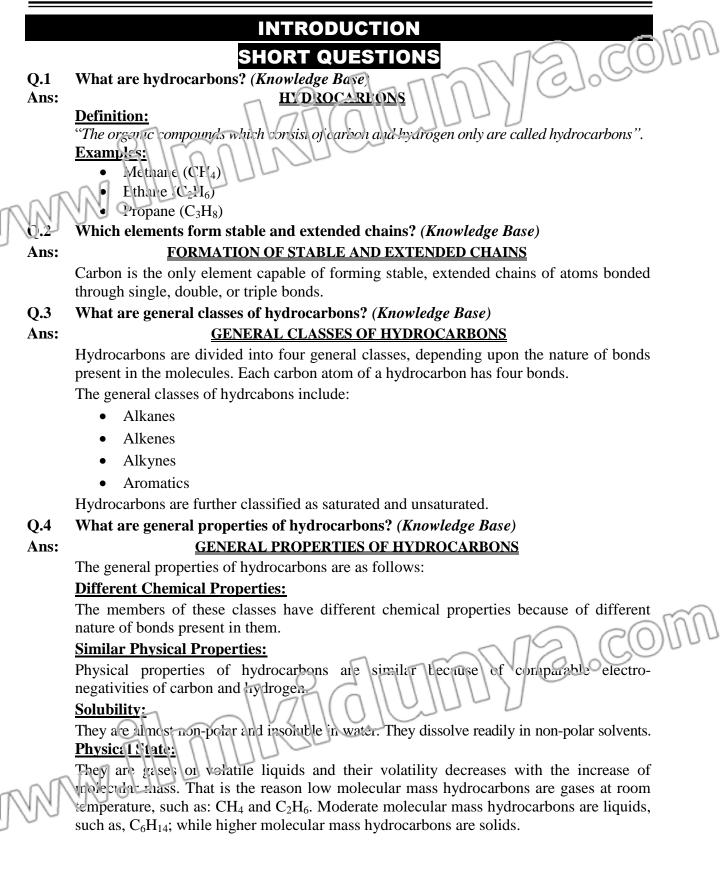
CHAPTER

HYDROCARBONS CLOCO

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Q.5 What is importance of hydrocarbons? (*Knowledge Base*)

Ans:

IMPORTANCE OF HYDROCARBONS

The importance of hydrocarbons is as follows:

As Fossil Fuels:

Fossil fuels are hydrocarbons. They are not only n ajor sources of energy but also are raw materials used to make thousands of consumer products.

As Starting Materials:

Hydrocartons are he starting materials for the synthesis of organic chemicals of continercial importance.

Other Uses:

These chemicals are essential for making:

- Plastics
- Synthetic rubbers
- Synthetic fibres
- Fertilizers

INTRODUCTION MULTIPLE CHOICE QUESTIONS

1.	The simplest class of organic compounds is: (K.B)			
	(A) Carbides	(B) Hydrocarbons		
	(C) Carbonates	(D) Nitrates		
2.	Hydrocarbons are divided into classes	:: (K.B)		
	(A) 4	(B) 3		
	(C) 2	(D) 1		
3.	Each carbon atom of hydrocarbon has	s bonds: (K.B)		
	(A) 4	(B) 3		
	(C) 2	(D) 1		
4.	Hydrocarbons are and	in water. (<i>K.B</i>)		
	(A) Polar, insoluble	(B) Non-polar, insoluble		
	(C) Polar, soluble	(D) Non-polar, soluble		
5.	These are hydrocarbons: (K.B)			
	(A) Fossil fuels	(B) Coals		
	(C) Petroleum	(D) All of these	210000	
	HYDROC	CARBONS		
			<u> </u>	
	long qi	JESTIONS		
Q.1	Describe the types of hydrocarbons?	Knowledge Base)	(DGK 2016 G-II)	
×		OR		
	Define and classify hydrocarbons.		(MNT 2016 G-II)	
O Th)R	``````````````````````````````````````	
ANI,	Explain saturated and unsaturated hy	drocarbons with exmaples.	(BWP 2016 G-II)	
Ans:	<u>HYDROC</u>	ARBONS		
	Definition:			
	"The organic compounds which cons	sist of carbon and hydrogen	only are called	
	hydrocarbons".			

Types of Hydrocarbons:

On the basis of structure, hydrocarbons are divided into two main classes.

1. Open Chain or Aliphatic Hydrocarbons:

"These are compounds in which first and the last carbon atom are not joined directly to each other. The open chain may be scaight or branched".

Examples:

n₃C-Ch₂-CH₂-CH₂ Straight chain (n-butane)

Branched chain (isobutane)

 $H_2C - CH - CH_3$

CH₃

Types of Open Chain Hydrocarbons:

Open chain hydrocarbons have been further subdivided into saturated and unsaturated hydrocarbons.

(a) Saturated Hydrocarbons:

"The hydrocarbon in which all the **four valencies** of **carbon atoms** are fully **satisfied** (saturated) by **single bonds** with other carbon atoms and hydrogen atoms are called saturated hydrocarbons".

Saturated hydrocarbons are also called alkanes. Thus, an alkane is a hydrocarbon in which the carbon atoms are connceted by only single covalent bond (there are no double or triple bonds in alkanes).

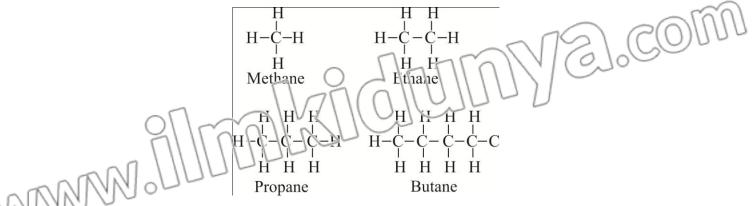
General Formula:

The general formula of saturated hydrocarbons is C_nH_{2n+2} , where n is the number of carbon atoms in one molecule of the alkane.

Examples:

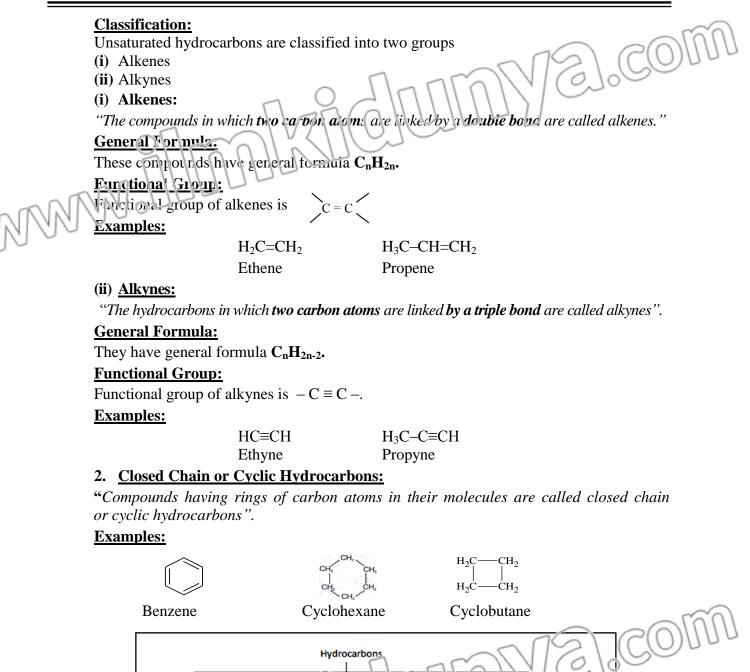
- Methane (CH₄),
- Ethane (C_2H_6) ,
- Propane (C_3H_8) and
- Butane (C_4H_{10})

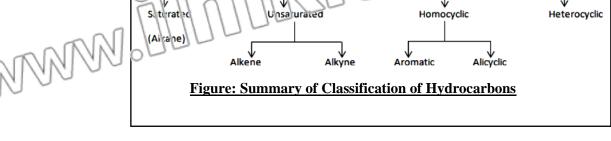
All these are saturated hydrocarbons because they contain only carbon-carbon single bonds as follows:



(b) Unsaturated Hydrocarbons:

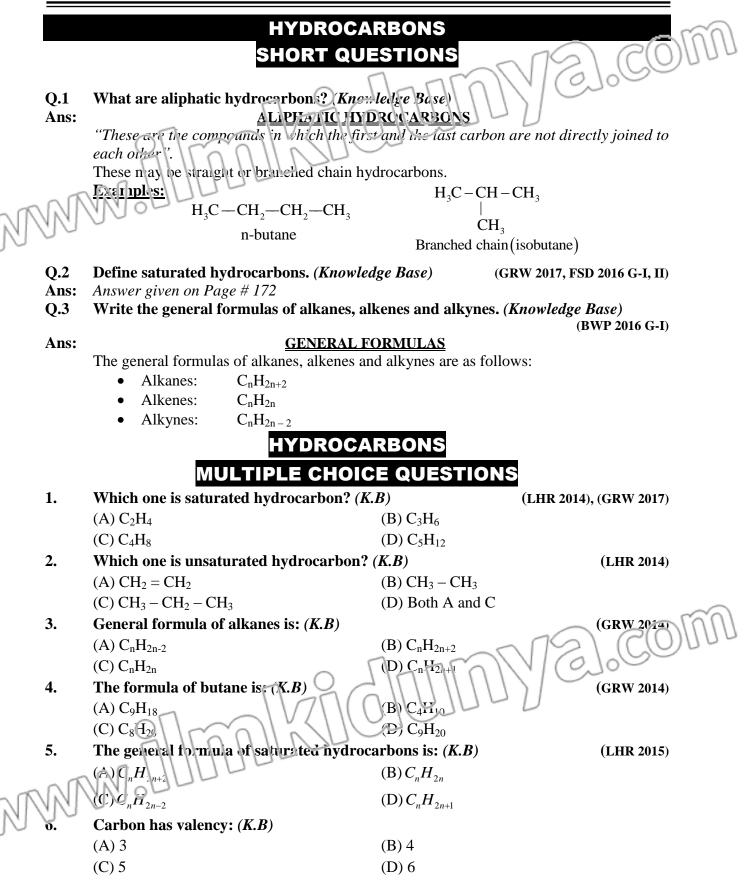
"The hydrocarbons in which **two carbon** atoms are linked by a **double or a triple** bond are called unsaturated hydrocarbons."





Open chain compounds

Closed chain compounds



Hydrocarbons

7.	Which of the following property is not present in hydrocarbons? (K.B)				
	(A) High melting point	(B) Non-polar property			
	(C) Solubility in non-polar solvent	(D) Poor conductivity			
8.	Hydrocarbons having high mole w	ar mass are. (K.B)			
	(A) Gases	(B) Liquid			
	(C) Solids	(D) All of these			
9.	Hydrocarbons having double bond	are: (K.B)			
	(A) / Jkane	(B) Alkene			
NN	(C) Alkyne	(D) Alkyl			
10.	What is the formula of methane? (1	K.B)			
	(A) CH_3	(B) CH_4			
	(C) CH ₂	(D) C_2H_5			
11.	Which of the following is not an exa	ample of open chain hydrocarbon? (K.B)			
	(A) CH_4	(B) C_3H_8			
	(C) C_2H_6	(D) C_6H_6			
12.	Number of bonds present in metha	ne: (<i>K</i> . <i>B</i>)			
	(A) 2	(B) 3			
	(C) 4	(D) 5			
13.	The compounds having at least one	benzene ring are called: (K.B)			
	(A) Aromatics	(B) Alkanes			
	(C) Alkenes	(D) Alkynes			
14.	Alkynes form: (K.B)				
	(A) Single bond	(B) Double bond			
	(C) Triple bond	(D) Ionic bond			
15.	The molecular formula of ethane is	: (<i>K.B</i>) (LHR 2013)			
	$(A) C_2 H_6$	(B) C_3H_8			
	(C) $C_{10}H_{16}$	(D) $C_{10}H_{20}$			
	12 <u>.</u> 1 T	T YOURSELF () // COUD			
i.	Why hydrocarbons are considered	l as parent organic compounds? (Understanding			
	Base) (GI:W 2015)				
Ans:		ANIC COMPOUNDS			
		parent organic compounds since other organic			
MM		erived from them by replacement of one or more			
100	hydrogen atoms by other atoms or gro	oup of atoms.			
	Example: CH ₂ OH is obtained by replacement of	$fH = atom of CH_{i}$ with OH			
	CH_3OH is obtained by replacement of H – atom of CH_4 with OH.				

(Knowledge Bese)

ii. What is the difference between a straight and a branched chain hydrocarbon?

