SECTION III: COMPRHENSIONS

ALKANES

COMPREHENSION # 101

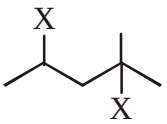
Paragraph for Questions Nos. 866 to 868

Alkanes can be prepared by Wurtz reaction, in which, alkyl halides are coupled each other with the help of metallic sodium is dry ether solvent, to give alkanes.

$$2RX \xrightarrow[dry\ ether]{Na} R-R$$

Due to elimination and rearrangement reactions, different byproducts are formed. Unsymmetrical alkanes can be prepared by this method, but practically it is very difficult to separate the individual alkane from the mixture of alkanes.

866. Which one of the following is correct for the following dihalide:



(A) intramolecular coupling alone take place

(B) extramolecular coupling alone take place

(C) intramolecular coupling dominates extramolecular coupling

(D) extramolecular coupling dominates intramolecular coupling

867. Identify the incorrect statement. In the stoichiometric Wurtz reaction on ethyl chloride.

(A) disproportionation of alkyl carbanion and alkyl halide take place.

(B) some sodium metal remains in the reaction mixture

(C) the byproducts dominate the chief product

(D) inter molecular hydrogenation take place

868. The intermediate in Wurtz reaction is:

(A) Carbanion (B) Carbocation

(C) anion radical (D) organo metallic compound

COMPREHENSION # 102
Paragraph for Questions Nos. 869 to 871

Wurtz reacton involves the condensation of two molecules of alkyl halides in the presence of sodium and dry ether $\mathrm{R}-X+2Na+X-\mathrm{R}\xrightarrow{DryEehter}\mathrm{R}-\mathrm{R}+2NaX$

In this reaction small amount of alkene is also formed as by-product.

$$CH_3CH_2Br+CH_3CH_2Br\xrightarrow{Na/Dry\ \text{ehter}}CH_3-CH_2-CH_2-CH_3+CH_2=CH_2+\underbrace{CH_3-CH_3}_{\text{By-products}}$$

Tertiary alkyl halides do not give Wurtz reaction. Frankland reaction is similar but has similar but has certain advantages over Wurtz reaction. It is useful in the synthesis of symmetrical alkanes. Frankland reaction is shown by primary, secondary as well as tertiary alkyl halide.

Answer the following questions

869. Which of the following alkanes is not obtained from Wurtz reaction?

(A) Methane (B) Ethane (C) Propane (D) Butane

870. A mixture of ethyl iodide and methyl iodide is subjected to the Wurtz reaction. The products formed are:

(A) ethane (B) butane (C) propane (D) 2-methylpropane

871. The intermediate compound(s) formed in frankland reaction is/are:

(A) $RZnI_2$ (B) R_2Zn (C) RZnI (D) R_2ZnI

COMPREHENSION # 103
Paragraph for Questions Nos. 872 to 874

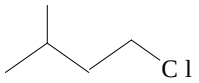
Chlorination on alkanes at below 300^0C

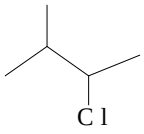
Reactivity order $3^0-H>2^0-H>1^0-H$

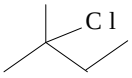
$4.5\ :\ 3.25\ :\ 1$

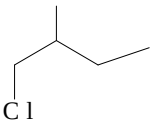
mono chlorination on 2-methyl butane

872. In the above reaction major product is

A) 

B) 

C) 

D) 

873. Number of isomers obtained in the above reaction

(A) 4 (B) 3 (C) 6 (D) 5

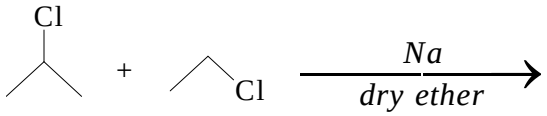
874. If chlorination takes place at '1' and '3' positions an 2-methyl butane simultaneously then how many optically active isomers are possible.

