdae \qquad (4) acbde$
- 5. Polymerization of ethylene gives \_\_\_\_\_.
  - (1) propylene (2) acetylene
  - (3) polyethylene (4) poly acetylene
- **6.** Addition of water to acetylene in presence of suitable catalyst produces \_\_\_\_\_.
  - (1) acetaldehyde (2) acetone
  - (3) ethyl alcohol (4) acetic acid
- 7. The hydrocarbon obtained by treating sodium ethanoate with soda lime is \_\_\_\_\_.
  - (1) ethane (2) methane
  - (3) propane (4) butane
- **8.** Final product obtained by treating ethane with excess chlorine in presence of sunlight is \_\_\_\_\_.
  - (1) monochloro ethane (2) dichloro ethane
  - (3) tetrachloro ethane (4) hexachloro ethane

- **9.** Which of the hydrocarbons can not decolourize the red coloured solution of bromine in CCl<sub>4</sub>?
  - (1)  $CH_4$  (2)  $C_2H_4$
  - (3)  $C_2H_2$  (4)  $C_3H_6$
- **10.** The hydrocarbons obtained by pyrolysis of ethane are \_\_\_\_\_\_ and \_\_\_\_\_.
  - (1)  $C_{2}H_{4}, C_{2}H_{2}$
  - (2)  $CH_4, C_2H_2$
  - (3)  $C_2H_4$ ,  $CH_4$
  - (4)  $C_{2}H_{2}, C_{6}H_{6}$
- **11.** Which of the following compounds on hydrolysis produces methane?
  - (1)  $CaCN_{2}$  (2)  $CaC_{2}$ (3)  $Al_{4}C_{3}$  (4) SiC
- **12.** Arrange the following hydrocarbons in the increasing order of volume of oxygen required for complete combustion per mole under the same conditions.
  - (a) Ethane (b) Propyne
  - (c) Ethyne (d) Propene
  - (e) Propane (f) Ethene
  - $(1) cfabde \qquad (2) edbafc$
  - $(3) cbfdae \qquad (4) ebdfac$
- **13.** 1 propanol and 2 propanol are \_\_\_\_\_ isomers.
  - (1) functional (2) position
  - (3) chain (4) stereo
- **14.** The product formed by decolourization of KMnO<sub>4</sub> by ethylene is \_\_\_\_\_\_ which is used as \_\_\_\_\_.
  - (1) ethane, oxidant
  - (2) ethyl alcohol, coolant
  - (3) ethylene glycol, antifreeze
  - (4) ethanol, reductant
- **15.** \_\_\_\_\_\_ of molasses takes place in the presence of enzymes.
  - (1) Fermentation
  - (2) Reduction
  - (3) polymerization
  - (4) Oxidation
- 16. \_\_\_\_\_ gives yellow precipitate when treated with  $I_2/NaOH$ .
  - (1) Methanal (2) Methanol
  - $(3) \quad 2 \text{propanol} \qquad (4) \quad 1 \text{propanol}$

- **17.** Which of the following is used to get absolute alcohol from rectified spirit?
  - (1) CaO (2) Ca
  - (3)  $CaCO_3$  (4)  $P_2O_5$
- 18. Which of the following compounds on reduction with NaBH<sub>4</sub> gives 2 – propanol?
  - (1) Ethyl alcohol (2) Acetaldehyde
  - (3) Propanaldehyde (4) Acetone
- **19.** Which of the following enzymes is required for the conversion of starch to maltose?
  - (1) Diastase (2) Maltase
  - (3) Invertase (4) Zymase
- **20.** Arrange the reactions given below in proper sequence for the conversion of ethane to methane.
  - (a) Treatment with sodium hydroxide
  - (b) Treatment with aqueous KOH
  - (c) Treatment with NaOH + CaO
  - (d) Halogenation
  - (e) Reaction with acidified  $K_2 Cr_2 O_7$
  - $(1) e a d b c \qquad (2) d b e a c$
  - (3) e c b a d (4) d e a b c
- **21.** \_\_\_\_\_ give lather even with hard water due to the formation of \_\_\_\_\_.
  - (1) Soaps, soluble salts
  - (2) Detergents, soluble salts
  - (3) Detergents, insoluble salts
  - (4) Soaps, insoluble precipitates
- **22.** The chemical name of vitamin  $B_{12}$  is \_\_\_\_\_
  - (1) Calciferol (2) tocopherol
  - (3) pyridoxine (4) cyanocobalamine
- 23. In deodorant soaps, the additive added is
  - (1) glycerol
  - (2) stearic acid
  - (3) potassium bicarbonate
  - (4) 3, 4, 5-Tribromo salicylaldehyde
- 24. In case of natural rubber, the monomeric units are
  - (1) isoprene (2) propene
  - (3) 1, 3-butadiene (4) vinyl chloride
- **25.** Which among the following is a chromophore of azo dyes?