Ans:

DIFFERENTIATION

The differences between straight chain and branched chain hydrocarbons are as follows:

rocarbons
ns are those in ng straight
ne)
ne)

iii. Give the general formulae of saturated and unsaturated hydrocarbons.

(Knowledge Base)

Ans:

GENERAL FORMULAE

Saturated Hydrocarbons:

Alkanes are saturated hydrocarbons. The general formula of saturated hydrocarbons is C_nH_{2n+2} .

Unsaturated Hydrocarbons:

Alkenes and alkynes are unsaturated hydrocarbons. The general formula of alkenes is C_nH_{2n} and that of alkynes is C_nH_{2n-2} .

iv. Define unsaturated hydrocarbons with examples. (*Knowledge Base*)

(LHR 2015, GRW 2013), (MTN 2017)

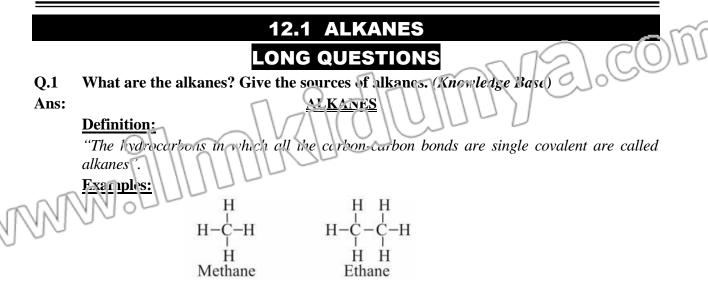
Ans:

UNSATURATED HYDROCARBONS

Definition:

"The hydrocarbons in which two carbon ctons are linked by a double or a triple bond are called unsaturated hydrocarbons".

_	<u>Examples</u> There are two types of unsaturated	hydrocarbons:	
	(i) A'kenes	(ii) Alkynes	
MAN	$Ol_2 C = CH_2$	$HC \equiv CH$	
W AG .	(Ethene)	(Ethyne)	
	$H_3C - CH = CH_2$	$H_3C - C \equiv CH$	
	(Propene)	(Propyne)	



Alkanes are Called Paraffins:

(BWP 2017)

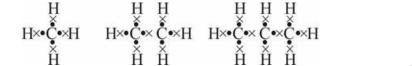
The simplest hydrocarbons are alkanes. In these compounds all the bonds of carbon atoms are single that means valencies of carbon atoms are saturated. Therefore, they are least reactive. That is the reason, alkanes are called paraffins (para means less, and affins means affinity or reactivity).

Alkanes as Homologous Series:

Alkanes form a homologous series of compounds in which each successive member of the series differes by a CH_2 group but they have similar structures amnd similar chemical properties.

Memebers of Alkane Series:

The first member of the series is methane (CH₄). Next ethane (C₂H₆), then next propane (C₃H₈) and so on. The electron cross and dot sturctures of simple alkanes are presented as follows:



Sources of Alkanes:

Following are the sources of alkanes (i) **Petroleum and Natural Gas:**

- The main sources of alkanes are petroleum and natural gas.
- Methane form: about 85% of natural gas.
- All the alkanes can be obtained commercially by the **fractional distillation** of crude performent.

(i) Marsh Gas:

• Marsh gas is obtained by the bacterial decay of vegetable matter contains mostly methane.

(iii) <u>Fuel Gases:</u>

• Fuel gases obtained from coal gas contain alkanes in small amounts.

SGD 2017)

(iv) Gobar Gas, Sewage Gas and Bio Gas:

- Methane occurs in gobar gas, sewage gas and bio-gas which are formed by the decomposition of cattle dung, excreta and plant wastes
- How alkanes can be prepared in laboratory? (Knowledge Application Base)

Underswinding+ (GRW 2013)

Ans:

Q.2

PRIARATION OF A LEANES

Alkanes form a series of honologous compounds. So, their methods of preparation and chemical properties are similar. There are many methods of preparation but only two methods are as follows

(i) Eydrogene tion of Alkenes and Alkynes:

Hydrogenation means addition of molecular hydrogen (H_2) in alkenes and alkynes".

Alkenes and alkynes are unsaturated compounds, so they have the capacity to add up atoms in them.

Reaction Conditions:

This reaction is carried out in the presence of **nickel catalyst at 250°C to 300 °C.** However, in the presence of catalyst platinum or palladium, the reaction takes place at room temperature.

Reactions:

$H_2C = CH_2$	+	$H_2 \xrightarrow{\text{Ni}} H_3\text{C} - \text{CH}_3$
нс≡сн	+	$H_2 \xrightarrow{Ni} H_2C = CH_2$

$$H_2C = CH_2 + H_2 \xrightarrow{Ni}_{250 - 300 \circ C} H_3C - CH_3$$

(ii) <u>Reduction of Alkyl Halides:</u>

"Reduction means addition of nascent hydrogen".

In fact, it is a replacement of a halogen atom with a hydrogen atom.

Reaction Conditions:

This reaction takes place in the presence of **Zn metal and dilute HCI**. **Reactions:**

$H_3C - Br$	+	$2[H] \xrightarrow{Zn/dil.HCl}$	CH ₄ +	HBr
CH ₃ CH ₂ Br	+	$2[H] \xrightarrow{Zn/dil.HCl}$	CH ₃ -CH	HBE

Q.3 Write down the physical properties of alkanes. (Knowledge Base)

(MTN 2017, SWL 2016 G-II)

Ans:

PHYSICAL PROPERTIES OF ALKANES

The physical properties of alkanes are as follows:

(i) <u>Physical State:</u>

Alkanes form a homologous series of compounds. First four members of the series are gases. The alkanes consisting of C_5 to C_{10} are **liquids** while **higher members** of the terie; me solids.

(ii) <u>Solubility:</u>

They are **nonpolar**, therefore, they are **insoluble** in **water** but soluble in organic solvents. (iii) <u>Density:</u>

The density of alkanes increases gradually with the increase of molecular size.

(GRW 2017)

(GRW 2016)

(iv) Melting and Boiling Points:

The melting and boiling points' of alkanes **increase** regularly with the **increase of molecular sizes**. This is because of increase of attractive forces between the molecules of alkanes.

(v) <u>Viscosity:</u>

The alkanes become more viscous as their molecular sizes increase.

(vi) Combustion:

Alkanes lecome less fiammable, i.e more difficult to burn with the increase of molecular sizes.

Q.4 Write down the chemical properties of alkanes. (Knowledge +Understanding+Application Ease) (Ex-Q.1)

OR

What type of reactions are given by alkanes? Explain with reference to halogenation of alkanes? (GRW 2013), (LHR 2013, 2015)

Ans:

CHEMICAL PROPERTIES OF ALKANES

Reactivity:

Alkanes are least reactive compounds being saturated hydrocarbons. However, they give reactions at high temperatures.

(i) <u>Halogenation:</u>

Alkanes give only substitution reactions which are:

"A reaction in which one or more hydrogen atoms of a saturated compound are replaced with some other atoms (halogen) is called a substitution reaction".

Reaction in Dark:

In dark there is **no reaction** of alkanes with halogens.

Reaction in Bright Sunlight:

In direct sunlight, reaction is explosive and carbon is deposited.

 $CH_4 + 2Cl_2 \xrightarrow{Bright sunlight} C + 4HCl$

Reaction in Diffused Sunlight:

Alkanes react fairly with halogens in diffused sunlight. In diffused sunlight, a series of reactions take place and at each step one hydrogen atom is substituted by halogen atoms, so that all the hydrogen atoms are substituted one by one by halogen atoms.

$$CH_{4} + Cl_{2} \xrightarrow{\text{Diffused}} CH_{3}Cl + HCl$$

$$Chloromethane$$

$$CH_{3}Cl + Cl_{2} \xrightarrow{\text{Diffused sunlight}} CH_{2}Cl_{2} + HCl$$

$$Dichloromethane$$

$$CH_{2}Cl_{2} + Cl_{2} \xrightarrow{\text{chfused sunlight}} CHICl_{3} + HCl$$

$$Trichloromethane$$

$$(Chloroform)$$

$$CHCl_{3} + Cl_{2} \xrightarrow{\text{Diffused sunlight}} CCl_{4} + HCl$$

$$Tetrachloromethane$$

$$(Carbon tetrachloride)$$

Hydrocarbons

(Ex-Q.2)

(ii) Combustion:

In Excess Supply of Oxygen:

Alkanes burn in the presence of excess of air or oxygen to produce a let of heat carbon dioxide and water.

Applications:

This reaction takes place in automobile contrustion engines, domestic heaters and cooking appliances It is highly exother high reaction and because of it alkanes are used as fuel.

CH +20, --- CO₂ + 2H₂O + Heat

In Limited Supply of Ozygen:

In the linuted supply of oxygen, there is incomplete combustion.

Disadvantage:

As a result, carbon monoxide is produced that creates suffocation and causes death.

$$3CH_4 + 4O_2 \longrightarrow 2CO + C + 6H_2O$$

What are the uses of alkanes? (*Knowledge Base*) 0.5 **USES OF ALKANES** (SGD 2016 G-II)

Ans:

The uses of alkanes (methane and ethane) are as follows:

- (i) Natural gas that is chiefly methane is used as domestic fuel.
- (ii) Compressed natural gas (CNG) is used as automobile fuel.
- (iii) These gases are used in the manufacture of chemicals such as carbon black, methyl alcohol, ethyl alcohol, chloroform, carbon tetrachloride, formaldehyde and acetaldehyde.

Use of Products of Alkanes:

The products of alkanes are used in daily life such as:

- Carbon black is used in the manufacture of shoe polishes, printers ink and as filler in rubber industry.
- Chloroform is used as a solvent for rubber, waxes, etc., and for anesthesia.
- Carbon tetrachloride is used as an industrial solvent and in dry cleaning.

12.1 ALKANES SHORT QUESTIONS

Q.1 Why orchids produce alkanes? (Knowledge Base) (Instersting Information Pg. # 87) (GRW 2014)

Δnc·	
Allo.	

PRODUCTION OF ALKANES BY OPCHIDS

Orchids are beautiful ornamental and colourful flowers. Some orchids produce alkanes to attract bees to pollinate their flowers.

What is use of butane and propage? (Knowledge Base) Q.2

Ans:

USFS OF EUTANE AND PROPANE

Propane and butane burn with very bet flames and are sold as liquefied petroleum gas (LPG). They are kept as liquids under pressure, but they vapourize easily when the pressure is released. Butane is also used in portable torches and gas lighters. What is marsh gas? (Knowledge Base)

MARSH GAS Marsh gas is obtained by the bacterial decay of vegetable matter contains mostly methane.

2

Q.4	How orchids attract bees to pollinate	e their flowers? (Knowledge Base)	
-	-	(Instersting Info	ermation Pg # 67
Ans:	Orchids produce alkanes to attract bee	DS ATTRACT BEES	21 (200
	Oremus produce arkanes to attract been	s to portinate dell'howers	0,100
	<u> </u>		
		DICE QUESTIONS	
1.	The formula of pertance is: (KB)		(LHR 2014)
1.	(A) $C_5 H_{12}$	(B) $C_5 H_{10}$	(LIIK 2014)
NI	VANGLIC		
UN	$(\mathbb{C}) : \mathcal{C}_5 \mathcal{H}_8$	(D) $C_5 H_{14}$	
2.	How many percent of natural gas is		(LHR 2014)
	(A) 82%	(B) 83%	
	(C) 84%	(D) 85%	
3.	General formula of alkanes is: (K.B)		(GRW 2014)
	$(A) C_n H_{2n-2}$	(B) C_nH_{2n+2}	
	$(C) C_n H_{2n}$	(D) $C_n H_{2n+1}$	
4.	The formula of octane is: (K.B)		(GRW 2014)
	(A) C_9H_{18}	(B) C_8H_{18}	
_	(C) C_8H_{20}	(D) C_9H_{20}	
5.	The number of hydrogen atoms in b		(LHR 2015)
	(A) 10	(B) 6	
_	(C) 8	(D) 4	
6.	The reduction of alkyl halides takes		(LHR 2015)
	(A) Cu / HCl	(B) Mg / HCl	
_	(C) Na / HCl	(D) Zn / HCl	
7.	Which one is methyl radical? (<i>K.B</i>)		(GRW 2015)
	(A) -CH ₂ -	$(B) CH_3-$	
0	(C) CH ₄	(D) $CH_3 - CH_3$	(
8.	Which one of these is a saturated hy		(GRW 2016)
	(A) C_2H_4	$(B) C_3 H_6$	21(COn
0	(C) C_4H_8	$(D) C_5 H_{12}$	
9.	The chemical formula of chloroform		(GRW 2016)
	(A) CH ₃ Cl	$(\mathbf{B}) \mathbf{C} \mathbf{H}_2 \mathbf{C} \mathbf{I}_2$ $(\mathbf{D}) \mathbf{C} \mathbf{C} \mathbf{I}_4$	
10	(C) CHCl ₃ The density of elvence increases with		
10.	The density of alkanes increases with (A) M.P	(B) B.P	
0.00	(C) Molecular size	(B) B.P (D) Bonds	
1NI	Which one is the characteristic prop		
J.C	(A) Displacement reactions	(B) Double displacement read	ction
	(C) Substitution reactions	(D) Redox reaction	
	(C) Substitution reactions	(D) REDOX TEACHOIL	

