CHEMISTRY

BOOKS - R SHARMA CHEMISTRY (HINGLISH)

ALKANES

Example

1. Give the $IUPAC$ names for each of the following :

(i) $(CH_3CH_2)_2CHCH(CH_3)CH_2CH_3$

(ii) $(CH_3)_4C$

(iii) $\left[(CH_3)_3C\right]_4C$

(iv) $(CH_3)_3CCH_2C(CH_3)_3$

Strategy: Select as the parent structure the longest possible continous chain and then consider the compound to have been derived from this structure by the replacement of H atoms by ends of the longest chain,

begin numbering at the end nearest to the branch that is first in alphabetical order.

3. Assign the name and position number to each substituent. Arrange the substituents in alphabetical order. Hyphenated prefixes such as tert- sec- are not used in the alphabetization of substituents.

4. Use on appropriate prefix to group like substituents: di=2, tri=3, tetra=4 penta= 5, and so on. Do not consider these prefix when alphabetizing attached groups.

5. Write the name as single word. Use hyphens to separate numbers and letters (plus some hyphenated prefix) and commas to spearate numbers. Do not leave any spaces.

Some examples showing the application of the rules of nomenclature are given below:

various alkyl groups as substituents. To avoid any mistake. it is always better to write the complete structural formula.

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2. Write the structural formulas for each of the following alkanes:

(a) n-Butane

(b) Isobutane

(c) Neopentane

Strategy: The prefix n is used for any alkane (no matter how large) in which C atoms form a continuos chain with no branching. In an isoalkane of six carbons of fewer, all carbons except one form a continous chain and that one C atom is attached to the next-to-end carbon. Neoalkane is characterized by the presence of a quaternary C atom.

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3. Write the structural formulas for each of the following groups: (i) n-butyl, (ii) isobutyl, (iii) sec-butyl, (iv) tertbutyl, (v) isopentyl (isomyl), and (vi) tert-pentyl (t-amyl).

Strategy: In n-alkyl groups, all C atoms form a continous C chain with no branching. In isoalkyl group, there is a CH_3-group on the next-to-

end carbon in the chain. Prefixes sec and tert-indicate secondary and tertiary, respectively, i.e., the H atom is removed from 2° and $3^{\circ} C$ atoms.

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4. Write the structure of different isomeric alkanes corresponding to the molecular formula C_6H_{14}. Also give their $IUPAC$ names.

Strategy: Start with the longest contionous chain with no branching and go on increasing the number of branching by removing one, two, etc, C atoms from the longest chain and reattaching them, but do not attach them to the terminal C atoms.

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5. Write the structures of different isomeric alkyl groups corresponding to the molecular formula C_5H_{11}. Also give the $IUPAC$ names of alochols obtained by attachment of the $-OH$ groups to these groups.

Strategy: There are three different skeletons of five C atoms. Pentane has three different type of H atoms, isopentane has four different types of H atoms, and neopentane has only one type of H atoms.

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6. When sodium propionate is electrolyzed, n-butane, ethane, ethylene, and ethyl propionate are obtained. Explain their formation through a suitable mechanism.

Strategy: Follow the radical mechanism.

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Follow Up Test 1

1. Paraffins are

A. saturated hydrocarbon

B. saturated cyclic hydrocarbons

C. saturated acyclic hydrocarbons

D. saturated alicyclic hydrocarbons

Answer: C

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2. Which of the following is not absolutely correct?

A. A general tetrahedral orientation of group and thus, sp^3 hybridization is the rule for the C atoms of all alkanes.

B. The $C-H$ and $C-C$ bonds have the same general electron distribution, being cyclindrically symmetrical about a line joining the atomic nuclei.

C. All four H atoms of methane and all six H atoms of ethane are identical.

D. Butane and pentane are examples of straight-chain alkanes.

Answer: D

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3. Which of the following $IUPAC$ name is correct?