(A) 2 (B) 4 (C) 6 (D) 8

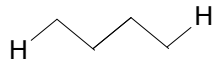
COMPREHENSION # 104
Paragraph for Questions Nos. 875 to 877

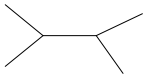
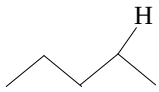
$$R - X \xrightarrow[dry\ ether]{Na} R - R + Na_X$$

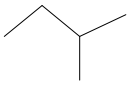
Mechanism is uncertain but explained by both ionic and free radical mechanism.

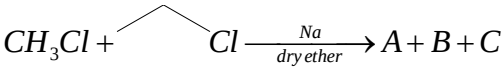
875. 

product (major)

A) 

B) 
C) 

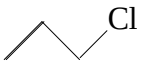
D) 

876. 

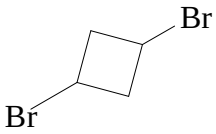
A, B, C are saturated hydrocarbons . Then *A, B, C* are

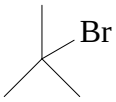
(A) Chain isomers (B) Positional isomers
(C) Homologous (D) Diastereomers

877. Which of the following reactant is not suitable for wurtz reaction

A) 

B) 

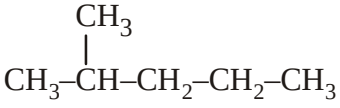
C) 

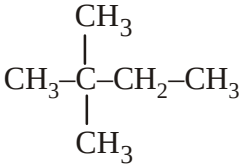
D) 

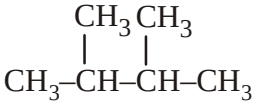
COMPREHENSION # 105
Paragraph for Questions Nos. 878 to 880

An alkane (A) molecular formula C_6H_{14} reacts with chlorine in the presence of ultra violet light to yield three isomeric monochloro derivatives (B) , (C) and (D) . Of these only (C) and (D) undergo dehydrohalogenation with sodium ethoxide in ethanol to produce an alkene . Moreover (C) and (D) yields the same alkene (E) (C_6H_{12}) . Hydrogenation of (E) produces (A) . Treating (E) with HCl produces a compound (F) that is an isomer of (B) , (C) and (D) . Treating (F) with Zn and acetic acid gives a compound (G) , which is isomeric with (A). Propose structures for (A) to (G) .

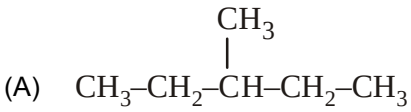
878. The structure of A is

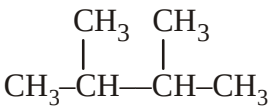
(A) $CH_3–CH_2–CH_2–CH_2–CH_2–CH_3$ (B) 

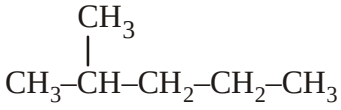
(C) 

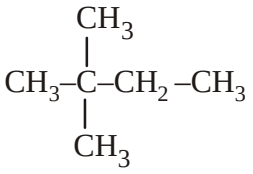
(D) 

879. The structure of G is

(A) 

(B) 

(C) 

(D) 

880. The compound (F) on treatment with alcoholic KOH, the major product obtained is

(A) 1-hexene (B) 2,3-dimethyl-2-butene

(C) 2,3-dimethyl-1-butene (D) 3-hexene

COMPREHENSION # 106

Paragraph for Questions Nos. 881 to 883

Alkanes are the saturated hydrocarbons. They are represented by a general formula C_nH_{2n+2} (n = 1, 2.....). They can be synthesized by different methods. One of the important method of formation is Corey-House synthesis. In this process when alkyl halide is treated with lithium, it forms alkyl lithium. Alkyl lithium on treatment with cuprous halide the formation of lithium dialkyl cuprate takes place. When it is treated with another alkyl halide or same alkyl halide, an alkane formation takes place. The reactions are as follows **:**

$$R{-}X + Li \longrightarrow RLi + LiX$$

$$2RLi + CuX \longrightarrow R_2CuLi + LiX$$

$$R_2CuLi + R'X \longrightarrow \underbrace{R{-}R'}_{\text{Alkane}} + RCu + LiX$$

