

Assignment - 3

Â **Organic Chemistry**



ORGANIC CHEMISTRY
Assignment Sheet

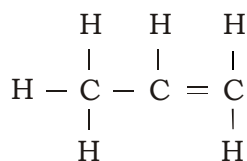
1. (a) For each of the compounds :
- (i) Ethane (ii) Vinegar,
 - (iii) Marsh gas, draw the relevant structural formula.
- (b) (i) What words is used to describe these three compounds taken together?
(ii) What is the special feature of the structure of :
- 1. C_2H_4 ?
 - 2. C_2H_2 ?
- (iii) What type of reaction is common to both of these compounds?[1999]
2. (a) Give the names and structural formula of :
- (i) A saturated hydrocarbon.
 - (ii) An unsaturated hydrocarbon with a double bond.
- (b) Copy and complete the following sentence :
A saturated hydrocarbon will undergo reactions whereas the typical reaction of an unsaturated hydrocarbon is
- (c) (i) Write the equation for the laboratory preparation of ethyne (acetylene) from calcium carbide.
(ii) What is the special feature of the structure of ethyne?
(iii) What would you see when ethyne is bubbled through a solution of bromine in carbon tetrachloride?
(iv) Name the addition product formed between ethene and water.[2000]
3. (a) Choosing only words from the following list, write down the appropriate words to fill in the blanks (i) to (v) below :
Addition, Carbohydrates, C_nH_{2n-2} , C_nH_{2n+n} Electrochemical, Homologous, Hydrocarbons, Saturated, Substitution, Unsaturated.
The alkanes form an/a (i) series with the general formula (ii) The alkanes are (iii) (iv) which generally undergo (v) reactions.
- (b) Ethanol can be converted to ethene which can then be changed to ethane. Fill in the blanks by choosing the correct word/words given within brackets.
- (i) The conversion of ethanol to ethene is an example of (dehydration / dehydrogenation)
 - (ii) Converting ethanol to ethene requires the use of (concentrated hydrochloric acid / concentrated nitric acid / concentrated sulphuric acid)
 - (iii) The conversion of ethene to ethane is an example of (hydration / hydrogenation)
 - (iv) The catalyst used in the conversion of ethene to ethane is commonly (iron/cobalt/nickel)
- (c) Write down the equation for the preparation of ethyne from calcium carbide. [2001]
4. (a) The list of some organic compounds is given below :
Ethanol, ethane, methanol, methane, ethyne and ethene
From the list above, name a compound :
- (i) Formed by the dehydration of ethanol by concentrated sulphuric acid.

- (ii) Which will give red precipitate with ammonical cuprous chloride solution.
- (iii) Which forms methanoic acid on oxidation in the presence of copper at 200°C.
- (iv) Which has vapour density 14 and turns alkaline potassium permanganate green.
- (v) Which forms chloroform on halogenation in the presence of sunlight.
- (vi) Which decolourises bromine solution in carbon tetrachloride.
- (b) Write balanced equations for the preparation of the following.
- (i) Ethane from sodium propionate
- (ii) Ethene from ethanol
- (iii) Ethyne from calcium carbide
- (iv) Ethanoic acid from ethane
5. (a) What is the type of reaction taking place between ethane and chlorine to form monochloroethane?
- (b) The reaction between ethene and chlorine forms only one product. Name the type of this reaction.
- (c) (i) Draw the structural formula of ethene.
- (ii) What is the feature of the ethene structure which allows ethene to react with chlorine in the way it does? **[2002]**
6. (a) Which compound should be heated with soda lime to obtain ethane gas in the laboratory?
- (b) Write the equation for the reaction in (a) above.
- (c) Write a balanced equation for the complete combustion of ethane.
- (d) Name a solid which can be used instead of concentrated sulphuric acid to prepare ethylene by the dehydration of ethanol.
- (e) Name a reagent which can be used to distinguish between ethane and ethene.
- (f) Ethylene forms an addition product with chlorine. Name this addition product and write its structural formula. **[2003]**
7. (a) Write the equation for the preparation of ethylene from ethyl alcohol.
- (b) Write the general formula for a saturated hydrocarbon and give one example of a saturated hydrocarbon with its structural formula.
- (c) Name a compound which will give acetylene gas when treated with water. **[2004]**
8. (a) Draw the structural formula of a compound with two carbon atoms in each of the following cases :
- (i) An alkane with a carbon to carbon single bond.
- (ii) An alcohol containing two carbon atoms.
- (iii) An unsaturated hydrocarbon with a carbon to carbon triple bond.
- (b) Ethane, Ethene, Ethanoic acid, Ethyne, Ethanol
From the box given above, name :
- (i) The compound with – OH as the part of its structure.
- (ii) The compound with – COOH as the part of its structure.
- (iii) Homologue of homologous series with general formula C_nH_{2n} .