A. 2, 2-Dimethylbutane

B. 2-Ethyhexane

C. 3-Isopropylpentane

D. 1, 1-Dimethylbutane

Answer: A

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4. The correct $IUPAC$ name of

is

A. ethylmethylhexane

B. 4-ethy-3-methylhexane

C. methylethylhexane

D. 3-ethyl-4 methylhexane

Answer: D

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5. The correct $IUPAC$ name of isohexyl group is

A. 2-methylpentyl

B. 1-methylpentyl

C. 4-methylpentyl

D. 3-methylpentyl

Answer: C

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6. The smallest alkane having a 3° carbon is

A. 2, 2-dimethypropane

B. isopentane

C. isobutane

D. 2, 3-dimethylbutane

Answer: C

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7. In ethene, the carbon-carbon bond distance is

A. $154pm$

B. $120pm$

C. $139pm$

D. $134pm$

Answer: A

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8. The $IUPAC$ name of unbranched alkane with $20C$ atoms is

A. hectane

B. icosane

C. triacontane

D. hentriacontane

Answer: B

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9. How many isomeric alkanes having the molecular formula C_5H_{12} are possible?

A. 4

B. 3

C. 2

D. 5

Answer: B

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10. How many alkyl groups having the molecular formula C_4H_9- are possible?

A. 4

B. 3

C. 2

D. 5

Answer: A

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11. Which of the following constitutional isomerism is exhibited by alkanes?

A. Position isomerism

B. Functional group isomerism

C. Metamerism

D. Chain isomerism

Answer: D

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Follow Up Test 2

1. $CH_3CH = CH_2 + H_2 \xrightarrow{Cayalyst} CH_3CH_2CH_3$

The catalyst used in the method of preparation is

A. Ni

B. Pt

C. Pd

D. All of these

Answer: D

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2. Dihydrogen gas adds to alkenes and alkynes in the presence of finely divided catalysts like $Pt, Pd,$ or Ni to form alkanes. This process is called

A. hydrogenation

B. hydration

C. hydrogenolysis

D. none of these

Answer: B

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3. The Sabatier-Senderens reduction is carried out by passing the vapors of organic compound mixed with hydrogen over _____ catalyst at $200 - 300^{\circ} C$.

A. NiO

B. Pt

C. Pd

D. Ni

Answer: D

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4. How many diffenrent alkenes can be hydrogenated to form 2-methylbutane.

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5. Raney nickel used as a catalyst in hydrogen is obtained by

A. heating nickel tetracarbonyl

B. griding solid nickel

C. treating nickel-aluminum alloy with dilute $NaOH$

D. treating nickel-aluminium alloy with dillute HCl

Answer: C

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6. Wilkinson's catalyst is used as a homogeneous hydrogenation catalyst for the conversion of alkenes to alkanes. It is a complex of

A. Pt

B. Ir

C. Ni

D. Rh

Answer: D

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Follow Up Test 3

1. Alkanes can be prepared by the reduction of alkyl halides (preferably bromides and iodides). In one of the methods, reaction is carried out by dissolving metals such as

(i) Zn and dil. HCl

(ii) Zn and $CH_3)COOH$

(iii) Zn and $NaOH$

(iv) $Zn - Cu$ or couple and alcohol

A. (i), (ii)

B. (iii), (iv)

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

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

Answer: D

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2. Which of the following reagents can reduce all types of alkyl halides?

A. Lithium aluminumhydride, $LiAlH_4$

B. Sodium borohybride, $NaBH_4$

C. Triphenytinhydride, Ph_3SnH

D. All of these

Answer: C

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3. Which of the following is used for the catalytic hydrogenolysis of alkyl halides ?

A. $H_2 / Pd / C$

B. H_2 / Pd

C. H_2 / Pt

D. $H_2 / Pt / C$

Answer: A

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4. Alkyl iodides may be reduced to the corresponding alkanes by heating with cincentrated hyriodic acid at $150^\circ C$ in the presence of

A. balck P

B. white P

C. yellow P

D. red P

Answer: D

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5. Which of the following is an organometallic compound?