U

	12.	Incomplete combustion of alkanes produ	Ices: (K.B)
	121	(A) Carbon dioxide	(B) Oxygen
		(C) Chlorine gas	(D) Carbon monoxide
	13.	What is the formula of butane? (<i>K</i> . <i>B</i>)	(EWP 2017), (RWP 2017),
	10.	(A) C_3H_8	$(B) \subset _{4} I [I_{10}]$
		(C) C_5H_{12}	$(D) C_{5}H_{14}$
	14.	Which of the following is not a function	
	14.	(A) Solvert in rubber	(B) Ly cleaning
		(C) Solven in vaxes	(D) Anaesthesia
	15.	Due to which property alkanes are used	
	13.	(A) Combus ion	(B) Halogenation
	OR	C) Oridation	(D) Reduction
N		Paraffins means: (K.B)	(D) Reduction
	J.C.	(A) Highly reactive	(B) Less reactive
1		(C) Oil forming	(D) None of these
	17.	Which one of the following is a substituti	
	1/.	(A) Halogenation of alkane	(B) Dehydration of alkane
	18.	(C) Hydrolysis of alkane	(D) Hydrogenation
	10.	Liquid alkanes have carbon atoms rangi $(A) \subseteq (A) \subseteq (A)$	
		(A) C_4 to C_6	(B) C_5 to C_{10} (D) Both A and B
	10	(C) C_8 to C_{18}	(D) Both A and B (KB)
	19.	Substitution reaction is the property of: $(A) A W_{\text{space}}$	
		(A) Alkanes	(B) Alkenes (D) None of these
	20	(C) Alkynes	(D) None of these
	20.	CNG stands for: (<i>K</i> . <i>B</i>)	(DGK 2017, RWP 2016 G-I)
		(A) Combustion natural gas	(B) Carbon natural gas
		(C) Compressed natural gas	(D) Cooled natural gas
		12.2 TEST Y	OURSELF
	i.	Which is the simplest alkane? (Knowledg	e Base)
	Ans:	SIMPLEST A	<u>ALKANE</u>
		The simplest alkane is methane having form	
	ii.	Give the structure of following compoun	ds: isopentane and isobutane.
			(Understanding Base)
	Ans:	STRUCTURES OF ISOPENTA	<u>ANE AND ISOBUTANE</u>
		• Isopentane:	
		$H_3C - CH - C$	$CH_2 - CH_3$
		CH ₃	n - n rail Vielous
		• Isobutane:	
		$H_3C - CH - C$	H_3
	iii.		
	111.	Cli	ficient supply of avygen?
		Chl Why the burning of alkanes requires suf	
	Ans:	Why the Lurning of alkanes requires suf	(Understanding Base)
	Ans:	Why the Lurning of alkanes requires suf	(Understanding Base)
~	Ans:	Why the Lurning of alkanes requires suf <u>SUFFICIENT OXYGEN</u> The burning of alkanes requires sufficient	<i>(Understanding Base)</i> <u>FOR BURNING</u> supply of oxygen because complete burning of
N	Ans:	Why the burning of alkan's requires suf <u>SUFFICIENT OXYGEN</u> The burning of alkanes requires sufficient alkares requires sufficient supply of oxy	<i>(Understanding Base)</i> FOR BURNING supply of oxygen because complete burning of gen to form CO ₂ , H ₂ O and heat. Otherwise
N	Ans:	Why the turning of alkanes requires suf <u>SUFFICIENT OXYGEN</u> The burning of alkanes requires sufficient dkares requires sufficient supply of oxy alkanes undergo incomplete combustion	(Understanding Base) FOR BURNING supply of oxygen because complete burning of rgen to form CO_2 , H_2O and heat. Otherwise in the limited supply of oxygen, as a result
N	Ans:	Why the burning of alkan's requires suf <u>SUFFICIENT OXYGEN</u> The burning of alkanes requires sufficient alkares requires sufficient supply of oxy	(Understanding Base) FOR BURNING supply of oxygen because complete burning of gen to form CO_2 , H_2O and heat. Otherwise in the limited supply of oxygen, as a result sonous gas and causes air pollution.

What do you mean by halogenation? Give the reaction of methane with chlorine in iv. bright sunlight. (Knowledge Base)

Ans:

HALOGENATION

"Addition of halogen to a substance is called halogenation

OR

"A reaction in which one or more indrogen alors of a saturated con pound are replaced with some other atoms like halogen atom is called halogenation".

Reaction of Methane with Culorine

In direct sunlight reaction is explosive and carbon is deposited.

Bright →C+4HCl $CH_4 + 2Cl_2 -$ Sunlight

12.2 ALKENES

LONG QUESTIONS

Define the alkenes. How alkenes can be prepared in laboratory? **0.1** (Knowledge+Understanding+Application Base) ALKENES

(SGD 2014)

Ans:

Definition:

"The hydrocarbons in which two carbons atoms are linked by a double bond are called alkenes".

General Formula:

They have general formula C_nH_{2n} and functional group C = CSimplest Alkene:

The simplest alkene is ethene having formula C_2H_4 .

Why Alkenes are Called Olefins?

(Ex. Short Ouestion # 9)

These compounds are also known as olefins (a Latin word meaning oil forming) because first members form oily products when react with halogens.

Name	Molecular formula	Condensed formula	Structural formula	Cross and dot formula
(i) Ethylene or ethene	C₂H₄	$H_2C = CH_2$	H > C = C < H	^H ∗;c∶∶c: ^{∗H} H×;c∶∶c: [∗] H
(ii) Propylene or propene	C ₃ H ₆	$H_3C - HC = CH_2$		1 Celo
(iii) Butylene or but⊛ne	C ₆ P ₁₈	H3C-H2C-HC-CH2	H H H H - C - C - C = C < H H H	ӊӊӊ нוç•×с•×с• *с:×н ӊн
(iv) Pentene	e C₅H ₁₀		$\begin{array}{c} H & H & H & H \\ H - C - C - C - C - C - C \\ H & H & H \end{array} = C \begin{pmatrix} H \\ H \\ H \end{pmatrix}$	

(Ex. Short Question #7)

Occurrence:

Occurrence of alkenes is as follows:

- (i) Alkenes being more reactive than alkanes, seldom occu, free in nature.
- (ii) Lower alkenes occur in coal gas in minute quantities.
- (iii) Ethylene is present in natural gas some times to the extent of 20%.
- (iv) Alkenes are produced in large uncunts by cracking of petroleum.

Preparation of Alkenes:

Alkenes are prepared by the removal of small atoms (H, OH, X) from the adjacent carbon atoms of the saturated compounds, so as to create a double bond between carbon atoms.

(i) <u>Debydration of Alcohols:</u>

Dehydration:

"The removal of water from a substance is called dehydration".

Preparation of Alkenes:

Ethene is prepared by heating a mixture of ethanol and excess of concentrated sulphuric acid at 180° C. In first step, ethyl hydrogen sulphate is formed which decomposes on heating to produce ethane, which is collected over water.

$$H_{3}C - CH_{2} - OH + H_{2}SO_{4} - H_{3}CH_{2} - OSO_{3}H$$

$$CH_3CH_2 - OSO_3H \xrightarrow{heat} H_2C = CH_2 + H_2SO_4$$

(ii) <u>Dehydrohalogenation of Alkyl Halides:</u>

Dehydrohalogenation:

"The **removal of hydrogen and halogen** from adjacent carbon atoms to create a double bond is called dehydrohalogenation".

Preparation of Alkenes:

On heating, ethyl bromide with alcoholic KOH, ethene is formed and removal of hydrogen and halogen takes place from adjacent carbon atoms to create a double bond.

$$H_3C - CH_2Br + KOH_{(Alcoholic)} \longrightarrow H_2C = CH_2 + KBr + H_2O$$

Q.2 Write down the physical properties of alkenes. (*Knowledge Base*)

(GRW 2015, 2017, FSD 2016 G-I, SGD 2016 G-II)

Ans:

PHYSICAL PROPERTIES OF ALKENES

The physical properties of alkenes are as follows:

(i) <u>Physical State and Color:</u>

The first member of the alkenes is ethene. It is a **colourless gas** with **pleasant odcor**. (ii) Solubility:

Alkenes are **nonpolar**, therefore, they are inseluble in water but soluble in organic solvents.

(iii)Density:

The first member of the series ethene is slightly less dense than air.

(iv)<u>Nature of Flame:</u>

Alkenes are illumnible hydrocarbons. On complete combustion, they form carbon diovide and water with release of energy. However, their **flame** is **smokier than alkanes** having a **similar number of carbon atoms**.

(v) <u>Melting and Boiling Points:</u>

Their melting and boiling points gradually increase with the increase of molecular sizes of the compounds in the series.

(Test Yourself 12.3 q.i)

(DGK 2017

Q.3 Write down the chemical properties of alkenes.

(Knowledge+Understanding+Application Base)

Ans:

CHEMICAL REACTIONS OF ALKENES

Reactivity of Alkenes:

Alkenes a reactive compound because the electrons of the double bord a easily available for reaction. These compounds have tendency to react readily by adding other atoms to become saturated compounds. As a result, the double bond is converted into a single bond that is more stable

Adition reactions are characteristic property of unsaturated compounds. Addition Reactions.

Wese one the reactions in which the products are formed by the addition of some reagents like H₂, Cl₂, etc., to an unsaturated organic compound".

In the process, one of the bonds of a double bond gets broken and two new single bonds are formed.

(i) Hydrogenation of Alkenes:

(MTN 2017)

"Hydrogenation means addition of molecular hydrogen to an unsaturated hydrocarbon in the presence of a catalyst (Ni, Pt) to form saturated compound".

$$H_2C = CH_2 + H_2 \xrightarrow{Ni}_{250 - 300 \circ C} H_3C - CH_3$$

Application:

On industrial scale, this reaction is used to convert vegetable oil into margarine (Banaspati ghee)

 $Oil + H_2 \longrightarrow Margarine (Banaspati ghee)$

(ii) Halogenation of Alkenes:

(GRW 2015), (MTN 2017) "Halogenation means addition of halogen like chlorine or bromine".

Bromination of alkenes is very important reaction. When bromine water (a solution of bromine in water having red-brown colour) is added to ethene in an inert solvent like carbon tetrachloride, its colour is discharged at once.

$$H_2C = CH_2 + Br_2 \xrightarrow{\qquad} H_2C \xrightarrow{\qquad} CH_2$$

Br Br
1,2-Dibromoethane

Application:

In the reaction, double bond of ethene is converted into a single bond by addition of a molecule of bromine. This reaction is used to identify the unsaturation of an organic compound.

(iii) Hydrohalogenation of Alkenes:

"The addition of hydrogen and halogen to c substance is called hydrohclegenation Dry gaseous hydrogen halides (HI, HBr and HC!) react with alkenes to produce alkyl halides. $H_{C} = CH_{T} H X - - - \rightarrow H_{C} - CH X$

$$H_2C = CH_2 + HBr - \rightarrow H_3C - CH_2Br$$

The order of reactivity of hydrogen halides is HI > HBr > HCl.

Ox dation of A kenes with KMnO4: (iy)

(LHR 2013)

Alkenes decolourize the pink colour of acidified dilute solution of potassium permanganate because the double bond electrons react with MnO_4^- ion, which further goes on to form MnO_2 and ethene glycol (**I**, 2-ethanediol). Such as there is addition of two hydroxyl groups at the double bond.

This reaction is also used to test the unsaturation in an organic compound.

 $3H_2C = CH_2 + 2KMnO_4 + 4H_2O$ \rightarrow 3H₂ C - CH₂ + 2MnO₂ + 2KOH

Ethene Clycor Q.4 What are the uses of ethene? (*Knowledge Base*) USES OF L'THENE

Ans:

The uses of alkenes are as follows.

- For artificial ripening of firits. (i)
- **(ii)** As a general anneathetic.
- (iii) For the manufacture of polythene. Polythene is a plastic material used in packaging, toys, bags, etc.