(1)	$\mathbf{\hat{\mathbf{C}}}$	(2)	NO
(1)	, C=O	(2)	-110

(3)  $-N \equiv N -$  (4)  $-NO_{2}$ 

**26.** Complete the blanks by identifying X and Y.



- (1) Ethanal, ethene
   (2) Ethanol, ethene
   (3) Ethanal, ethyne
   (4) Ethanol, ethyne
- **27.** Compound A on treatment with copper at 300°C gives B and a gas C. It is possible to get back A from B and C in presence of D. Both B and A on treatment with certain reagent give same compound E, which on treatment with A, gives compound F with fruity smell. Identify the functional isomer of F.
  - (1)  $CH_3OH$  (2) HCOOH (3)  $CH_3COOH$  (4) HCHO
- **28.** The molecular formula of organic compound X is C<sub>5</sub>H<sub>12</sub>O. The possible number of position isomers of X are
  - (1) 4 (2) 3
  - (3) 2 (4) 7
- **29.** The molar ratio of CO<sub>2</sub> and H<sub>2</sub>O produced by the combustion of one mole of hydrocarbon X is 5 : 4. Identify the succeeding and preceeding homologues of X.
  - (1)  $C_6H_{14}, C_4H_{10}$  (2)  $C_6H_{12}, C_4H_8$ (3)  $C_5H_{10}, C_7H_{14}$  (4)  $C_6H_{10}, C_4H_6$
- **30.** Give the general formulae of monosaccharides and polysaccharides.
  - (1)  $(CH_2O)_n, C_n(H_2O)_{2n}$
  - (2)  $(CH_2O)_{2n}, C_n(H_2O)_n$
  - (3)  $(CH_2O)_n, C_n(H_2O)_{n-1}$
  - (4)  $(CH_2O)_{n-1}, C_n(H_2O)_{n+1}$
- **31.** From the list of alkenes given below, identify the alkenes which on ozonolysis give only ketones.
  - (a) 2 methyl1 butene
  - (b) 1 butene
  - (c) 2, 3 dimethyl 2 butene
  - (d) 3 methyl 2 pentene
  - (e) 3, 4 dimethyl 3 hexene
  - (f) 2, 5 dimethyl 2, 4 hexadiene

- (1) a, b and c (2) c, e and f
- (3) d, e and f (4) c, d and e
- **32.** From the list of compounds given, identify the compound which gives formaldehyde on treatment with suitable reagent.
  - (a) Ethene (b) Ethyne
  - (c) Methanol (d) Formic acid
  - (e) Ethanol (f) Acetic acid
  - (1) a, c and d (2) b, c and d
  - (3) e, f and b (4) b, e and f
- 33. Identify position isomers among the following.
  - (a) 3 methyl 2 hexene
  - (b) 2, 4 dimethyl 2 pentene
  - (c) 2, 3 dimethyl 2 pentene
  - (d) 4 methyl 2 hexene
  - (e) 3, 4 dimethy 12 pentene

- (1) a, d : b, c, e
- (2) a, b: d, c, e
- (3) b, c : a, e, d
- (4) d, b : a, c, e
- 34. Identify disaccharides among the following.
  - (a) Stachyose (b) Lactose
  - (c) Maltose(d) Raffinose(e) Sucrose
  - (1) a, b, e (2) c, d, e
  - (3) b, d, e (4) b, c, e
- **35.** From the compounds given below, identify the compounds which exhibit chain, position and functional isomerism.
  - (a) Alcohols(c) Ketones

(1) a, b

- (b) Aldehydes(d) Carboxylic acids
- (2) b, c
- (3) c, d (4) a, c

## **PRACTICE EXERCISE 9 (B)**

*Directions for questions 1 to 35:* Select the correct alternative from the given choices.