A. Lithium cetate

B. Ethyl lithium

C. Lithium methoxide

D. Lithium dimethylamide

Answer: B

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6. An alkyl magnesium halide reacts with water to give an alkane. In this reaction water acts as

A. a solvent

B. an acid

C. a base

D. a catalyst

Answer: B

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7. Which of the following iodides is commonly used for the preparation of `Gridgnard reagent?

A. CH_3I

B. CH_3CH_2I

C. $CH_3CH_2CH_2I$

D. $CH_3CH_2CH_2I$

Answer: A

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8. Which of the following Grignard reagents is commonly used for the estimation of active hydrogen in a compound?

A. C_6H_5MgI

B. $C_6H_{11}MgI$

C. CH_3I

D. C_2H_5MgI

Answer: C

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9. Ethylmagnesium bromide reacts with methanol to prodece.

A. Propane

B. methane

C. methoxyethane

D. ethane

Answer: D

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10. How many hydrocarbons are formed when ethyl bromide is subjected to the Wurtz reaction?

A. Just one

B. Two

C. Three

D. Four

Answer: C

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11. Which of the following alkyl bromides may be used for the synthesis of $2, 3$-dimethylbutane by the Wurtz reaction?

A. s-Butyl bromide

B. Isobutyl bromide

C. Isopropyl bromide

D. n-Propul bromide

Answer: C

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12. Which of the following hydrocarbons is not formed when a mixture of ethyliodide and n-Propyliodide is subjected to the Wurtz reaction?

A. n-Propane

B. n-Butane

C. n-Pentane

D. n-Hexane

Answer: A

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13. The Wurtz reaction is best suited for the preparation of

A. symmetrical odd carbon alkanes

B. symmetrical even carbon alkanes

C. unsymmetrical odd carbon alkanes

D. unsymmetrical even carbon alkanes

Answer: B

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14. Which of the following is known as Gilman reagent?

A. R_2Zn

B. RLi

C. R_2CuLi

D. RMg_X

Answer: C

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15. Which of the following alkyl halides is not suitable for reactions with lithium dialkylcuprate in the Corey-House synthesis?

A. $(CH_3)_3CBr$

B. C_2H_5Br

C. CH_3Br

D. $CH_3CH_2CH_2I$

Answer: A

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16. Ethyl iodide is treated first with lithium in dry ether and then with cuprous iodide $(\underline{C})$ and finally with n-Proply iodide. The expected alkane is

A. ethane

B. pentane

C. propane

D. butane

Answer: B

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Follow Up Test 4

1. The reaction whereby a carboxylic acid loses CO_2 is called decarboxylation. It is carried out by heating a mixture of the sodium salt of carboxylic acid and

A. sodium hydroxide

B. sodamide

C. soda-lime

D. soda-ash

Answer: C

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2. How many moles of HI are needed to reduce one mole of carboxlic acid $(RCOOH)$into the corresponding alkane (RH)?

A. Two

B. Six

C. Four

D. Three

Answer: B

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3. When a concentrated aqueous solution of the Na or K salt of a .....acid is electrolyzed, an alkane is obtained.

A. saturated monocarboxylic

B. saturated dicarboxylic

C. unsaturated monocarboxylic

D. unsaturated dicarboxylic

Answer: A

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4. When sodium salt of butanoic acid is subjected to `Kolbe's electrolytic method, we get

A. n-butane

B. Propane

C. isobutane

D. n-hexane

Answer: D

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5. Sodium salt of which acid will be needed to prepare propane by decarboxylation?

A. Propanoic acid

B. Butanoic acid

C. Ethanoic acid

D. A mixture of methanoic and ethanoic acid

Answer: B

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6. During Kolbe's electrolytic method, the alkane formed may have..... relative to the salt of acid.