OH OH

- (iv) As a starting material for the manufacture of a large number of compounds such as ethylene oxide, ethyl alcohol, ethylene glycol, diethyl ether, etc.
- Ethylene oxide is used as a fumigant. **(v)**
- Ethylene glycol is used as an antifreeze, diethlyl ether and ethyl alcohol are used (**vi**) as solvent.
- For making poisonous mustard gas which is used in chemical warfare. (vii)

12.2 ALKENES SHORT QUESTIONS

Q.1 What are alkenes? Give their general formula. (Knowledge Base)

Ans:

ALKENES

Alkenes are unsaturated hydrocarbons having double bond between two carbon atoms. **Examples:**

- Ethene : $H_2C = CH_2$
- Propene : $H_3C C = CH_2$

General Formula:

General formula of alkenes is C_nH_{2n} .

Give a test to identify ethene $(H_2C = CH_2)$. (*Understanding Base*) Q.2 (GRW 2015) Ans: **TEST TO IDENTIFY ETHENE**

Ethene $(H_2C = CH_2)$ can be identified using bromine-water test. It decolorizes bromine water which is the indication of the presence of a double bond in the compound.

Why bananas are stored away from rest of the fruits? (Knowledge Base) Q.3

(Interesting Information 12, #90) (GI W 2015)

Ans:

STORAGE OF EANANAS

Ripening bananas produce ethere gas that makes fruits ripen fastly and lead to food spoilage. That is the reason barares are slored away from test of the fruits.

Write a note on occurrence of alkenes. (Knowledge Base) **O.4**

(DGK 2016 G-I)

Answer is given on Page # 184 Ans:

MULTIPLE CHOICE QUESTIONS

Alkenes are prepared from alcohols by a process called: (K.B) (LHR 2016, MTN 2017)

- (A) Dehydrogenation
- (C) Dehydration

(B) Dehalogenation (D) Dehydohalogenation

2.	Oxidation of alkene with KMnO ₄ produce	s: (U.B)	(LHR 2016, MTN 2017)
	(A) Glyoxal	(B) Oxalic acid	
	(C) Glycol	(D) Formic acid	π (π (0) U
3.	Dehydrohalogenation of alkyl halides take		$\in O[:(K.B)]$
	(A) Alcoholic KOH	(B) Aqueous NaCl	1 Cho
	(C) Alcoholic NaCl	(D) Aquecus KCH	
4.	A solution of bromine in water having cold	ur: (<i>K.B</i>)	
	(A) Dark trown	(B) Purple	
	(C) Red brown	(D) Voilet	
5.	Alkenes are also called: (K.B)		(SWL 2017)
0	(A) Faraffin:	(B) Olefins	
	(C) Acetylenes	(D) All of above	
1010	Ethanol reacts with H ₂ SO ₄ at temperature		
\bigcirc	(A) 150° C	(B) $16^{\circ}C$	
_	$(C) 180^{\circ}C$	(D) 253 K	
7.	Banaspati ghee is also called: (K.B)		
	(A) Vegetable oil	(B) Margarine	
0	(C) Cooking oil	(D) Coconut oil	
8.	Ethylene oxide is used as: (K.B)	$(\mathbf{D}) \subset 1$	
	(A) Anti-freeze	(B) Solvent	1
0	(C) Fumigant	(D) Poisonous mustare	1 gas
9.	Banana when riped produces gas: (K.B)	(D) Mathana	
	(A) Ethene(C) Noble gas	(B) Methane	
10.	Number of bonds in propene is: (<i>K.B</i>)	(D) Oxygen gas	
10.	(A) 6	(B) 7	
	$ \begin{array}{c} (A) \\ (C) \\ 8 \end{array} $	(D) 9	
11.	Butene is also called: (K.B)	(D)	
11.	(A) Ethylene	(B) Acetylene	
	(C) Methane	(D) Butylene	
12.	Alkenes are insoluble in: (<i>K</i> . <i>B</i>)	(D) Dutylene	
	(A) Organic solvent	(B) Alcohol	
	(C) Water (H_2O)	(D) Both B and C	
	12.3 TEST YO		
		JONGEEI	
i.	Why alkenes are reactive? (Knowledge+Un	nderstanding Base)	
Ans:	<u>REACTIVITY OF</u>	<u>ALKENES</u>	
	Alkenes are reactive compounds because t		
	available for reaction. These compounds h		
	other atoms to become saturated compound	s As a result, the dou	ible bond is converted
	into a single bond that is more stable		
ii.	How can you prepare propene from pr	opylalcohol? (Under	standing+Application
	Base)		
Ans:	PHEPARATION		- f
	Propene can be prepared from propyl alcoho		or propyr alconol and
-	excers of concentrated sulphuric acid at 180°		
$\Delta N h$	$CH_3 - CH_2 - CH_2 - \frac{H_2SO_4}{180^{\circ}C} \rightarrow C$	$CH_2 - CH = CH_2 + H_2C$)
UU	\sim 3 2 180°C	3 2 2	
-	О́Н		
	(Propyl alcohol)		



(DGK 2017)

Occurrence

Acetylene does not occur free in nature. Traces of acetylene are present in coal gas (about 0.06%)

Preparation of Alkynes:

Alkynes are prepared by the following methods

(i) Dehydrohalogenation of Vicinal Dihaldes

"The *#enoval of hydrogen and halogen* from an alkyl halide is called dehydrokalogenation".

Process:

When a vicinal dinalide is heated with alcoholic KOH, two hydrogen along with two halogen atoms are removed from two adjacent carbon atoms with formation of a triple bond between the adjacent carbons.

$$\begin{array}{ccc} \text{Cl} & \text{H} \\ \text{H} - \text{C} - \text{C} - \text{H} & \text{H} & \text{2KOH} & \xrightarrow{\text{Alcoholic}} & \text{HC} \equiv \text{CH} & \text{H} & \text{2KCl} & \text{H} & \text{2H}_2\text{O} \\ \text{H} & \text{Cl} & \text{H} & \text{Cl} & \text{H} & \text{Cl} & \text{H} & \text{H}$$

(ii) Dehalogenation of Tetrahalides:

"The removal of halogen from a substance is called dehalogenation".

Process:

When alkyl tetrahalides are heated with zinc dust, the elimination of halogen atoms takes place to form ethyne.

$$H = CI \quad CI \quad CI \quad H = CI \quad H = 2Zn_{(dust)} \xrightarrow{Heat} HC \equiv CH + 2ZnCl_{2}$$

Q.2 Write down the physical properties of alkynes. (*Knowledge Base*)

(LHR 2014, DGK 2017, SWL 2016 G-II)

Ans:

PHYSICAL PROPERTIES

The physical properties of alkynes are as follows:

- (i) Alkynes also form a series of compounds. Its first member is acetylene. It is a **colourless** gas with **faint garlic odour**.
- (ii) Acetylene is **slightly soluble in water** but soluble in organic solvents such as benzene, alcohol, acetone, ether, etc.
- (iii)Acetylene is slightly lighter than air.
- (iv) Alkynes are also flammable. They produce smokier flames that those of a kanes and alkenes.

CHEMICAL PROPERTYES

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Q.3 Write down the chemical properties of alkyres
(Knowledge+Understanding+Application Base)
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(BWP 2016 G-II)
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Ans:

Reactivity of all ynes: Reason:

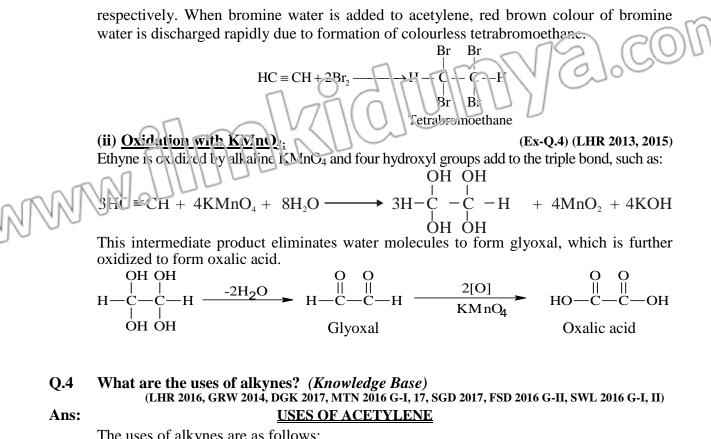
Alkynes are reactive compounds because of presence of a triple bond. A triple bond consists of we weak bonds and a strong bond.

Mechanism:

When alkynes react with other substances, two weak bonds are readily broken one by one and addition takes place easily. The addition reactions of alkynes resemble to those of alkenes.

(i) Addition of Halogen:

Chlorine and bromine add to acetylene to form tetrachloroethane and tetrabromoethane,



- The uses of alkynes are as follows:
- (i) Acetylene produces oxy-acetylene flame with oxygen. It is a highly exothermic reaction. Heat released is used for welding purposes.
- (ii) Acetylene is used to prepare other chemicals, such as alcohols, acetaldehyde and acids.
- It is used for the **ripening of fruits.** (iii)
- (iv) It is used for the **manufacturing of polymer products** like polyvinyl chloride, polyvinyl acetate and synthetic rubber like neoprene.
- It is polymerized to form benzene which is used as raw material to form a variety of **(v)** organic compounds.

12.3 ALKYNES SHORT QUESTIONS

Define the alkynes. Give their general form i.a. (*Inculedge Base*) 0.1 ALKYNES

Ans:

Definition: "The haccarbons in which we carbon atoms are linked by a triple bond are called alkynes '.

Examples:

F have and propyne.

General Formula:

General formula of alkynes is C_nH_{2n-2} .

(GRW 2014)

	Q.2	Write down molecular and structural for	·			
	Ans:	(Knowledge+Understanding Base)FORMULAS OF JMolecular and structural formulas of ethyneMolecular formula: C_2H_2 Structural formula: $H - C \equiv C - H$	ETHYNE	MTN 2015 (- H)		
N	M	MULTIPLE CHOIC				
, _	1.	Traces of acetylene are present in coal ga	s about: (K.B)			
		(A) 0.06%	(B) 0.07%			
		(C) 0.08%	(D) 0.09%			
	2.	Which one is used for ripening of fruits? (K.B)				
		(A) Ethyne	(B) Butane			
		(C) Buane	(D) Propane			
	3.	Which compound is used for welding pro	cess? (K.B)			
		(A) CH ₄	(B) KMnO ₄			
		(C) Acetylene	(D) Ethylene			
	4.	Which of the following does not occur free in nature? (K.B)				
		(A) Ethylene	(B) Acetylene			
		(C) Propylene	(D) Pentene			
	5.	Alkynes form bonds between carb	oon and hydrogen atoms. (K.B	?)		
		(A) Triple bond	(B) Double bond			
		(C) Single bond	(D) Ionic bond	- 50		
	6.	Di-methyl acetylene is also called: (K.B)	- 06	D COMUU		
		(A) Ethyne	(B) Propyne	5.6600		
		(C) Butyne	(D) Hexyne			
	7.	Alkynes are also called: (X.B)		(DGK 2017)		
		(A) Olefin	(B) Parraffins			
		(C) Ace ylenes	(D) Ethanes			
- 00	8 R	General to reals of alkynes is: (K.B)	(B ¹	WP 2016 G-I, II)		
NI	N.	(A) $C_n H_{2n}$	(B) $C_n H_{2n+2}$			
50		(C) $C_n H_{2n+1}$	(D) $C_n H_{2n-2}$			

12.4 TEST YOURSELF

i. Why the alkynes are called acetylenes? (Knowledge Base)

Ans: Answer given on Page # 188

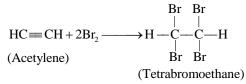
ii. How is tetrabromoethave prepared from acetyleve? (Understanding+Application Base)

Ans:

iv.

PIXEPARATION OF TETRABROMOETHANE

When bromine water is added to acetylene, red brown colour of bromine water is discharged rapidly due to formation of colourless tetrabromoethane.



This reaction is used to identify the unsaturation of alkynes.

iii. How can you prepare acetylene from tetrachloroethane? (Understanding+Application Base)

Ans:<u>PREPARATION OF ACETYLENE</u>Acetylene can be prepared by dehalogenation of tetrahalides or tetrachloroethane. When
tetrachloroethane is heated with zinc dust, the elimination of halogen atoms takes place to
form acetylene.

$$H \xrightarrow{Cl} Cl \qquad H + 2Zn \xrightarrow{Heat} HC \equiv CH + 2ZnCl_{2}$$

$$H \xrightarrow{Cl} Cl \qquad (Dust) \qquad (Acetylene)$$

v. What is difference between glycol and glyoxal? (*Knowledge Base*) Ans: <u>DIFFERENTIATION</u>

 Glycol
 Glyoxal

 Functional Group

 • The functional group in glycol is hydroxyl group (OH).
 • The functional group in glycol is aldehyde group.