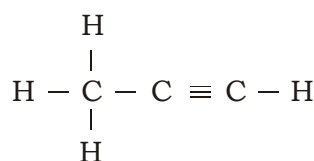
- (c) Write the equations for the following laboratory preparations :
- Ethane from sodium propionate
 - Ethene from iodoethane
 - Ethyne from calcium carbide
 - Methanol from iodomethane
- [2005]**
9. Write balanced chemical equations for the following reactions :
- Ethane and oxygen in the presence of molybdenum oxide.
 - Preparation of methane from anhydrous sodium ethanoate (sodium acetate.)
 - Heating ethanol of 443K (170°C) in the presence of concentrated sulphuric acid.
- [2006]**
10. (a) Draw the structural formula of the two isomers of butane. Give the correct IUPAC name of each isomer.
- (b) State one use of acetylene.
- [2006]**
11. (a) Give the correct IUPAC name and the functional group for each of the compounds whose structural formulae are given below :
- $$\begin{array}{c} \text{H} \quad \text{H} \quad \text{O} \\ | \quad | \quad || \\ \text{H} - \text{C} - \text{C} - \text{C} - \text{H} \\ | \quad | \\ \text{H} \quad \text{H} \end{array}$$
 - $$\begin{array}{c} \text{H} \quad \text{H} \quad \text{O} \\ | \quad | \quad || \\ \text{H} - \text{C} - \text{C} - \text{C} - \text{OH} \\ | \quad | \quad | \\ \text{H} \quad \text{H} \quad \text{H} \end{array}$$
- (b) (i) Write the equation for the preparation of carbon tetrachloride from methane.
- (ii) Draw the structural formula of ethyne.
- (iii) How is the structure of alkynes different from that of alkenes?
- (c) Fill in the blanks with the correct words from the brackets :
- Alkenes are the (i) (analogous / homologous) series of (ii) (saturated / unsaturated) hydrocarbons. They differ from alkanes due to the presence of (iii) (double / single) bonds. Alkenes mainly undergo (iv) (addition / substitution) reactions.
- [2006]**
12. Complete the following table which relates to three homologous series of hydrocarbons :
- [2007]**

General formula	C_nH_{2n}	$\text{C}_n\text{H}_{2n-2}$	$\text{C}_n\text{H}_{2n+2}$
IUPAC name of the homologous series			
Characteristic bond type			Single bond
IUPAC name of the first member of the series			
Type of reaction with chlorine		Addition	

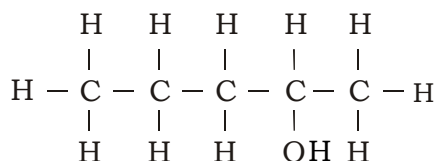
13. Give the IUPAC names of the following compounds numbered (a) to (e). The IUPAC name of the compounds on left are to guide you into giving the correct IUPAC names of the compounds on the right. **[2007]**



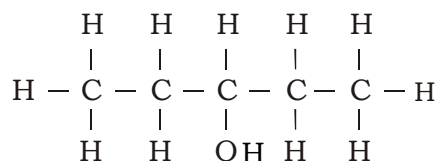
Propene



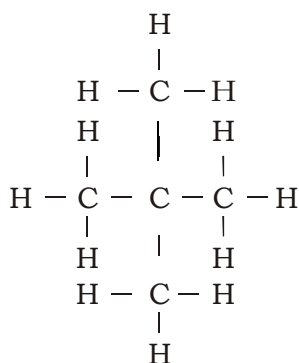
(a)



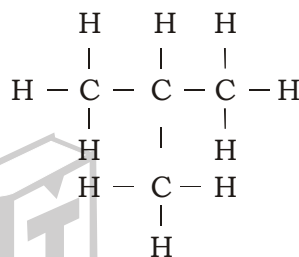
Pentan-2-ol



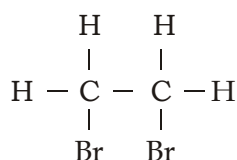
(b)