A. same number of C atoms

B. more number of C atoms

C. both (1) and (2)

D. less number of C atoms

Answer: C

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7. During Kolbe's electrolytic method, the pH of aqueous solution of salt of acid

A. increases

B. decreases

C. remains the same

D. first decreases then increases

Answer: A

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Follow Up Test 5

1. How many moles of HI are needed to reduce one mole of aldehyde or keton?

A. Four

B. Two

C. Six

D. Three

Answer: A

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2. The conversion $RCOR \rightarrow RCH_2R$ cannot be effected by

A. conc. HI and red $Pat 150^\circ C$

B. Wurtz reaction

C. Wolff-Kishner reduction

D. Clemmensen reduction

Answer: B

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3. The Clemmensen reduction consists of refluxing the ketone or aldehyde with concentrated hydrochloric acid containing amalgamated

A. Na

B. Mg

C. Zn

D. Cu

Answer: C

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4. In Wolff-Kishner reduction, hydrazones are heated with ..... at $180^\circ C$, nitrogen is eliminated, and a hydrocarbon is obtined.

A. sodium acetate

B. sodium ethoxide

C. alkyl sodium

D. sodium hydroxide

Answer: B

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5. How many moles of HI are used to reduced one mole of monohydric alcohol ?

A. Six

B. Four

C. Three

D. Two

Answer: D

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Follow Up Test 6

1. An alkane molecule is

A. very weakly polar

B. nonpolar

C. both (1) and (2)

D. highly polar

Answer: C

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2. Which of the following n-alkane is not a solid at room temperature?

A. $CH_3(CH_2)_{18}CH_3$

B. $CH_3CH_2)_{17}CH_3$

C. $CH_3(CH_2)_{16}CH_3$

D. $CH_3(CH_2)_{15}CH_3$

Answer: D

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3. Which of the following gases boils at $0^\circ C$

A. CH_4

B. CH_3CH_3

C. $CH_3CH_2CH_3$

D. $CH_3CH_2CH_2CH_3$

Answer: D

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4. Except for the very small alkanes $(C_1 \rightarrow C_4)$, the boiling point rises.....degrees of each C that is added to the chain.

A. $20 \text{to} 30$

B. $30 \text{to} 40$

C. $10 \text{to} 15$

D. $15 \text{to} 25$

Answer: A

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5. In the series of n-alkanes, the melting point of an unbranched alkane with an even number of C atoms is much.....than the previous unbranched alkane with an odd number of C atoms but slightly.....than the succeeding unbranched alkane with an odd number of C atoms.

A. lower, lower

B. higher,higher

C. higher,lower

D. lower, higher

Answer: C

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6. Which of the following compounds has the highest boiling point ?

A. $2,2$-Dimethylpropane

B. n-Hexane

C. n-Pentane

D. 2-Methylbutane

Answer: B

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7. Alkanes are insoluble or almost insoluble in

A. benzene

B. ether

C. chloroform

D. water

Answer: D

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8. Liquid alkanes do not dissolve

A. salts

B. oils

C. fats

D. waxes

Answer: A

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9. Which of the following has the maximum solubility in a given nonpolar solvent?

A. CH_4

B. C_2H_6

C. C_3H_8

D. C_4H_{10}

Answer: A

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10. When the neopentane is added to water, it floats because

A. it is spherical in shape

B. it is insoluble in water

C. it is less dense than water

D. both (2) and (3)

Answer: C

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Follow Up Test 7

1. Alkanes are usually unreactive under ordinary conditions because

(i) the $C-C$ and $C-H$ bonds are quite strong

(ii) the $C-C$ bonds are nonpolar and $C-H$ bonds are weakly polar

(iii) they have no unshared electrons

(iv) they do not possess any functional group

A. (i), (ii)

B. (iii), (iv)

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

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

Answer: D

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2. Which of the following equations describes the reactions of chlorine with an excess of methane?