And in case of Wurtz reaction when alkyl halide (RX) is treated with sodium in presence of dry ether it gives the formation of alkane.

$$2RX + Na \xrightarrow[\text{Ether}]{\text{Dry}} R{-}R + 2NaX.$$

881. In Corey house reaction the yield of R–R' by raction of R'–X with R_2CuLi is in the following order

(A) Primary > Secondary > Tertiary (B) Tertiary > Secondary > Primary

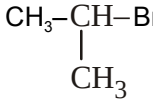
(C) Secondary > Primary > Tertiary (D) Secondary > Tertiary > Primary

882. In case of Wurtz reaction which alkyl halide gives maximum yield of alkane?

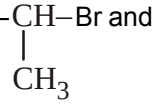
(A) Isopropyl bromide (B) Methyl bromide

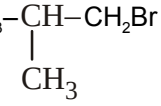
(C) Tert-butyl bromide (D) Ethyl bromide

883. To form the isopentane which of the following alkyl halides should be used in Corey house synthesis (RX) and (R'X) respectively as shown above **:**

(A) Both 

(B) CH_3Br and $CH_3CH_2CH_2CH_2Br$

(C)  and CH_3Br

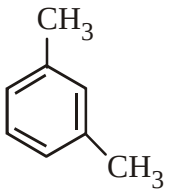
(D) CH_3Br and 

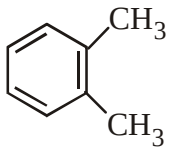
COMPREHENSION # 107

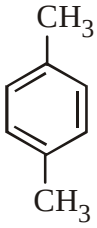
Paragraph for Questions Nos. 884 to 886

Two unknown compounds (A & B) have same molecular formula C_4H_9Br which give n-butane on reaction with Zn-Cu/EtOH

884. The compound A on wurtz reaction gives a linear hydrocarbon (X) which on further reaction with Cr_2O_3/Al_2O_3 gives an hydrocarbon that has octane number more than 100. The compound is:

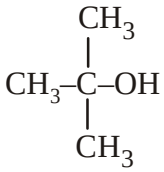
(A) 

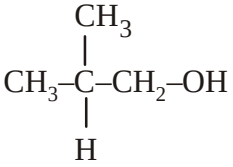
(B) 

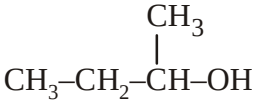
(C) 

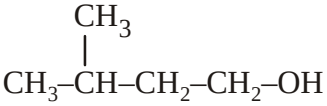
(D) 

885. The compound A $\xrightarrow{LiAlH_4}$ C $\xrightarrow{AlCl_3}$ D $\xrightarrow[H^+]{KMnO_4}$ E. The structure of E is:

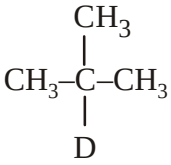
(A) 

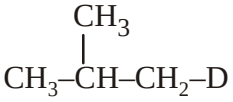
(B) 

(C) 

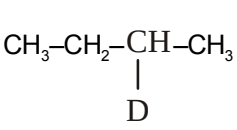
(D) 

886. The compound B $\xrightarrow[Et_2O]{Mg}$ Y $\xrightarrow{D_2O}$ Z. The compound Z is

(A) 

(B) 

(C) $CH_3–CH_2–CH_2–CH_2–D$

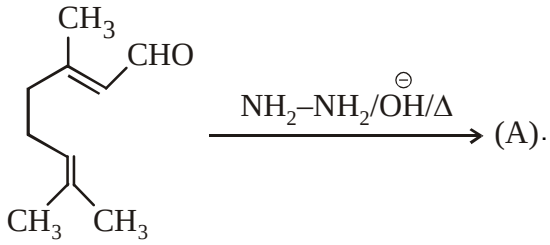
(D) 