 • The formula of a glycol is H_C - C.H_
 • The formula of a glycol is H_C - C.H_

 • The formula of a glycol is OH OH
 • The formula of a glycol is H_C - C.H_

 • It belongs to alcohol family.
 • It does not belong to aldehyde family.

vi.	Write the formula of oxalic acid. (<i>Knowledge Base</i>)	(BWP 2016 G-II)
Ans:	<u>FORMULA OF OXALIC ACID</u> The formula of oxalic acid is $C_2H_2O_4$ or (COOH) ₂ , which can also be really the formula of oxalic acid is $C_2H_2O_4$ or (COOH) ₂ .	oresented as:
	HO-C-C-C-CH	El.Cor
	HYDROCARBONS AS FEED STOCK IN INDUS	STRY
Q.1	Write down the applications of hydrocarbons. (Application Base)	
- 15	(Science, Technology a	and Society Pg. # 94)
\Ads: `	HYDROCARBONS AS FEED STOCK IN INDUSTRY	
011	Hydrocarbons are not only used as fuel in automobiles or industries, the	ey are also used as
\cup	raw materials in many industries.	-
	(i) Petrochemical Industry	
	"The organic compounds prepared from hydrocarbons (petroleum and	l natural gas) are
	called petrochemicals."	0 /
	Examples:	

Some of the important petrochemicals are:

- Methyl alcohol
- Ethyl alcohol
- Formic acid
- Chloroform
- Carbon tetrachloride
- Ethylene
- Butadiene
- Benzene
- Toluene etc.

(ii) <u>Plastic Industry:</u>

Hydrocarbons are used as raw materials for the preparation of a large variety of synthetic polymers, called plastics like polythene, polyester.

Properties of Synthetic Polymers:

These can be given any shape when soft, and on hardening make a durable article to be used in common life.

Examples:

- Crockery items (cups, glass, jug, plates, spoons)
- Furniture items (chair, table, stool)
- Automobile parts
- Electric and sewage items
- A lot of other household items

(iii) <u>Rubber Industry:</u>

Hydro carbons are used to prepare syn hetic rubber such as acetylene is used to prepare butadiene nubber used for making footwear, tyres and toys. Similarly, a good quality rubber neoprere is prepared from chloroprene.

(IV) Synthetic Fiber Industry:

Hydroerbons are used to prepare synthetic fibres like nylon, rayon, polyesters.

Properties of Fibres:

- These fibres have better qualities like greater strength, good elasticity, and resistance to wear and tear.
- Clothes made of synthetic fibres are long lasting than that of natural fibres.

)<u>,CO</u>

Ans:

(v) Synthetic Detergents:

Long chain hydrocarbons obtained from petroleum are used to make sonthetic detergents and washing powders.

Properties:

- These detergents are codium salts of all vI hydrogen sulphate. •
- These detergents have better at a stronger cleaning properties than that of soaps.
- They can be used even in hard water.

PROCAREONS AS FEED STOCK IN INDUSTRY SHORT QUESTIONS

How Indicorations are used as a fuel? (Knowledge+Application Base)

(Science, Technology and Society Pg. # 94)

OR

Describe combustion process and give chemical equation. HYDROCARBONS AS FUEL

The main constituents of fuels (coal, petroleum and natural gas) are hydrocarbons. When hydrocarbons are burnt in air the reaction is called combustion. It is highly exothermic reaction, i.e. it produces a lot of heat. The basic combustion reaction is:

$$CH_4 + O_2 \longrightarrow CO_2 + H_2O + heat$$

Significance of Heat Produced:

The heat energy thus produced is used to meet needs of energy in:

- Homes
- Transportation
- Industries

Describe use of hydrocarbons in synthetic fibre industry. (Knowledge Base) 0.2 HYDROCARBONS IN SYNTHETIC FIBRE INDUSTRY Ans:

Hydrocarbons are used to prepare synthetic fibres like nylon, rayon, polyesters. **Preperties of Fibres:**

- These fibres have better qualities like greater strength, good elasticity, and • resistance to wear and tear.
- Clothes made of synthetic fibres are long lasting than that of natural fibres.

MULTIPLE CHOICE QUESTIONS

- Due to which property alkanes are used as fuel? (K.B) 1. (A) Combustion
 - (B) Halogenation

(D) Nore of these

- (D) Reduction
- The organic compounds prepared from hydrocarbons (petroleum and natural as) 2. are called: (K.B) (B) Petroleum
 - (A) Petrochemicals (C) Pharmaceuticals

(C) Oxidation

Which one of the following is synthetic polymer: (K.B) 3. (A) Toluene (B) Silk (C) Benzene (D) Polyester

Which one is petrochemica 2(K.B)4. (A) Accepted

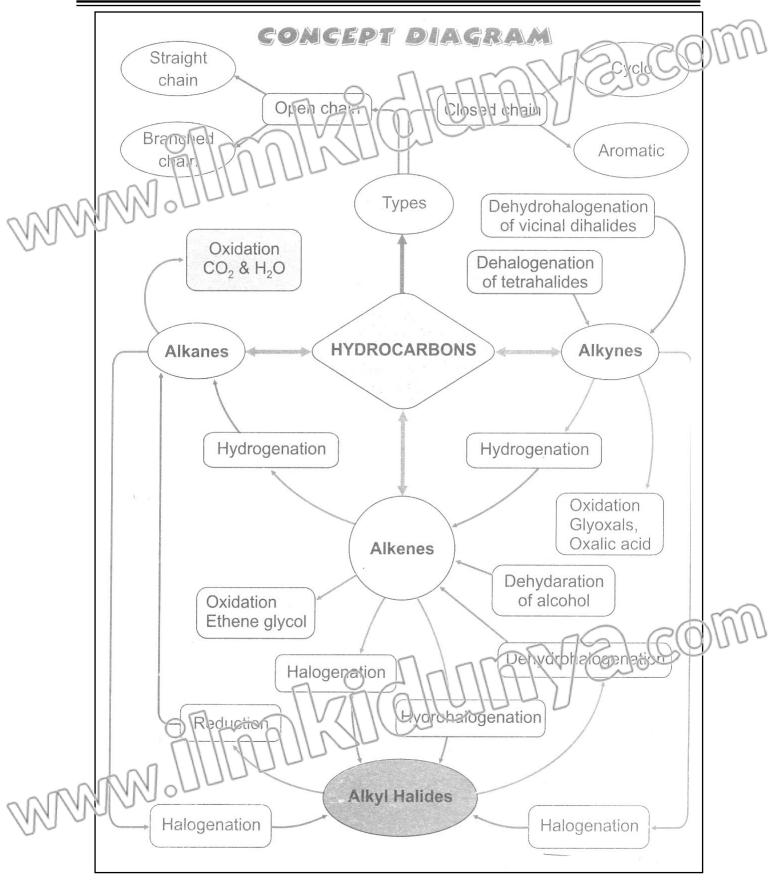
- (C) Nylon
- Necorene is prepared from: (K.B)
- (A) Benzene
- (C) Chloroform

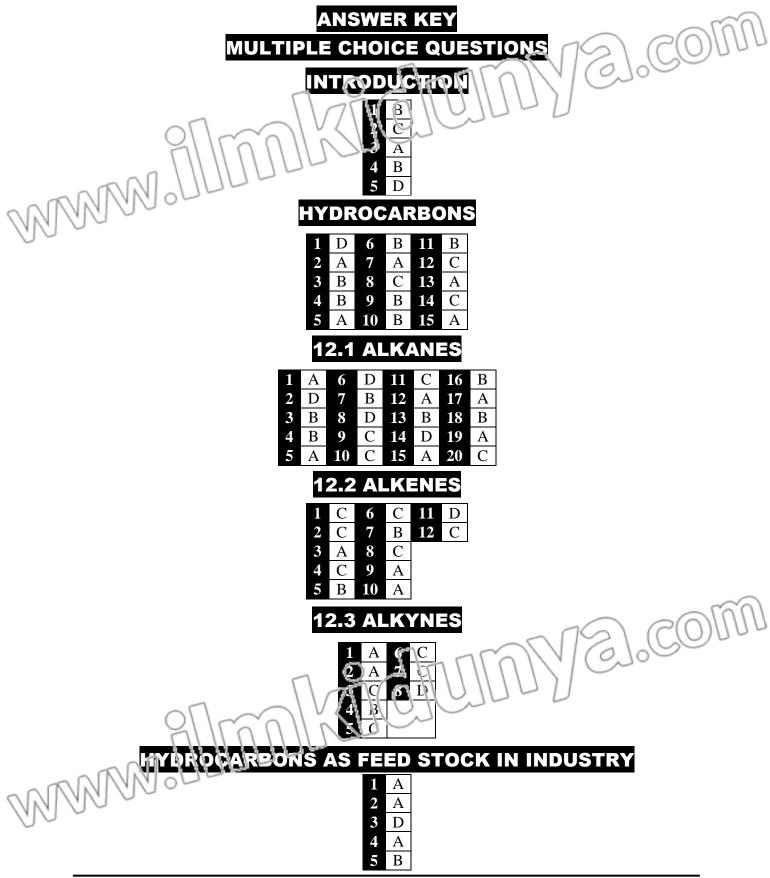
(B) Chloroprene

(D) Polyester fibres

(B) Ravon

(D) Carbon tetrachloride





<u> </u>		,
	EXERCIS	E SOLUTION
1.		nolecules would have no effect on an aqueous
1.	solution of bromine? (U.B)	(LFR 2013, CRW 2013, RW) 2017, BWP 2016 G-I)
	(a) CH ₄	(b) C ₁₀ H ₂₀
	(c) C_2I_4	(d) C_2H_2
2.		carbon atoms, all singly bonded, it will
~	have the following characteristics ex	
M	(a) It will be saturated hydrocarbon	(b) It will have 8 hydrogen atoms
N.	(d) hs name will be n-butane	(d) It will be least reactive $f(X, P)$
5.	The reduction of alkyl halides takes	place in the presence of: $(K.B)$ (LHR 2015, BWP 2016 G-I)
	(a) Zn/HCI	(b) Na/HCl
	(c) Mg/HC l	(d) Cu/HCl
I.		roduce which one of the following? (<i>K.B</i>)(SGD 2014)
	(a) Carbon tetrachloride	(b) Chloroform
	(c) Carbon black	(d) Chloromethane
5.	Incomplete combustion of alkanes p	roduces: (<i>K.B</i>) (GRW 2013)
	(a) Carbon dioxide only	(b) Carbon monoxide only
	(c) Carbon monoxide and carbon black	
) .	Alkenes are prepared from alcohols	
	(a) Dehydrogenation	(b) Dehalogenation
-	(c) Dehydration	(d) Dehydrohalogenation
	Dehydrohalogenation takes place in	-
	(a) NaOH aqueous	(b) Alcoholic KOH
	(c) Aqueous KOH Oxidation of ethene with KMnO ₄ pro	(d) Alcoholic NaOH aduces: (K, B) (MTN 2017)
8.	(a) Oxalic acid	oduces: (<i>K.B</i>) (MTN 2017) (b) Glyoxal
	(c) Ethene glycol	(d) Propene glycol
).	Which one of these is a saturated hy	
	(LHR	2 2014, FSD 2016 G-I, II, SGD 2016 G-II, MTN 2016 G-II)
	(a) C_2H_4	(b) C_3H_6
10	(c) C_4H_8	$(d) C_5 H_{12}$
10.	next member of the same homologou	ala C_8H_{14} . What is the molecular formula of the us series? (U,B)
	(a) C_9H_{18}	(b, C_0H_{16})
	(a) $C_{9}H_{18}$ (c) $C_{9}H_{20}$	$(d) C_{9}H_{12}$
1.		three members of the alkane hydrocarbons are
	CH4, C-H6 and C3H8 What is the m	cleenar formula for the eighth alkane member,
	octane, which is found in petrol? (K.	
0	$(a) C_{3}H_{12}$	(b) C_8H_{14}
N	Vc) C 3H-8	(d) C_8H_{20}
YY.	•	one mole of hydrogen to form a saturated
	hydrocarbon. What formula could b (a) C ₃ H ₈	(b) C_6H_{12}
	(a) $C_3 H_8$ (c) $C_4 H_{10}$	(b) $C_6 H_{12}$ (d) $C_7 H_{16}$
		$(\mathbf{u}) \sim /\mathbf{I} \mathbf{I}_{0}$