A. $CH_4 + Cl_2 \xrightarrow{hv} CH_3Cl + HCl$

B. $CH_4 + 2Cl_2 \xrightarrow{hv} CH_2Cl_2 + 2HCl$

C. $CH_4 + 2Cl_2 \rightarrow CHCl_3 + 3HCl$

D. $CH_4 + 4Cl_2 \rightarrow CCl_4 + 4HCl$

Answer: A

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3. What products are formed when the mixture of CH_4 and Cl_2 is exposed to direct sunlight?

A. $CCl_4 + 4HCl$

B. $CHCl_3 + 3HCl$

C. $CH_2Cl_2 + 2HCl$

D. $C + 4HCl$

Answer: D

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4. The reaction conditions leading to the best yield of C_2H_{5Cl} are

A. $C_2H_6 + Cl_2 \xrightarrow[light]{UV}$

B. $C_2H_6 + Cl_2 \xrightarrow[\text{room temperature}]{Dark}$

C. $\underset{\text{Excess}}{C_2H_6} + Cl_2 \xrightarrow[light]{UV}$

D. $C_2H_6 + \underset{Excess}{Cl_2} \xrightarrow[light]{UV}$

Answer: C

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5. Organic intermediate formed during the photochemical chlorination of an alkane is

A. carbene

B. carbanion

C. carbocation

D. carbon radical

Answer: D

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6. Hydbridization of C in the $\dot{C}H_3$ radical is

A. sp^3d

B. sp^3

C. sp^2

D. sp

Answer: C

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7. The reactivity of the halogens towards any given alkane is

A. $I_2 > > Br_2 > Cl_2 > > F_2$

B. $F_2 > > Cl_2 > Br_2 > > I_2$

C. $F_2 > Cl_2 > I_2 > Br_2$

D. $Cl_2 > F_2 > Br_2 > I_2$

Answer: B

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8. Which of the follwing is not the characteristic of the mechanism of free radical halogenation chain reactions?

A. Recation can be terminated prematurely by adding radical scavengers.

B. Initiators such as organic preoxides can catalyze the reaction in the absence of light or heat.

C. If O_2 is present, there is an inhibition period after which the reaction rate decreases.

D. The quantum yield is typically high.

Answer: C

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9. Which of the following free radicals is the most stable?

A. $\dot{C}H_3$

B. $\dot{C}H_2CH_2CH(CH_3)_2$

C. $CH_3\dot{C}HCH_2CH_3$

D. $CH_3CH_2\dot{C}(CH_3)_2$

Answer: D

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10. The relative reactivity of $1^\circ : 2^\circ : 3^\circ\ H's$ to chlorination is $1:3:8:5$.

In the reaction

$$\underset{Excess}{CH_3CH_2CH_2CH_3} + Cl_2 \rightarrow \underset{(A)}{CH_3CH_2CH(Cl)CH_2CH_2Cl} + \underset{(B)}{CH_2(Cl)CH(CH_3)_2}$$

the percentage yields of the products (A) and (B) are expected to be

A. $48, 52$

B. $28, 72$

C. $99, 4, 0.6$

D. $35, 65$

Answer: B

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11. Laboratory chlorination of alkanes is often done with .....

A. $SOCl_2$

B. S_2Cl_2

C. SO_2Cl_2

D. SCl_4

Answer: C

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Follow Up Test

1. Which of the following will give only one monochloro derivative?

A. Neopentane

B. Isohexane

C. isobutane

D. Isopentane

Answer: A

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Follow Up Test 8

1. Nitration of propane with nitric acid vapor at about $430^{\circ}C$ is expected to yield

(i) 1-nitropropane

(ii) 2-nitropropane

(iii) nitroethane

(iv) nitromethane

A. (i), (ii)

B. (iii), (iv)

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

D. (ii)

Answer: C

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2. Nitroalkanes can be prepared by heating an alkyl halide with..... In aqueous ethanolic solution.