ALKENES

COMPREHENSION # 108

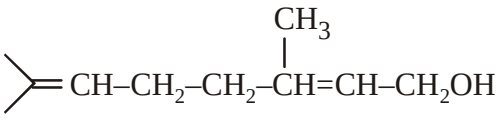
Paragraph for Questions Nos. 887 to 889

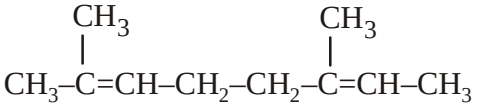
Citral is unsaturated aldehyde found in lemon oil. Fragrance of citral leaves and fruits is due to the presence of this compound.

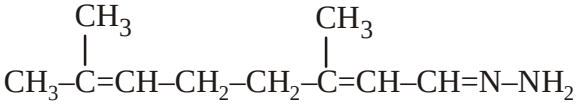
887. 

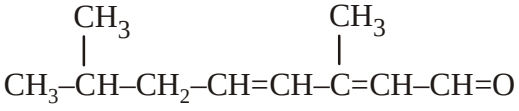
Citral

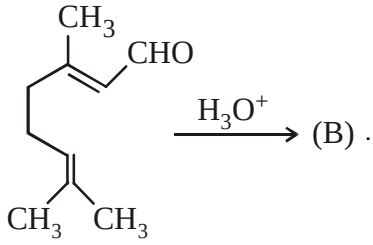
The product (A) is :

(A) 

(B) 

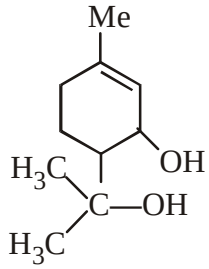
(C) 

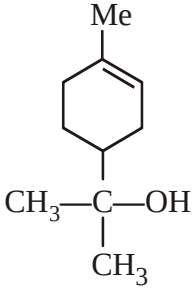
(D) 

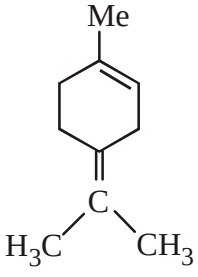
888. 

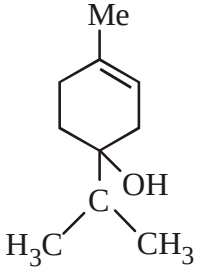
Citral

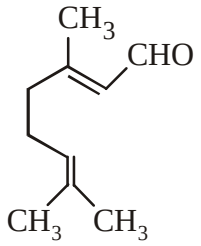
The product (B) is :

(A) 

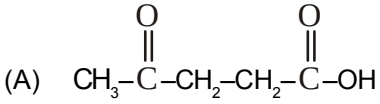
(B) 

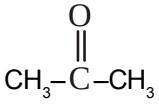
(C) 

(D) 

889.  $\xrightarrow{KMnO_4 / H^{\oplus}}$ products .The product(s) is/are :

Citral

(A) 

(B) 

(C) CO_2

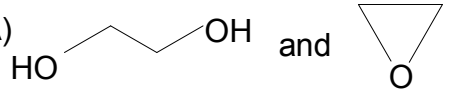
(D) All of these

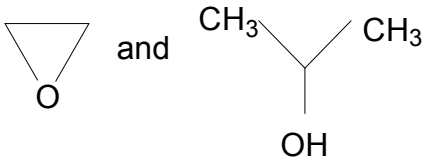
COMPREHENSION # 109

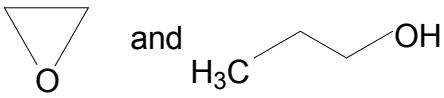
Paragraph for Questions Nos. 890 to 892

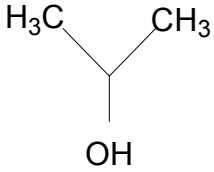
Alkenes can be oxidized in the presence of different reagents to give different products. Alkenes on oxidation in presence of silver at high temperature give cyclic ethers, which also can be synthesized by using per acids Alkenes on reductive ozonolysis give carbonyl compounds in presence of Zinc and H_2O_2. On reaction with acidic $KMnO_4$, it also produces corresponding Carbonyl compound. Alkynes can be also oxidized in presence of such reagents but the products are different.