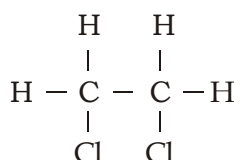
2, 2 - dimethylpropane



(c)



1, 2 dibromo ethane



(d)

14. (a) Distinguish between the saturated hydrocarbon ethane and the unsaturated hydrocarbon ethene by drawing their structural formulae.
- (b) Addition reactions and substitution reactions are type of organic reactions. Which type of reaction is shown by :
- (i) ethane? (ii) ethene
- (c) (i) Write the equation for the complete combustion of ethane.
- (ii) Using appropriate catalysts, ethane can be oxidized to an alcohol, an aldehyde and an acid. Name the alcohol, aldehyde and acid formed when ethane is oxidized.
- (d) (i) Why is pure acetic acid known as glacial acetic acid?
- (ii) What type of compound is formed by the reaction between acetic acid and alcohol?

[2008]

15. Write the equations for the following reactions :
- Ethene and water (steam)
 - Bromoethane and an aqueous solution of sodium hydroxide
 - Calcium carbide and water
- [2008]
16. Name the organic compound prepared by each of the following reactions:
- $C_2H_5COONa + NaOH$
 - $CH_3I + 2[H]$
 - $C_2H_5Br + KOH$ (alcoholic solution)
 - $CaC_2 + 2H_2O$
- [2008]
17. (a) Give chemical equation for :
- the laboratory preparation of methane from sodium acetate.
 - the reaction of one mole of ethene with one mole of chlorine gas.
 - the preparation of ethyne from 1, 2-dibromoethane.
- [2009]
- (b) State how the following conversions can be carried out :
- Ethyl chloride to ethyl alcohol
 - Ethyl chloride to ethene
 - Ethene to ethyl alcohol
 - Ethyl alcohol to ethene
- [2009]
18. Fill in the blanks with the correct words from the brackets.
The general formula for alkanes is (a)
(C_nH_{2n} / C_nH_{2n-2} / C_nH_{2n+2}). For alkynes the general formula is (b).....
(C_nH_{2n} / C_nH_{2n-2} / C_nH_{2n+2})
- [2009]
19. Methane is the first member of alkane, when it is treated with excess of chlorine in the presence of diffused sunlight it forms carbon tetrachloride. Draw the appropriate structural formula of carbon tetrachloride and state the type of bond present in it.
- [2009]
20. Find the odd one out explain your choice.
- C_3H_8 , C_5H_{10} , C_2H_6 , CH_4 .
 - Formic acid, Nitric acid, Acetic acid, Propanoic acid.
- [2009]
21. Compound A is bubbled through bromine dissolved in carbon tetrachloride and the product is $CH_2Br - CH_2Br$.
- [2010]
- A $\xrightarrow{Br_2/CCl_4}$ $CH_2Br - CH_2Br$
- Draw the structural formula of A.
 - What type of reaction has A undergone ?
 - What is your observation ?
 - Name (not formula) the compound formed when steam reacts with A in the presence of phosphoric acid.
 - What is the procedure for converting the product of (b) (iv) back to A ?