A. KNO_2

B. $NaNO_2$

C. $Ca(NO_2)_2$

D. $AgNO_2$

Answer: D

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3. t-Nitro compounds may be prepared by the oxidation of..... With potassium permanganate.

A. R_3CNHOH

B. R_3CNH_2

C. R_3CCN

D. R_3CNHNH_2

Answer: B

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4. Sulphonation of a normal alkane from.....onwards is carried out by treating the alkane with oleum.

A. propane

B. butane

C. pentane

D. hexane

Answer: D

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5. How many moles of oxygen gas are needed to perform the combustion of one mole of alkane, C_nH_{2n+1}?

A. $3n$

B. $3n+1$

C. $n+1$

D. $\frac{(3n+1)}{2}$

Answer: D

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6. When methane gas is heated at $1500^\circ C$ for a very short time (fraction of a second), it forms

A. CH_2

B. $CH \equiv CH$

C. $CH_2 = CH_2$

D. CH_3OH

Answer: B

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7. Carbon black is carbon in a very finely divided state. It is used to make paints and printers ink. It is obtained by the thermal decomposition of

A. CH_4

B. CH_3CH_3

C. $(CH_3)_4C$

D. $CH_3CH_2CH_3$

Answer: A

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8. Which of the following has the highest enthalpy of combustion?

A. n-Pentane

B. isopentane

C. Neopentane

D. All have equal values

Answer: C

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9. Which of the follwing catalysts is used to oxidation methane to methanal?

A. Ag_2O

B. $(CH_3COO)_2Mn$

C. Cu

D. Mo_2O_3

Answer: B

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10. Stream reforming of methane is used for the industrial preparation of

A. O_2

B. H_2

C. H_2O

D. H_2O_2

Answer: B

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11. $CH_3CH_2CH_2CH_3 \xrightarrow[\Delta]{AlCl_3 / HCl}$

A. $CH_3CH = CHCH_3$

B. $CH_3CH_2CH_3$

C. $CH_3CH_2CH = CH_2$

D. $(CH_3)_3CH$

Answer: D

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12. Cracking of alkanes involves

A. carbene meachanism

B. cationoic mechanism

C. free radical mechanism

D. anionic machanism

Answer: C

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13. Cracking of propane is expected to yield

A. propene, ethene,methane, and H_2

B. propene and H_2

C. ethene and methane

D. ethyne, methane, and H_2

Answer: A

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14. n-Hexane on prolonged heating with a mixture of Al_2O_3 and $Cr_2O_3 at 600^\circ C$ gives

A. cyclohexane

B. cyclohexene

C. benzene

D. cyclobutane and ethene

Answer: C

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15. How many arenes are formed when n-"alkane", C_9H_{12}, is subjected to aromatization?

A. Seven

B. Six

C. Five

D. Eight

Answer: D

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Follow Up Test 9

1. Stereoisomers (different arrangements of atoms) that can be converted into one another by roatation about single bonds are called

A. enantiomers

B. conformers

C. diasteromers

D. aromers

Answer: B

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2. The number of theoretically possible conformations of an alkane is

A. infinite

B. two

C. Four

D. Three

Answer: A

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3. The staggered conformation of ethane is more stalble than its elispsed conforamtion by about

A. 4kcal mol^{-1}

B. 5kcal mol^{-1}

C. 2kcal mol^{-1}

D. 3kcal mol^{-1}

Answer: D

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4. Which of the following alkanes cannot have conformations?

A. $(CH_3)_4C$

B. $(CH_3)_3CH$

C. CH_4

D. $(CH_3)_2CHCH_2CH_3$

Answer: C

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5. The dihedral angle of the least stable conformation of ethane is

A. 0°

B. 60°

C. 109.5°

D. 120°

Answer: A

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Question Bank

1. The unbranched (straight chain) alkanes possess

A. 2° and $3^\circ C's$

B. 1° and $2^\circ C's$

C. 1° and $3^\circ C's$

D. 3° and $4^\circ C's$

Answer: B

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2. The possible number of isomeric alkanes having the molecular formula C_4H_{10} is

A. zero

B. one

C. two

D. Three

Answer: C

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3. How many isomeric alkanes having the molecular formula C_3H_7- are possible?