890. Ethylene on reaction with mCPBA(m-chloro per Benzoic acid) in $CH_2C\ell_2$ forms a compound (X), which on reaction with CH_3MgI and subsequent Hydrolysis gives a compound (Y). (X) and (Y) are respectively

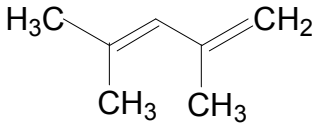
(A) 

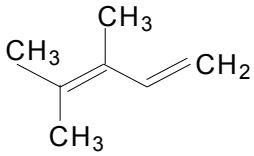
(B) 

(C) 

(D) H_3C - CHO and 

891. An open chain Hydrocarbon (C_7H_{12}) on ozonolysis produces propanone ; methanal and – oxo – propanal. The Hydrocabon could be 2

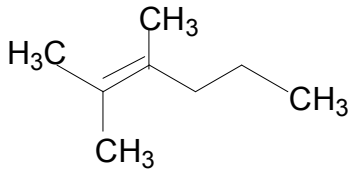
(A) 

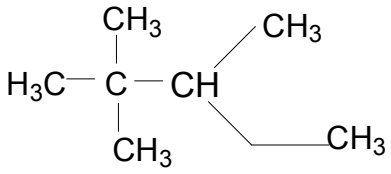
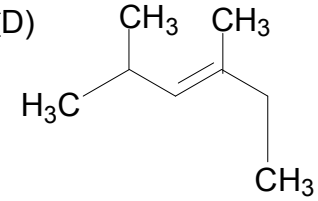
(B) 

(C) Either of these

(D) $CH_3 - CH_2COOH$

892. A Hydrocarbon (C_8H_{16}) on oxidation with a hot acidified solution of $KMnO_4$ forms 2-Butanone and Isobutyric acid as a product. The Hydrocarbon is

(A) $(CH_3)_2 C = C (CH_2 CH_{3)2}$ (B) 

(C)  (D) 

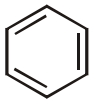
COMPREHENSION # 110

Paragraph for Questions Nos. 893 to 895

An alkene (A) on oxidation with $K_2Cr_2O_7/H_2SO_4$ gives only two moles of gas (X), which turns lime water milky.

893. The 'A' can be:

(A) $H_2C=CH_2$ (B) $CH_2=CH–CH=CH_2$

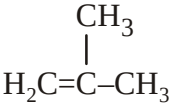
(C)  (D) $CH_2=CH–CH_2–CH=CH_2$

894. 'B' that is next homologous of 'A'. The product/s on oxidation of 'B' are:

(A) Acetic acid (B) Acetic acid and formic acid

(C) Acetone and acetic acid (D) Acetic acid/ CO_2

895. The compound 'C' is the just higher homologous of 'B' but on oxidation does not evolve CO_2. The 'C' is

(A) $H_3C–CH=CH–CH_3$ (B) 

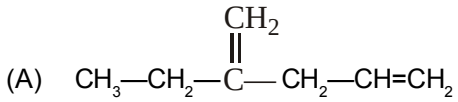
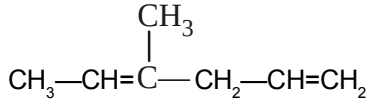
(C) $H_2C=CH–CH_2–CH_3$ (D) None of these

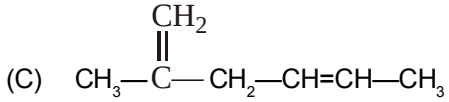
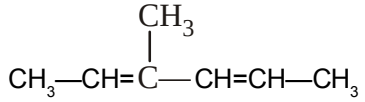
COMPREHENSION # 111