	13. Dehydration of alcohols can be carried out with: (K.B)(GRW 2013, SWL 2016 G-II, FS						
		(a) NaOH	(b) КОН				
		(c) H_2SO_4	(d) HCl				
	14.	The end product of oxidation of acetylen	(GRW 2013)				
		(a) Oxalic acid	(b) Glycol				
		(c) Glyoxa	(d) None of these				
	15.	Dehalogenation of terrahalides produces acetylene. This reaction takes place in the					
		presence of: (K, \mathcal{P}_{7})					
AMA	181	(a) Socium metal	(b) Zinc metal				
AG.	00	(c) Magnesium metal	(d) Potassium metal				
	16.	Substitution reaction is the characteristic	of: (K.B)				
		(a) Alkanes	(b) Alkenes				
		(c) Alkynes	(d) None of these				
	17.	Halogenation of methane in the presence of diffused sunlight takes place: (K.B)					
		(a) Suddenly, only in one step	(b) Slowly in one step				
		(c) In a series of four steps	(d) Fastly in two steps				
	18.	Which one of the following is a substitution	on reaction? (K.B)				
		(a) Halogenation of alkynes	(b) Halogenation of alkenes				
		(c) Halogenation of alkanes	(d) Bromination of alkenes				
	19.	The order of reactivity of hydrogen halide	es with alkenes is: (K.B)				
			(SGD 2016 G-I, 17, DGK 20156 G-I)				
		(a) HI > HBr	(b) $HBr > HI$				
		(c) HCl> HBr	(d) $HBr < HCl$				
	20.	Oxidation of alkenes produces: (K.B)	(GRW 2013, BWP 2017, FSD 2017 G-1)				
		(a) Glyoxal	(b) Oxalic acid				
		(c) Glycol	(d) Formic acid				
		ANSWER	KEY COULD'				
			In Mrn IV CJo				
			b 17 c				
			c 18 c				
			a 19 a				
	M	5 c 10 b 15	b 20 b				
(NN)	90	~					
0 -							

	EXERCISE SHO	ORT QUESTIONS		
Q.1	Differentiate between saturated and u	insaturated hydrocarbons. (Knowledge 3 ise)		
Ans:	DIFFUREN	(GRW 2017, RWP 2010 C-I, MIN 2016 G-2, ITLATION		
	The differences between saturated and u			
		Unsaturated Hydrocarbons		
		efinition		
	• The conpounds in which all the four	• The compounds in which two carbon		
-	valencies of carbon atoms are fully	atoms are linked by a double or triple		
	Satisfied by single bonds with other	bond are called hydrocarbons.		
N	Vearbon atoms and hydrogen atoms			
_	are called saturated hydrocarbons.			
L	Oth	ner Name		
•	 Saturated hydrocarbons are also 	-		
	called alkanes.	alkenes (with double covalent bond) and		
	~	alkynes (with triple covalent bond).		
_		al Formula		
•	• Their general formula is C_nH_{2n+2} .	• Their general formula is C_nH_{2n} for alkene		
_		and C_nH_{2n-2} for alkynes.		
\vdash	xamples			
•	• CH_4 (Methane)	• $H_2C = CH_2$ (Ethene) $HC \equiv CH$ (Ethyne)		
_ L	H_3C-CH_3 (Ethane)			
Q.2	hydrogen atoms are present in it? (Un	oon atoms has a triple bond in it. How manderstanding Base)		
Ans:	• •	<u>F H-ATOMS</u>		
		is atoms with a triple bond will have follow		
	structure. $H_3C-C \equiv C-CH_3$	_		
	Thus there are six hydrogen atoms in it.			
).3	Why the alkanes are called paraffins? (Knowledge Base)			
2.3				
-	(GRW 2015), (<u>ALKANES ARF</u>	(SGD 2017), (BWP 2017), (FSD 2017)(RWP G-I,II 20 <u>E PARAFFINS</u>		
-	(GRW 2015), (<u>ALKANES ARF</u> Para means 'less' and affin means 'a	SGD 2017), (BWP 2017), (FSD 2017)(RWP G-I,II 20 <u>E PARAFFINS</u> affinity' or reactivity, Alkanes are least react		
-	(GRW 2015), (<u>ALKANES ARE</u> Para means 'less' and affin means 'a compounds. In these compounds all the	SGD 2017), (BWP 2017), (FSD 2017)(RWP G-I,II 20 <u>E PARAFFINS</u> affinity' or reactivity, Alkanes are least react bonds of carbon atoms are single, that means		
Ans:	(GRW 2015), (<u>ALKANES ARE</u> Para means 'less' and affin means 'a compounds. In these compounds all the valencies of carbon atoms are fully satis	SGD 2017), (BWP 2017), (FSD 2017)(RWP G-I,II 20 <u>E PARAFFINS</u> affinity' or reactivity, Alkanes are least react bonds of carbon atoms are single, that means fied.		
Ans:	(GRW 2015), (<u>ALKANES ARE</u> Para means 'less' and affin means 'a compounds. In these compounds all the valencies of carbon atoms are fully satis	SGD 2017), (BWP 2017), (FSD 2017)(RWP G-I,II 20 <u>E PARAFFINS</u> affinity' or reactivity, Alkanes are least react bonds of carbon atoms are single, that means fied. ion of alkenes' <i>Knowledge+Application Base</i>		
Ans: Q.4	(GRW 2015), (<u>ALKANES ARH</u> Para means 'less' and affin means 'a compounds. In these compounds all the valencies of carbon atoms are fully satis What do you know about hydrogen at	SGD 2017), (BWP 2017), (FSD 2017)(RWP G-I,II 20 <u>E PARAFFINS</u> affinity' or reactivity, Alkanes are least react bonds of carbon atoms are single, that means fied. ion of aik nes.' <i>Knowleage+Application Base</i> (BWP 2016 G-I,		
Q.3 Ans: Q.4 Ans:	(GRW 2015), (<u>ALKANES ARE</u> Para means 'less' and affin means 'a compounds. In these compounds all the valencies of carbon atoms are fully satis What do you know about hydrogenation <u>HVLROGENAT</u>	SGD 2017), (BWP 2017), (FSD 2017)(RWP G-I,II 20 <u>E PARAFFINS</u> affinity' or reactivity, Alkanes are least react bonds of carbon atoms are single, that means fied. ion of aikenes.' <i>Knowleage</i> +Application Base (BWP 2016 G-I, <u>ON OF ALKENES</u>		
Ans: Q.4	(GRW 2015), (<u>ALKANES ARE</u> Para means 'less' and affin means 'a compounds. In these compounds all the valencies of carbon atoms are fully satis What do you know about hydrogenation <u>HVL ROGENATI</u> Hydrogenation means addition of mole	SGD 2017), (BWP 2017), (FSD 2017)(RWP G-I,II 20 <u>E PARAFFINS</u> affinity' or reactivity, Alkanes are least react bonds of carbon atoms are single, that means fied. ion of alkenes? <i>Knowleage+Application Base</i> (BWP 2016 G-I, <u>ON OF ALKENES</u> cular hydrogen to an unsaturated hydrocarbon		
Ans: Q.4	(GRW 2015), (<u>ALKANES ARH</u> Para means 'less' and affin means 'a compounds. In these compounds all the valencies of carbon atoms are fully satis What do you know about hydrogenation <u>HYLROGENAT</u> Hydrogenation means addition of moley the presence of a catalyst (Nh, Pt) to form	SGD 2017), (BWP 2017), (FSD 2017)(RWP G-I,II 20 <u>E PARAFFINS</u> affinity' or reactivity, Alkanes are least react bonds of carbon atoms are single, that means fied. ion of alkenes.' <i>Knowleage</i> +Application Base (BWP 2016 G-I, <u>ONOF ALKENES</u> cular hydrogen to an unsaturated hydrocarbon n saturated compound.		
Ans: Q.4	(GRW 2015), (<u>ALKANES ARE</u> Para means 'less' and affin means 'a compounds. In these compounds all the valencies of carbon atoms are fully satis What do you know about hydrogen ation <u>HVL ROGENATI</u> Hydrogen ation means addition of moles the presence of a catalyst (Nh, Pt) to form $H_2C=CH_2+H_2$ -	SGD 2017), (BWP 2017), (FSD 2017)(RWP G-I,II 20 <u>E PARAFFINS</u> affinity' or reactivity, Alkanes are least reactive bonds of carbon atoms are single, that means fied. ion of alkenes? <i>Knowleage+Application Base</i> (BWP 2016 G-I, <u>ON OF ALKENES</u> cular hydrogen to an unsaturated hydrocarbon		

Chapter-12 **Hydrocarbons** Q.5 How alkyl halides are reduced? (Knowledge+Application Base) (GRW 2013, PWP 2016 G **REDUCTION OF ALKYL HALIDES** Ans: When alkyl halides are treated with HCl in the presence of Zn, they are reduced Zn/al.HC $CH_{2r+2[H]}$ $CH_1 + HBr$ Zn/ dil.HCl $CH_3CH_2Br + 2[H]$ H_3C-CH_3+HBr Why the alkanes are used as fuel? (Understanding+Application Base) Q.6 (GRW 2014) **USE OF ALKANES AS FUELS** Ans: Alkanes are used as fuel because they burn easily in excess of air or oxygen to produce a let c_1 heat, CO₂ and water then heat is produced. $CH_4 + O_2 \longrightarrow CO_2 + H_2O + Heat$ **Q.7** How can you prepare ethene from alcohol and ethyl bromide? (Knowledge+Application Base) Ans:

PREPARATION OF ALKENES

Alkenes are prepared by the removal of small atoms (H, OH, X) from the adjacent carbon atoms of the saturated compounds, so as to create a double bond between carbon atoms.

(i) Dehydration of Alcohols:

"The removal of water from a substance is called dehydration".

Process:

Ethene is prepared by heating a mixture of ethanol and excess of concentrated sulphuric acid at 180°C. In first step, ethyl hydrogen sulphate is formed which decomposes on heating to produce ethane, which is collected over water.

$$H_{3}C - CH_{2} - OH + H_{2}SO_{4} - \underbrace{180^{\circ}C}_{CH_{3}}CH_{2} - OSO_{3}H + H_{2}O$$
$$CH_{3}CH_{2} - OSO_{3}H - \underbrace{heat}_{heat} + H_{2}C = CH_{2} + H_{2}SO_{4}$$

(ii) Dehydrohalogenation of Alkyl Bromide:

(LHR 2014)

"The removal of hvdrogen and halogen from substance called a is dehydrohalogenation".

Process:

On heating, ethyl bromide with alcoholic KOH, ethere is formed, Removal of nydrogen and halogen takes place from adjacent carbon alorns to create a double bond.

$$H_{2}C - CH_{2}Br + KCH_{(Alcoh/lic)} - \overset{I'eat}{\longrightarrow} H_{2}C = CH_{2} - KBr + H_{2}O$$

DENTIFICATION OF PROPANE

Identify propane from propene with a cnemical test. **Q.8**

Ans:

Id identify propane from propene, pass the two gases (propane and propene) through blomine water separately. Propene will decolourise reddish brown colour of bromine but propane cannot.

$$CH_3 - CH_2 = CH_2 + Br_2 \longrightarrow CH_3 - CH - CH_2$$

Q.9 Why the alkenes are called olefins? (Knowledge Base

(FSD 2017, SWL 2016 G-II, MTN 2016 G-I)

Br

Br

Colourless

Ans:

Ans:

LKUNES CALLED OLEFINS

Alter es are also known as olefins because lower members of the series form oily podicts when react with halogens. Olefins is a Latin word which means oil forming.

Why alkanes can't be oxidized with KMnO₄ solution? (*Understanding Base*)(GRW 2013) OXIDATION OF ALKANES WITH KMnO₄

Alkanes cannot be oxidized with KMnO4 solution because they are saturated hydrocarbons and are least reactive due to presence of all C - C single bonds.

Alkane+KMnO₄+H₂O \longrightarrow No reaction

Q.11 What are the addition reactions? Explain with an example. (*Knowledge Base*)

(LHR 2015, GRW 2013)

Ans:

ADDITION REACTIONS

Definition:

"These are the reactions in which the products are formed by the addition of some reagents like H_2 , Cl_2 etc. to an unsaturated organic compound".

Mechanism:

In the process, one of the bonds of double bonds gets broken and two new single bonds are formed.