A. 2

B. 3

C. 4

D. 1

Answer: A

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4. Grignard reagent is an organometallic compounds in which..... Metal is directly bonded to C atom.

A. Zn

B. Mg

C. Cd

D. Hg

Answer: C

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5. Which one of the following cannot be prepared by Wurtz reaction ?

A. $CH_3CH_2CH_3$

B. CH_3CH_3

C. CH_4

D. $CH_3CH_2CH_2CH_3$

Answer: C

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6. Combustion (burning) is a chemical reaction (or complex of chemical reactions) in which a substance combines with oxygen producing

A. heat

B. light

C. flame

D. All of these

Answer: D

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7. Which of the follwing is the most stable conformation of ethane?

A. Skew

B. Gauche

C. Stggered

D. Eclipsed

Answer: C

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8. The smallest alkane having a quaternary $(4^{\circ})C$ atom is

A. isopentane

B. tert-butane

C. Neopentane

D. isohexane

Answer: C

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9. The $C - H$ bond is alkanes is

A. 120pm

B. 110pm

C. 130pm

D. 140pm

Answer: B

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10. The correct $IUPAC$ name of the following alkane is

A. tetramethylpentane

B. $2, 2, 4, 4$-methylpentane

C. $2, 4$-tetramethylpentane

D. $2, 2, 4, 4$-tetramethylpentane

Answer: D

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11. Zinc-copper couple that can be used as a reducing agent is obtained by

A. welding Zn and Cu wires together

B. coating copper with Zn

C. coating Zn with Cu

D. mixing Zn dust and copper gauge

Answer: C

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12. Which of the following is reduced most easily to an alkane by $NaBH_4$ or LiAlH_(4)`?

A. $CH_3CH_2CH_2I$

B. $CH_3CH_2CH_2Br$

C. $CH_3CH_2CH_2CI$

D. $CH_3CH_2CH_2F$

Answer: A

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13. Which of the following halides is the best to prepare Grignard reagent?

A. RF

B. RCI

C. RBr

D. RI

Answer: D

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14. Propane can be best prepared by the reaction

A. $CH_3CH_2CH_2COONa \xrightarrow[CaO,\ \Delta]{NaOH}$

B. $CH_3CH_2Br + (CH_3)_2CuLi \xrightarrow{Et_2O}$

C. $CH_3CH_2I + CH_3I \xrightarrow[Et_2O]{Na}$

D. $CH_3CH_2COONa + CH_3COONa \xrightarrow[\text{Electrolysis}]{H_2O}$

Answer: B

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15. Hydbridization of C atom in methylsodium is

A. sp^3d

B. sp

C. sp^3

D. sp^2

Answer: C

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16. Electrolysis of a concentrated solution of potassium acetate gives

A. ethane

B. methane

C. propane

D. butane

Answer: A

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17. An alkyl bromide reacts with Na metal to form $4,5$-diethyl loctane. The bromide is

A. $CH_3(CH_2)_3CHBrCH_3$

B. $CH_3(CH_2)_2CH_2Br$

C. $CH_3(CH_2)_2CHBrCH_2CH_3$

D. $CH_3(CH_2)_4CH_2Br$

Answer: C

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18. In the reaction sequence

the end product is

A. $CH_3CH_2CH_3$

B. $CH_3CH_2CH_2CH_3$

C. 

D. CH_3CH_3 and $CH_3COOC_2H_5$

Answer: B

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19. Which of the following alkanes has no net dipole moment ?