Paragraph for Questions Nos. 896 to 898

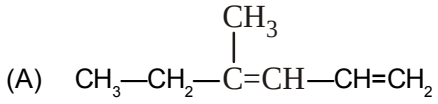
An unsaturated hydrocarbon A (C_7H_{12}) absorbs 2 molecule of hydrogen when hydrogenated. On oxidation it gives one molecule each of acetic acid, and acetoacetic acid and on reduction give 2-methylhexane :

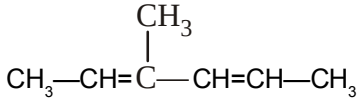
896. The structure of A:

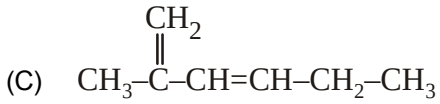
(A)  (B) 

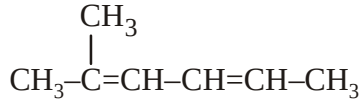
(C)  (D) 

897. The compound A on heating produces a more stable compound:

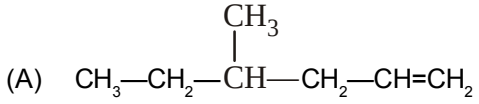
(A) 

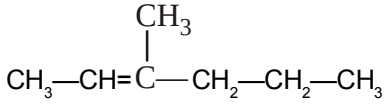
(B) 

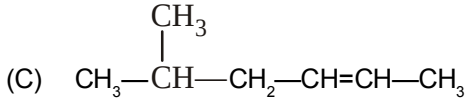
(C) 

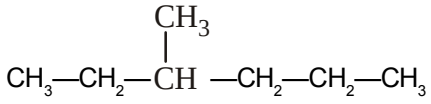
(D) 

898. The A on Birch Reduction with Na/Lq.NH_3 gives:

(A) 

(B) 

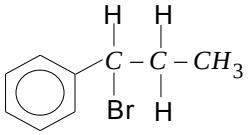
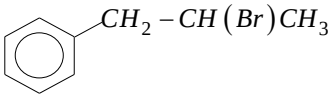
(C) 

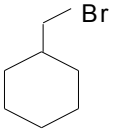
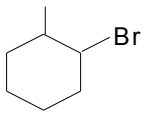
(D) 

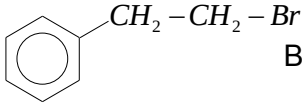
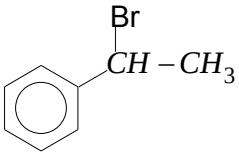
COMPREHENSION # 112
Paragraph for Questions Nos. 899 to 901

Dehydrobromination of (A) & (B) gives same alkene (C). Alkene (C) can regenerate (A) & (B) by the addition of HBr in presence & absence of peroxide respectively. 1, 1 – diphenyl ethane is obtained on reaction of (C) with benzene in the presence of H^+ ions.

899. Compound 'A' & 'B' are

(A) A :  B : 

(B) A :  B : 

(C) A :  B : 

(D) None

900. Hydrolysis of (A) & (B) gives isomeric products (D) & (E). Which of the following statement for D & E is not true ?

(A) Both D & E gives iodoform test
(B) Both D & E gives same alkene upon dehydration
(C) Both D & E reacts with NaOH
(D) None of these

901. A when treated with NBS & then with $NaNH_2$ gives (X), when (X) is reacted with H_2O / H^+ it gives :-

(A) Phenol (B) Acetophenone (C) Benzoic acid (D) None of these

Answer Key

Qs.	Ans.	Qs.	Ans.
866	C	901	B
867	C		
868	D		
869	A		
870	A		
871	BC		
872	B		
873	C		
874	B		
875	C		
876	C		
877	D		
878	C		
879	B		
880	B		
881	A		
882	B		
883	D		
884	B		
885	A		
886	D		
887	B		
888	A		
889	D		
890	C		
891	C		
892	D		
893	A		
894	D		
895	A		
896	C		
897	D		
898	C		
899	C		
900	A		