Example:

• Addition of molecular hydrogen to an unsaturated hydrocarbon in the presence of a catalyst (Ni, Pt) to form saturated compounds takes place.

$$H_2C = CH_2 - H_2 \xrightarrow{Ni}{250 \cdot 300^\circ} H_3C - CH_3$$

Q.12 Justify that alkanes give substitution reactions. (Understanding Pare)

Ans:

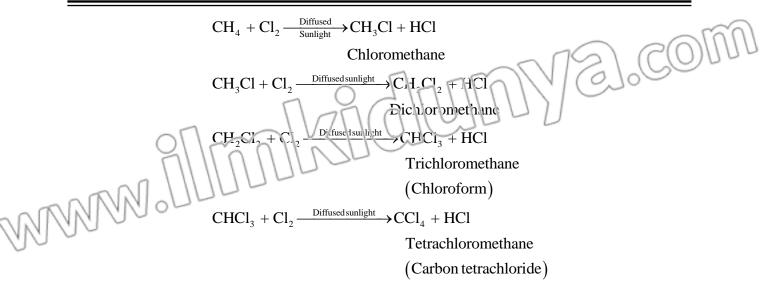
ALKANES GIVE SUBSTITUTION REACTIONS

"Substitution reaction is a reaction in which one or more hydrogen ctoms of a saturated compound are replaced with some other ctons like halogens is called a substitution reaction"

These reactions are a characteristic property of alkanes.

<u>Exernple:</u>

In differed sunlight, a series of reactions take place and at each step one hydrogen atom is substituted by halogen atoms, so that all the hydrogen atoms are substituted one by one by halogen atoms



Q.13 Both, alkenes and alkynes are unsaturated hydrocarbons. State the one 'most significant difference between them. (*Understanding Base*) (FSD 2017)

Ans:

MOST SIGNIFICANT DIFFERENCE

The most significant differences between alkenes and alkynes are as follows:

	0				•		
		Alke	enes			Alkynes	
	Nature of Bond						
		nes two y a doubl	carbon atom le bond.	s are •	• In alkynes two carbon atoms are linked by a triple bond.		
	Functional Group						
	• Their fu	nctional	group is	•	• Their functional group is		
		-C 	C = C -		$-C \equiv C -$		
		Examples					
	• $H_2C=CH_2$ (Ethene)		•	$HC \equiv CH$	(Ethyne)		
	H ₃ C–CH	H=CH ₂	(Propene)		$H_3C - C \equiv CI$	H (Propyne)	
.14	Write the molecular, dot and cross and structural for mulas of ethy ne. (Knowledge Base)						
ns:	FORVIULAS OF EDHINE The molecular, dot and cross and structural formulas of ethyne are as follows:						
	Name Molecular Formula Structural Formula Cross and dot Formu						
N	Etnyne		C_2H_2	H–C	$C \equiv C - H$	H×∙C∛≴C∙×H	

(SGD 2016 C-11, DGK 2016 G 1)

Q.15 Why hydrocarbons are soluble in organic solvents? (*Knowledge Base*)

Ans:

SOLUBILITY OF HYDROCARBONS

"Lile Dissolves Like"

We know that

Therefore, hydrocarbons being non-polar in character are more soluble in non polar organic solvents such as etter, varbon tetrachloride etc.

<u>Ezer iple:</u>

Petrol is dissolved in kerosene oil.

Give the physical properties of alkanes. (*Knowledge Base*) (MTN 2017, BWP 2016 G-I)

Ans:

PHYSICAL PROPERTIES OF ALKANES

The physical properties of alkanes are as follows:

(i) <u>Physical state:</u>

Alkanes form a homologous series of compounds. The first four members of the series are gases. The alkanes consisting of C_5 to C_{10} are liquids while higher members of the series are solids.

(ii) <u>Solubility:</u>

They are non-polar, therefore, they are insoluble in water but soluble in organic solvents.

(iii)<u>Density:</u>

The density of alkanes increases gradually with the increase of molecular size.

(iv) <u>Melting and Boiling Points:</u>

The melting and boiling points of alkanes increase regularly with the increase of molecular sizes. This is because of increase of attractive forces between the molecules of alkanes.

(v) <u>Viscosity:</u>

The alkanes become more viscous as their molecular sizes increase.

(vi) Nature of Flame:

Alkanes become less flammable, i.e. more difficult to burn with the increase of molecular sizes.

Q.17 How can you identify ethane from ethene? (Understanding Base) (SGD 2510 G 1) Ans: <u>IDENTIFICATION OF ETHANE</u>

For the identification of ethane from ethere, bromine water is added to both ethane and ethene in the presence of an inert colvent like carbon tetrachloride. Ethene will give reaction with bromine water but ethane will not react with it.

<u>Examples</u>

MANNA

 $H_2C=CH_2+Br_2 \longrightarrow Br-CH_2-CH_2-Br$

(Ethene)

 $H_3C-CH_3+Br_2 \longrightarrow No reaction$

(Ethane)

Bromination is an important reaction for checking of unsaturation in organic compounds.

Q.18 Why colour of bromine water discharges on addition of ethene in it?

Ans:

COLOUR OF BROMINE WATER

Colour of bromine water discharges on acdition of ethene in it because couble bond of ethene is converted into a single bond and nature of bromine is charged.

Example: $H_2C = CH_2 + Br_2 \rightarrow$ Br–CH₂–CH₂–Br

This reaction is used to identify the unsaturation of an organic compound.

State one important use of each: (Knowledge Base)

(i) Ethene (ii) Acetylene

(iii) Chloroform

(iv) Carbon tetrachloride

(Understanding +Application Bese)

Ans:

0.19

IMPORTANT USES

(i) <u>Ethene:</u>

Oxy-ethylene flame is used for welding purposes.

(ii) Acetylene:

It is used for the manufacturing of polymer products like polyvinyl chloride, polyvinyl acetate and synthetic rubber like neoprene.

(iii) <u>Chloroform:</u>

Chloroform is used as a solvent for rubber, waxes etc. and for anaesthesia.

(iv) Carbon Tetrachloride:

Carbon tetrachloride is used as an industrial solvent and in dry cleaning.

EXERCISE LONG QUESTIONS

- Q.1 What types of reactions are given by alkanes? Explain with reference to halogenations of alkanes. (*Knowledge Base*)
- **Ans:** See LQ.4 (Topic 12.1)
- Q.2 Alkanes are a source of heat. Explain it. (Application Base)
- Ans: See LQ.1 (Topic *Application of Hydrocarbons)
- Q.3 Prepare the following as directed: (Understanding + Application base)
- (a) Ethane from ethene
- (b) Acetylene from tetrahalide
- (c) Carbon tetra cholri le from methane
- (d) Ethylene glyco from ethene
 - 1,2-dibromoethane from ethene
- (f) Glyoxal from acetylene

C(0)[]

Ans.

PREPARATIONS AS DIRECTED

 $\rightarrow H_3C - CH_3$

(a) <u>Ethane From Ethene:</u>

When hydrogen is passd through ethene in presence of heated nickel catalyst, ethene is formed.

250-200

(b) <u>Acetylene From Tetra halide:</u>

When all yl tetrahalides are heated with zinc dust, the elimination of halides takes place to form alcetylene.

 (\mathbf{H}_2)

CH_+

 $H_{2}C$

$$\begin{array}{cccc} Cl & Cl \\ | & | \\ H - C - C - H \\ | & | \\ Cl & Cl \end{array} + 2Zn_{dust} \longrightarrow \begin{array}{c} HC \equiv CH \\ ethyne \end{array} + 2ZnCl_2$$

(c) <u>Carbon Tetracholride From Methane:</u>

Carbon tetrachloride is prepared by the substitution reaction of methane with chlorine in diffused sunlight.

In diffused sunlight, a series of reactions take place and at each step one hydrogen atom is substituted by halogen atoms, so that all the hydrogen atoms are substituted one by one by halogen atoms.

$$\begin{array}{c} CH_4 + Cl_2 & \xrightarrow{\text{Diffused}} CH_3Cl + HCl \\ & Chloromethane \\ CH_3Cl + Cl_2 & \xrightarrow{\text{Diffused sunlight}} CH_2Cl_2 + HCl \\ & \text{Dichloromethane} \\ CH_2Cl_2 + Cl_2 & \xrightarrow{\text{Diffused sunlight}} CHCl_3 + HCl \\ & \text{Trichloromethane} \\ & (Chloroform) \\ CHCl_3 + Cl_2 & \xrightarrow{\text{Diffused sunlight}} CCl_4 + HC \\ & \text{Tetrachloromethane} \\ & (Carbon tetrachloride) \\ \end{array}$$

$$(d) \quad \underbrace{\text{Ethvlene Gly col} \text{ for on Ethones}}_{KMinO_4} \\ \text{Ethvlene glycol} \text{ is prepared by the reaction of ethane with acidified dilute solution of KMinO_4 \\ & 3H_2C = CH_2 + 2KMnO_4 + 4H_2O \longrightarrow 3H_2 C - CH_2 + 2MnO_2 + 2KOH \\ & OH & OH \\ & \text{Ethvlene glycol} \end{array}$$

(e) <u>1,2-dibromoethane From Ethene:</u>

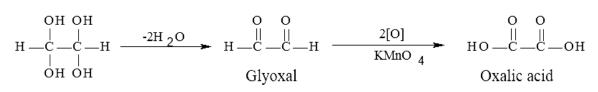
When bromine water is added to ethene in an inert solvent like carbon terrachloride in decolourizes to form 1, 2-dibromoethane. This reaction is used to iden ity the unsaturation of an organic compound.

Clyoxal From Acetylene:

Acetylene is oxidized by alkaline KMnO₄ and four hydroxyl groups add to the triple bond.

$$3HC \equiv CH + 4KMnO_4 + 8H_2O \longrightarrow 3H - C - C - H + 4MnO_2 + 4KOH OH OH$$

This intermediate product eliminates water molecules to form glyoxal, which is further oxidized to form oxalic acid.

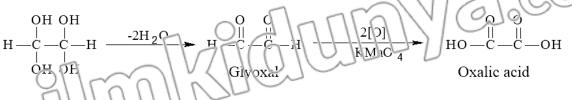


Q.4Explain the oxidation of acetylene. (Knowledge+Understanding Base)Ans.OXIDATION OF ACETYLENE

Acetylene (ethyne) is oxidized by alkaline KMnO₄ and four hydroxyl groups add to the triple bond, such as:

$$3HC \equiv CH + 4KMnO_4 + 8H_2O \longrightarrow 3H - C - C - H + 4MnO_2 + 4KOH OH OH OH$$

This intermediate product eliminates water molecules to form glyoxal, which is further oxidized to form oxalic acid.



Q.5 Write palanced chemical equations for the following reactions. Also name the product: that are formed. (Knowledge+Understanding Base)

- (i) A mixture of ethyne and hydrogen is passed over heated nickel
- (ii) Ethyne is treated with chlorine
- (iii) Ethyne is burnt in air
- (iv) Ethyne is passed through bromine water

Ans.

BALANCED EQUATIONS AND NAMES OF PRODUCTS

The balanced chemical equations for the reactions along with names of proudets are as follows:

ŀΗ

 $HC \equiv CH + H$

 $=CH_2$

 $HC \equiv CH + 2Cl_2 \longrightarrow H - C - C - H$ Cl Cl

(ii) Reaction Between Ethyne and Chlorine:

Tetrachloroethane

(iii) **Burning of Ethyne in Air:**

 $2\text{HC} \equiv \text{CH} + 5\text{O}_2 \longrightarrow 4\text{CO}_2 + 2\text{H}_2\text{O} + \text{Heat}$

250-300°C

250-3 10°C

(iv) Reaciton Between Ethyne and Bromine Water:

$$HC \equiv CH + 2Br_2 \longrightarrow H - \begin{array}{c} Br & Br \\ | & | \\ C - C - H \\ | & | \\ Br & Br \end{array}$$

Tetrabromoethane

Q.6 Explain briefly: (*Knowledge+Understanding Base*)

- (i) Why butane undergoes substitution reactions?
- (ii) There are millions of organic compounds.
- (iii) Acetylene undergoes addition reactions in two stages.
- (iv) Alkynes are more reactive than alkanes.

Ans.

JUSTIFICATION

(i) <u>Substitution Reactions of Butane:</u>

Butane is saturated hydrocarbon (alkane). Like other alkanes it gives substitution reactions by replacing its hydrogen atoms with some other atoms. Also it cannot underge addition reacitons.

(ii) Millions of Organic Compounds:

There are millions of organic compounds due to the following four properties:

- Catenation
- Isomerism
- Strength of covalent bonds of carbon
- Multiple bonding

Moreover, the number of organic compounds is very large because they are derived from hydrocarbons (parent organic compounds).