- 1. The part of IUPAC name of the organic compound which denotes functional group is called \_\_\_\_\_.
  - (1) prefix
  - (2) primary suffix
  - (3) secondary suffix
  - (4) roor word
- **2.** 1 Pentene and 3 Methyl–1–butene are \_\_\_\_\_\_ isomers.

(1) chain	(2)	position
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- (3) functional (4) metamers
- **3.** Which of the following compounds contains a triple bond?

(1)	$C_2H_6$	(2)	$C_4H_8$
(3)	$C_5H_8$	(4)	$C_{5}H_{12}$

**4.** What is the correct structural formula of 3 – Methyl-1-pentyne?

$$\begin{array}{ccccc} H & H & H \\ | & | & | \\ (1) & H - C - C - C - C - C = CH \\ | & | & | \\ H & H & H \end{array}$$

(2) 
$$H - C - C - C - C = CH$$
  
 $H - H - C - C - C - C = CH$   
 $H - H - CH,$ 

(3) 
$$H - C \equiv C - C - C - CH_3$$
  
|  
|  
|  
|  
|  
|  
|  
|

- **5.** Hexane exhibits chain isomerism. One of its isomers possesses two tertiary carbon atoms. Arrange the following steps in proper sequence to write IUPAC name for the respective isomer.
  - (a) Identification of number of carbon atoms in the main chain
  - (b) Writing the structure of respective isomer of hexane
  - (c) Numbering of carbon chain

- (d) Giving position numbers for the alkyl groups attached to main chain
- (e) Identification of nature of tertiary carbon atom
- (1) baced (2) eabfd
- (3) b e c a d (4) e b a c d
- 6. \_\_\_\_\_ on hydrolysis gives ethyne gas.
  - (1)  $CaC_2$  (2)  $BeC_2$
  - (3)  $Al_4C_3$  (4) SiC
- 7. Acetylene can form red precipitate of \_\_\_\_\_ when it is passed through ammonical cuprous chloride.
  - (1) copper sulphate
  - (2) copper acetylide
  - (3) copper nitrate
  - (4) polypropylene
- 8. Polymerization of acetylene gives \_\_\_\_\_.
  - (1) propylene (2) poly acetylene
  - (3) benzene (4) polypropylene
- **9.** Saturated compound formed by the addition of halogen to acetylene is \_\_\_\_\_.
  - (1) 1, 1, 2, 2, tetrahaloalkane
  - (2) 1, 2 dihaloalkane
  - (3) 1, 1 dihaloalkane
  - (4) 2, 2 dihaloalkane
- **10.** Complete hydrogenation of ethyne gives \_\_\_\_
  - (1) ethane (2) ethene
  - (3) methane (4) none of these
- **11.** What is the number of hydrogen atoms present in the hydrocarbon formed by the hydrogenation of ethylene?

(1)	4	(2)	6
(3)	8	(4)	2

**12.** How many grams of hydrogen is required to saturate one mole of acetylene?

(1)	3 g	(2)	6 g
(3)	10 g	(4)	4 g

- **13.** The compound formed when ethyl alcohol is treated with conc.H<sub>2</sub>SO<sub>4</sub> at 170°C is \_\_\_\_\_.
  - (1) ethane (2) ethene
  - (3) ethyne (4) ethanal
- **14.** By treating alkyl chloride with aqueous KOH, \_\_\_\_\_\_ is produced along with KCl.
  - (1) alcohol (2) aldehyde
  - (3) alkane (4) alkene