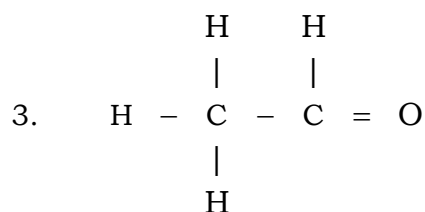
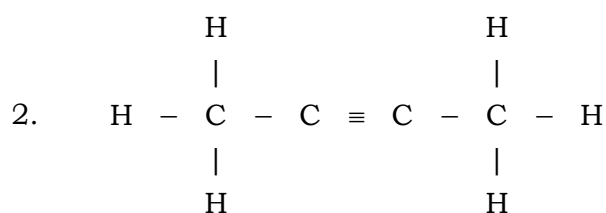
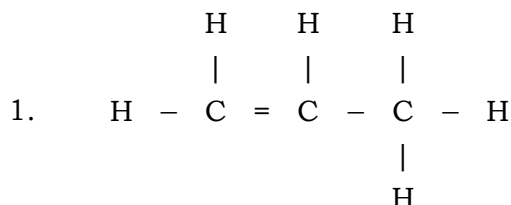
22. Draw the structural formula for each of the following :
(i) Ethanoic acid (ii) But-2-yne **[2010]**
23. Write balanced chemical equation for the following :
(i) Monochloro ethane is hydrolysed with aqueous KOH.
(ii) A mixture of sodalime and sodium acetate is heated.
(iii) Ethanol under high pressure and low temperature is treated with acidified potassium dichromate.
(iv) Water is added to calcium carbide.
(v) Ethanol reacts with sodium at room temperature. **[2011]**
24. Choose the correct word/phrase from within the brackets to complete the following sentences:
(i) The catalyst used for conversion of ethene to ethane is commonly (nickel/ iron/ cobalt).
(ii) When acetaldehyde is oxidized with acidified potassium dichromate, it forms (ester/ ethanol/ acetic acid).
(iii) Ethanoic acid reacts with ethanol in presence of concentrated H_2SO_4 , so as to form a compound and water. The chemical reaction which takes place is called (dehydration/ hydrogenation/ esterification)
(iv) Write the equation for the reaction taking place between 1, 2 - dibromoethane and alcoholic potassium hydroxide.
(v) The product formed when ethene gas reacts with water in the presence of sulphuric acid is (ethanol/ ethanal/ ethanoic acid) **[2011]**
25. State the observation : Bromine vapours are passed into a soln. of ethyne in carbon tetrachloride. **[2012]**
26. From - Ethyne, ethanol, acetic acid, ethene, methane. Choose the one which relates to (i) to (iv)
(i) An unsaturated hydrocarbon used for welding purposes.
(ii) An organic compound whose functional group is carboxyl.
(iii) A hydrocarbon which on catalytic hydrogenation gives a saturated hydrocarbon.
(iv) An organic compound used as a thermometric liquid. **[2012]**
27. (i) Why is pure acetic acid known as glacial acetic acid.
(ii) Give a chemical equation for the reaction between ethyl alcohol & acetic acid. **[2012]**
28. Rewrite the correct statement with the missing word/s: Ethyl alcohol is dehydrated by sulphuric acid at a temperature of about $170^\circ C$. **[2012]**
29. Give the structural formula for : (i) Methanoic acid, Ethanal, (iii) Ethyne, (iv) Acetone, (v) 2-methylpropane. **[2012]**

30. Identify the gas evolved in the following reactions when :
sodium propionate is heated with soda lime. [2013]
31. Give suitable chemical terms for the following : [2013]
A reaction in which hydrogen of an alkane is replaced by a halogen.
32. Give a chemical test to distinguish between the following pairs of compounds:
Ethene gas and ethane gas. [2013]
33. Identify the statement that is incorrect about alkanes : [2013]
(a) They are hydrocarbons.
(b) There is a single covalent bond between carbon and hydrogen.
(c) They can undergo both substitution as well as addition reactions.
(d) On complete combustion they produce carbon dioxide and water.
34. (a) Give balanced equations for the laboratory preparations of the following organic compounds: [2013]
(i) A saturated hydrocarbon from iodomethane.
(ii) An unsaturated hydrocarbon from an alcohol.
(iii) An unsaturated hydrocarbon from calcium carbide.
(iv) An alcohol from ethyl bromide.
(b) Give the structural formulae for the following:
(i) An isomer of n-butane.
(ii) 2-propanol.
(iii) Diethyl ether.
(c) Give reasons for the following:
(i) Methane does not undergo addition reactions, but ethene does.
(ii) Ethyne is more reactive than ethane.
(iii) Hydrocarbons are excellent fuels. [2013]
35. Choose the correct answer from the options given below :
The I.U.P.A.C. name of acetylene is,
(A) propane
(B) propyne
(C) ethene
(D) ethyne [2014]
36. Fill in the blanks from the choices given within brackets :
The compound formed when ethanol reacts with sodium is
(sodium ethanoate, sodium ethoxide, sodium propanoate) [2014]
37. Give one word or phrase for the following :
Hydrocarbons containing a $\begin{array}{c} \text{O} \\ || \\ \text{C} \end{array}$ functional group. [2014]