(iii) Addition Reactions of Acetylene:

Alkynes are reactive compounds because of presence of a triple bond. A triple bond consists of two weak bonds (π -bonds) and a strong bond (σ -bond).

When alkynes react with other substances, two weak bonds are readily broken one by one and addition takes place easily. The addition reactions of alkynes resemble to those of alkenes.

$$HC \equiv CH + H_2 \xrightarrow{Ni} H_2C = CH_2$$

$$\mathbf{H}_2 = \mathbf{C}\mathbf{H}_2 + \mathbf{H}_2 \xrightarrow{\mathrm{Ni}}_{250 \cdot 300^{\circ}\mathrm{C}} \mathbf{H}_3 \mathbf{C} - \mathbf{C}\mathbf{H}_2$$

(iv) More Reactivity of Alkynes:

Alkynes are more reactive compound's that alkanes because of presence of a triple bond. A triple bond consists of two weak bonds (π -bonds) and ϵ strong bond (σ -bond). When alkynes react with other substances two weak bonds are readily broken one by one and addition takes place easily. The addition reactions of alkynes resemble to those of alkenes

ADDITIONAL CONCEPTUAL QUESTIONS

Differ minte between Glyoxal and Oxalic Acid. (Understanding Base)

DIFFERENTIATION

Glyoxal	Oxalic Acid		
Definition:	Definition:		
Glyoxal is dialdehyde	Oxalic acid is dicarboxylic		
compound.	compound.		
Functional Group:	Functional Group:		
• It has aldeyhydic functional	• It has carboxylic functional group		
group (-CHO)	(-COOH)		
Structure:	Structure:		
0 0	0 0		
H-Č-Č-H	$HO - \ddot{C} - \ddot{C} - OH$		

Q.2 How alkyl halides are produced fom alkenes? (Understanding Base)

Ans: Alkyl Halides can be prepared from Alkenes by Hydrohalogenation (Addition of hydrogen and halogens). Dry gaseous halides react with alkene to produce alkyl halides.

$$H_2C = CH_2 + HX \rightarrow H_3C - CH_2X$$

$$H_2C = CH_2 + HBr \rightarrow H_3C - CH_2Br$$

Q.3 What is the difference between 1-butyne and 2-butyne or Dimethyl Acetylene?

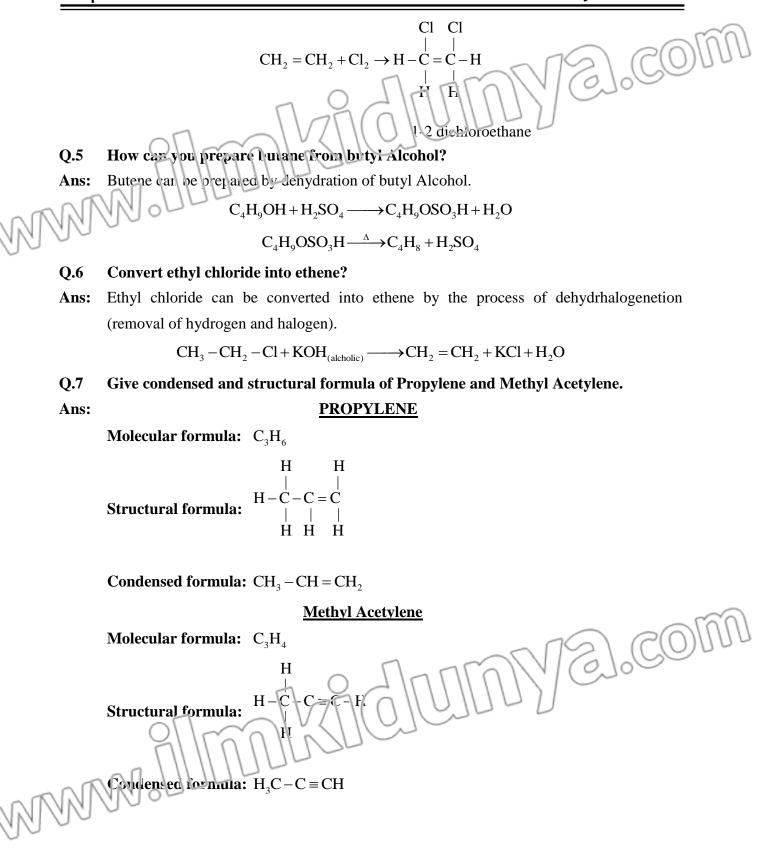
Ans

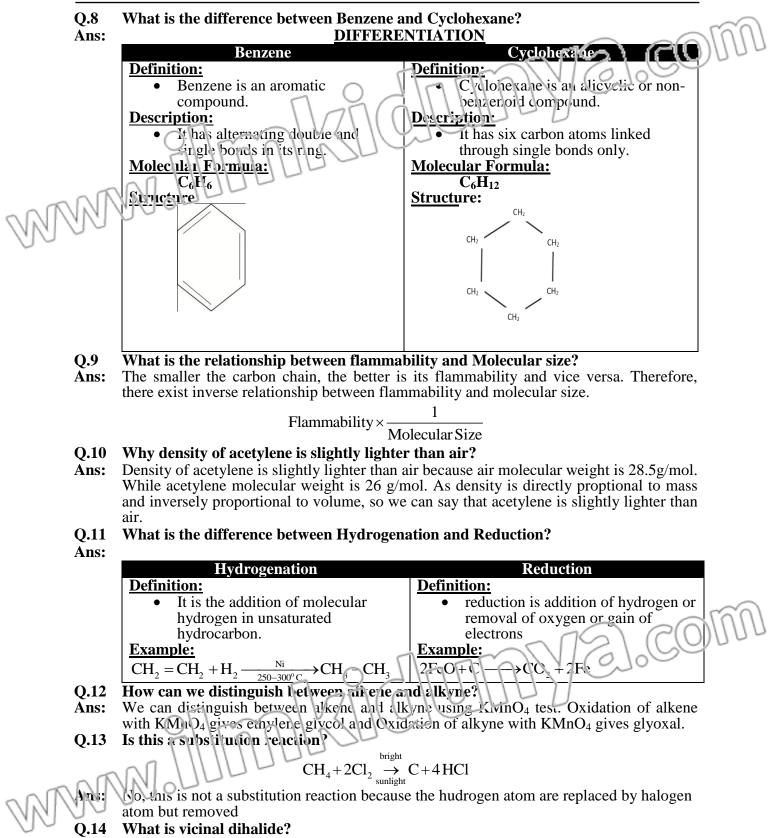
DIFFERENTIATION

1-Butyne	2-Butyne (Dimethyl Acetylene)
Definition:	Definition:
• The carbon-carbon triple bond	• The carbon-carbon sripte bond is a
is at end of carbon chain.	midule of carbor chain
Common Name:	Common Name:
• Its common name is e.hyl	• Hs common name is dimethyl
Acetylene	Acetylene
Structure:	Structure:
$H_3C - CH_2 - C \equiv CH$	$H_3C - C = C - CH_3$

How can you prepare 1-2, dichloroethene?

Ans: Ethene will undergo an addition reaction with Cl_2 to give 1-2 dichloroethane.





Ans: Compounds which has two halogen atoms on the adjacent carbon atoms is called vicinal dihalide

	TERMS TO KNOW	- 16
Terms		U(C
Hydrocarbons	The organic compounds which consist of carbon and hypergen only are called hydrocarbons.	
Open Chain Compounds	These are compounds in which first and the last carbon atom are not joined directly to each other. The open chain may be straight or branched.	
Alphatic	These are the compounds in which the first and the last carbon are	
Hydrocarbons	not directly joined to each other.	
Saturated	The hydrocarbon in which all the four valencies of carbon atoms are	
Saturated	fully satisfied (saturated) by single bonds with other carbon atoms	
Hydrocarbons	and hydrogen atoms are called saturated hydrocarbons.	
Unsaturated	The hydrocarbons in which two carbon atoms are linked by a	
Hydrocarbons	double or a triple bond are called unsaturated hydrocarbons.	
Alkanes	The hydrcarbons in which all the carbon-carbon bonds are single	
Aikanes	covalent are called alkanes.	
A 11	The compounds in which two carbon atoms are linked by a double	
Alkenes	bond are called alkenes.	
A 11	The hydrocarbons in which two carbon atoms are linked by a triple	
Alkynes	bond are called alkynes.	
Closed Chain	Compounds having rings of carbon atoms in their molecules are	
Hydrocarbons	called closed chain or cyclic hydrocarbons.	- 10
Studiaht Chain	Straight chain hydrocarbons are those in which carbon atoms link with	J)(C
Straight Chain	each other through single, double or wiple cond forming a straight	
Hydrocarbons	chain.	
Branched Chain	Branched chain hydroarbons are those in which there is a branch	
Hydrocarbons	along a straight chain.	
MALTUL	A reaction in which one or more hydrogen atoms of a saturated	
Substitution Reaction	compound are replaced with some other atoms (halogen) is called	
Í	a substitution reaction.	
Halogenation	Addition of halogen to a substance is called halogenation.	

	•	
	Dehlogenation	Removal of halogen from a substance is called dehalogenation.
	Hydration	Addition of water to a substance is called hydration
	Dehydration	Removal of water from a substance is called delightation.
		These are the scactions in which the products are formed by the
	Addition Reactions	addition of some reagents life H_2 , Cl_2 , etc., to an unsaturated organic compound.
	TRA DUC	Hydrogenation means addition of molecular hydrogen to an
\mathbb{N}	Hydrogenation	unsaturated hydrocarbon in the presence of a catalyst (Ni, Pt) to
10		form saturated compound.
	Bromination	Addition of bromine to a substance is called bromination.
	Dehydrogenation	Removal of hydrogen from a substance is called dehydrogenation.
		Removal of hydrogen and halogen from an alkyl halide is called
	Dehydrohalogenation	dehydrohalogenation.
	Dehalogenation	Removal of halogen from a substance is called dehalogenation.
	Hydroxyl Group	The functional group in glycol is hydroxyl group (OH).
	(OH)	
	Petrochemicals	The organic compounds prepared from hydrocarbons (petroleum
	retrochennicais	and natural gas) are called petrochemicals.
	Paraffins	Paraffins means less affinity. Alkanes are called paraffins due to
		their less reactivity.
	Olefins	Olefins means oil forming. Alkenes are called olefins due to their
	Olemis	property of forming oily products on reaction with lower halogens.
		The gas (major compounent is methane) produced from masny
	Marsh Gas	places due to anaerobic decomposition of dead organic matter is
		called mursh gas.
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≫	Chap	ter–12		Hydrocarbons		
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	Time	35 Minutes		Marks: 25		
i	Q.1	Four possible answers (A), (B), (C) and	(D) to each grassion are			
I	C	correct answer.		(6×1=6)		
I	1.	One of the hydrocarbers levets with one	mole of hydrogen to form a	saturated		
I		hydroczebon, What formula could be of	ine X?			
		(A) C_3H_8	(B) $C_6 H_{12}$			
The second se	NI	(C) $C_4 H_{1a}$	(D) C ₇ H ₁₆			
NA	AN.	Traces of acetylene are present in coal ga	s about:			
00		(A) 0.06%	(B) 0.08%			
I		(C) 1.1%	(D) 90%			
1	3.	Which one is the formula of chlorometha	ne?			
1		(A) CH_2Cl_2	(B) CCl ₄			
I		(C) $CHCl_3$	(D) CH ₃ Cl			
I	4.	In dry cleaning which chemical is used:				
I		(A) Chloroform	(B) Carbon tetrachloride			
I		(C) Acetaldehyde	(D) Ethanol			
1	5.	Dehydration means removal of:				
1		(A) Water	(B) Halogen			
		(C) Hydrogen	(D) All of these			
I	6.	General formula of alkanes is:				
I		(A) C_nH_{2n-2}	(B) $C_n H_{2n}$			
I		(C) C_nH_{2n+2}	$(D) C_n H_{2n+1}$			
	Q.2	Give short answers to the following quest	tions.	(5×2=10)		
	(i)	What are saturated hydrocarbons? Give an e				
I.	(ii)	21 (20000				
1	(iii)	(iii) Why alkenes are called "olefins"?				
	(iv)	What is meant by hydrogenation?				
I	(v)	Write sources of alkenes.				
1	Q.3	Answer the following questions in detail.		(5+4=9)		
000	A.	Write Town the chemical properties of alky	nes?	(5)		
AN,	(ii)	How alkanes are prepared?		(4)		
	NOTE: Parents or guardians can conduct this test in their supervision in order to check the skill of students.					
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