- **15.** IUPAC name of  $CH_3COOH$  is
  - (1) acetic acid (2) formic acid
  - (3) methanoic acid (4) ethanoic acid
- **16.** Which of the following compounds can be used to prepare ethene from ethyl alcohol?
  - (1)  $Al_2O_3$  (2)  $H_2SO_4$
  - (3) CaO (4) Both (1) and (2)
- **17.** Which among the following reactions does not give methyl alcohol?
  - (1) The reaction of ethylene with  $H_2SO_4$  at 80°C
  - (2) The reaction of water gas with hydrogen at high temperature
  - (3) Alkaline hydrolysis of methyl bromide
  - (4) Both (1) and (2)
- **18.** The secondary suffix, 'one' indicates the following functional group in the compound.

р

(1) -COOH  
(2) 
$$\stackrel{R}{\sim} C = O$$
  
(3)  $\stackrel{H}{\sim} C = O$   
(4) -OH

- **19.** Identify the correct sequence of given steps for the conversion of calcium carbide to methyl alcohol.
  - (a) Reaction with aqueous KOH
  - (b) Hydrolysis
  - (c) Reaction with soda lime
  - (d) Reaction with  $HgSO_4/H_2SO_4$
  - (e) Reaction with  $HgSO_4$
  - (f) Reaction with  $PCl_{\epsilon}$
  - (1) bdecfa (2) bdcafe
  - (3) bfdeac (4) dbcefa
- **20.** \_\_\_\_\_\_ is the additive used in transparent soaps.
  - (1) Potassium bicarbonate
  - (2) Stearic acid
  - (3) Salicylic acid
  - (4) Glycerine
- 21. \_\_\_\_\_ is used to remove the sulphur impurity from crude oil.
  - (1)  $SO_2$  (2) CuO
  - (3)  $P_2O_5$  (4)  $NO_2$
- **22.** Antiseptics are a class of \_\_\_\_\_ drugs.
  - (1) analgesic (2) antipyretic
  - (3) tranquilizer (4) antibiotic

- **23.** The compound with which hexamethylene diamine on polymerization gives nylon–6, 6 is
  - (1) citric acid
  - (2) adipic acid
  - (3) oxalic acid
  - (4) tartaric acid
- 24. The chemical name of vitamin D is
  - (1) retinol (2) ferridoxin
  - (3) calciferol (4) ergosterol
- **25.** Example of a basic dye is
  - (1) alizarin (2) indigo
  - (3) martius yellow (4) malachite green
- **26.** A hydrocarbon on ozonolysis gives one mole each of compounds A and B. Both A and B on reduction with sodium borohydride gives compounds C and D belonging to same homologous series. C has no position isomer whereas D has position isomer. A and B do not belong to the same homologous series. However, both A and B on oxidation with acidfied KMnO<sub>4</sub> give same compound. Identify the hydrocarbon.
  - (1) 3 -merthyl 2 -butene
  - (2) 2, 3 dimethyl 1 butene
  - (3) 2 -methyl 2 -butene
  - (4) 3, 4 dimethyl 1 butene
- **27.** Mention the reagent used for the hydroxylation of alkenes.
  - (1) Cold dil alkaline  $KMnO_4$
  - (2) Cold dil acidified  $KMnO_4$
  - (3) Cold dil acifified  $K_2 Cr_2 O_7$
  - (4) Cold dil alkaline  $K_2 Cr_2 O_7$
- **28.** Write the name of product obtained when ethene reacts with  $O_3$ 
  - (1) Acetaldehyde (2) Formaldehyde
  - (3) Acetone (4) Formic acid
- **29.** Two metals X and Y have 3 and 2 electrons in their valence shells 'M' and 'N' respectively. These metals can form binary compounds A and B with the same non-metal carbon. Both A and B can undergo hydrolysis forming hydrocarbons C and D. Identify C and D.
  - (1)  $C_2H_6, C_3H_4$  (2)  $C_3H_6, C_3H_4$ (3)  $CH_4, C_2H_2$  (4)  $C_4H_{10}, C_3H_6$
- 30. The number structural isomers for pentene are
  - (1) 3 (2) 4
  - (3) 5 (4) 6