38. Write balanced equations for the following :
Preparation of ethane from sodium propionate. **[2014]**
39. State the conditions required for the following reactions to take place:
(i) Catalytic hydrogenation of ethyne.
(ii) Preparation of ethyne from ethylene dibromide.
(iii) Catalytic oxidation of ammonia to nitric oxide.
(iv) Any two conditions for the conversion of sulphur dioxide to sulphur trioxide. **[2014]**
40. Give balanced equations for the following :
Preparation of ethanol from monochloroethane and aq. sodium hydroxide. **[2014]**
41. Give the structural formula of the following :
(i) ethanol.
(ii) 1-propanal
(iii) ethanoic acid
(iv) 1,2, dichloroethane. **[2014]**
42. Choose the most appropriate answer for each of the following:
Identify the statement which does not describe the property of alkenes:
(A) They are unsaturated hydrocarbons
(B) They decolourise bromine water
(C) They can undergo addition as well as substitution reactions
(D) They undergo combustion with oxygen forming carbon dioxide **[2014]**
43. (a) Give balanced chemical equations for the following conversions:
(i) Ethanoic acid to ethyl ethanoate.
(ii) Calcium carbide to ethyne.
(iii) Sodium ethanoate to methane.
(b) Using their structural formulae identify the functional group by circling them:
(i) Dimethyl ether.
(ii) Propanone.
(c) Name the following:
(i) Process by which ethane is obtained from ethene.
(ii) A hydrocarbon which contributes towards the greenhouse effect.
(iii) Distinctive reaction that takes place when ethanol is treated with acetic acid.
(iv) The property of element by virtue of which atoms of the element can link to each other in the form of a long chain or ring structure.
(v) Reaction when an alkyl halide is treated with alcoholic potassium hydroxide. **[2015]**
44. Fill in the blanks with the choices given in brackets.
Conversion of ethene to ethane is an example of _____
(hydration/hydrogenation). **[2016]**
45. Write balanced chemical equations for each of the following:
Preparation of ethanol from Ethyl Chloride. **[2016]**

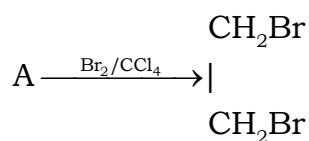
46. Identify the term/substance in each of the following :
- (i) The catalyst used in the conversion of ethyne to ethane.
- (ii) The type of reactions alkenes undergo. [2016]

47. Write the IUPAC names of each of the following: - [2016]



48. Write a balanced chemical equation for each of the following:
- (i) Burning of ethane in plentiful supply of air.
- (ii) Action of water on Calcium carbide.
- (iii) Heating of Ethanol at 170°C in the presence of conc. Sulphuric acid. [2016]
49. Give the structural formulae of each of the following
- (i) 2-methyl propane
- (ii) Ethanoic acid
- (iii) Butan-2-ol [2016]

50. Equation for their reaction when compound A is bubbled through bromine dissolved in carbon tetrachloride is as follows:



- (i) Draw the structure of A.
- (ii) State your observation during this reaction. [2016]

51. Fill in the blanks from the choices given in brackets:
The compound formed when ethene reacts with Hydrogen is _____ .
(CH₄, C₂H₆, C₃H₈) [2017]
52. Choose the correct answer from the options given below :
If the molecular formula of an organic compound is C₁₀H₁₈ it is;
1. alkene
2. alkane
3. alkyne
4. Not a hydrocarbon [2017]
53. Identify the substance underlined, in each of the following cases:
An organic compound containing - COOH functional group. [2017]
54. Write a balanced chemical equation for each of the following :
Preparation of methane from iodomethane. [2017]
55. Draw the structural formula for each of the following :
1. 2, 3 - dimethyl butane
2. diethyl ether
3. propanoic acid [2017]
56. Identify the term or substance based on the descriptions given below :
(i) Ice like crystals formed on cooling an organic acid sufficiently.
(ii) Hydrocarbon containing a triple bond used for welding purposes.
(iii) The property by virtue of which the compound has the same molecular formula but different structural formulae.
(iv) The compound formed where two alkyl groups are linked by $\begin{array}{c} \text{O} \\ \parallel \\ -\text{C}- \end{array}$ group. [2017]
57. **Give a balanced chemical equation for each of the following :**
(i) Preparation of ethane from Sodium propionate.
(ii) Action of alcoholic KOH on bromoethane. [2017]