- **31.** Ethyne on treatment with two reagents separately gives different products. One of the products belongs to same class of compounds. Identify the reagents.
  - (a)  $O_3 + Zn dust$  (b)  $H_2SO_4 + HgSO_4$ (c) Alkaline KMnO<sub>4</sub> (d) HOCl
  - (1) a and d (2) b and c
  - (3) a and c (4) b and d
- **32.** From the list of compounds given below, identify the compounds which can give only two position isomers.
  - (a) Hexane (b) Pentene
  - (c) Heptyne (d) Propanol
  - (e) Pentanone
  - (1) a, d and b (2) b, d and e
  - (3) e, a and c (4) b, c and d
- **33.** Identify the essential amino acids among the following.
  - (a) Leucine (b) Valine
  - (c) Glycine (d) Lysine
  - (e) Serine
  - (1) a, b and c (2) b, d and e
  - (3) a, b and d (4) b, d and c
- **34.** Identify the compounds which give yellow precipitate with  $I_2$  + NaOH.
  - (a) Ethyl alcohol (b) Acetone
  - (c) Propyl alcohol (d) 2 propanol
  - (e) 3 butanone (f) Butanal
  - (1) c, e and f
  - (2) a, d and f
  - (3) e, f and a
  - (4) a, b and d
- **35.** Identify the incorrect statements among the following.
  - (a) The relative sweetness of fructose is the maximum and it is a reducing sugar.
  - (b) The source of milk is lactose and it is non reducing sugar.
  - (c) Maltose possesses glycoside bond between one glucose unit and one fructose unit and it is reducing sugar.
  - (d) Glucose possesses aldehyde group and it is a non reducing sugar.
  - (e) Molecular formula of sucrose is  $C_{12}H_{22}O_{11}$  and possesses glycoside bond between two glucose units.
  - (1) a, b and c (2) b, c and d
  - (3) c, d and e (4) a, d and e

# ANSWER KEYS

#### PRACTICE EXERCISE 9 (A)

1. 2	<b>2.</b> 2	<b>3.</b> 2	<b>4.</b> 1	5. 3	<b>6.</b> 1	<b>7.</b> 2	<b>8.</b> 4	<b>9.</b> 1	<b>10.</b> 3
11. 3	<b>12.</b> 1	<b>13.</b> 2	14. 3	<b>15.</b> 1	<b>16.</b> 4	<b>17.</b> 1	<b>18.</b> 4	<b>19.</b> 1	<b>20.</b> 2
<b>21.</b> 2	<b>22.</b> 4	<b>23.</b> 4	<b>24.</b> 1	<b>25.</b> 3	<b>26.</b> 2	<b>27.</b> 3	<b>28.</b> 2	<b>29.</b> 4	<b>30.</b> 3
<b>31.</b> 2	<b>32.</b> 1	<b>33.</b> 1	<b>34.</b> 4	<b>35.</b> 4					
PRACTIC	E EXERCISE	9 (B)							
1. 3	<b>2.</b> 1	3. 3	<b>4.</b> 3	5. 3	<b>6.</b> 1	<b>7.</b> 2	<b>8.</b> 3	<b>9.</b> 1	<b>10.</b> 1
11. 2	<b>12.</b> 4	13. 2	<b>14.</b> 1	15. 4	<b>16.</b> 4	<b>17.</b> 1	<b>18.</b> 3	<b>19.</b> 1	<b>20.</b> 4
<b>21.</b> 2	<b>22.</b> 4	<b>23.</b> 2	<b>24.</b> 3	<b>25.</b> 1	<b>26.</b> 3	<b>27.</b> 1	<b>28.</b> 2	<b>29.</b> 3	<b>30.</b> 3
<b>31.</b> 3	<b>32.</b> 2	<b>33.</b> 3	<b>34.</b> 4	<b>35.</b> 3					

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