A. $C(CH_3)_4$

B. CH_3CH_3

C. CH_4

D. All of these

Answer: D

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20. Which of the following is not formed when ethyl radical reacts with itself ?

A. $CH \equiv CH$

B. $CH_2 = CH_2$

C. CH_3CH_3

D. $CH_3CH_2CH_2CH_3$

Answer: A

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21. Which of the following alkanes is the least reactive towards free-radical substitution reactions ?

A. $CH_3CH_2CH_3$

B. $(CH_3)_2CH$

C. $(CH_3)_3CH$

D. CH_4

Answer: D

Watch Video Solution

22. Which of the following is readily sulphonated ?

A. Butane

B. Isobutane

C. Neopentane

D. Methane

Answer: B

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23. n-Heptane on prolonged heating with a mixture of Al_2O_3 and $Cr_2O_3 at 600^\circ C$ gives mainly

A. methylcyclohexane

B. cycloheptane

C. methylbenzene

D. isoheptane

Answer: C

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24. The population of eclipsed -like conformations

A. increases with increase of temperature

B. increases with decrease of temperature

C. decreases with increase of temperature

D. remains unchanged with change of temperature

Answer: A

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25. Which of the following alkanes has only primary hydrogen atoms?

A. 2, 2, 3, 3-Tetramethylbutane

B. 3, 4, 4, 5-Tetramethylpentane

C. 2, 2, 4, 4-Tetramethylpentane

D. 2, 2, 4-Tetramethylpentane

Answer: A

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26. The possible number of isomeric alkanes having the molecular formula $C_5H_{11}-$ is

A. 9

B. 11

C. 8

D. 10

Answer: C

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27. Write the structure of all the alkenes that can be hydrogenated to from 2-mrthyl pentane.

A. 3

B. 4

C. 5

D. 2

Answer: B

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28. The $C-C-C$ bond angle in long unbranched alkanes is

A. 180°

B. 109.5°

C. slightly greater than 109.5°

D. slightly smaller than 109.5°

Answer: C

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29. Propane may be obtained by the catalytic hydrogenation of

(i) cyclopropane

(ii) propene

(iii) propyne

A. (i), (ii)

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

C. (ii), (iii)

D. (i),(ii)

Answer: B

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30. Which of the following is the best reagent to convert t-butyl chloride to isobutane?

A. $HI/redP$

B. Ph_3SnH

C. $Zn-Cu/C_2H_5OH$

D. $LiAlH_4$

Answer: B

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31. In the reaction $CH_3CH_2I + Zn - Cu + CH_3CH_2OH \rightarrow$ the product expected is

A. CH_3CH_3

B. $CH_3CH_2CH_2CH_3$

C. $CH_3CH_2OCH_2CH_3$

D. A mixture of all these compounds

Answer: A

Watch Video Solution

32. Which of the following alkanes can be synthesized by the Wurtz reaction in good yield ?

A. $(CH_3)_3CCH_2CH_2CH_3$

B. $(CH_3)_2CHCH_2CH(CH_3)_2$

C. $CH_3CH_2C(CH_3)_2CH_2CH_3$

D. $(CH_3)_2CHCH_2CH(CH_3)_2$

Answer: B

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33. Which of the following central C atoms has a regular tetrahedral shape and an ideal sp^3 hybridization?

A. $(CH_3)_2CH$

B. $(CH_3)_3CH$

C. $(CH_3)_4C$

D. $(CH_3)_3CCH_2CH_3$

Answer: C

Watch Video Solution

34. An alkane C_7H_{16} is produced by the reaction of lithium di $(3-\text{Pentyl})$ cuprate with ethyl bromide. The alkane produced is

A. 3-methylhexane

B. 2-ethylpentane

C. heptane

D. 3-ethylpentane

Answer: D

Watch Video Solution

35. An aqueous solution containing sodium acetate and sodium propionate is electrolyzed. Which of the following alkanes is targeter as product?

A. ethane

B. Propane

C. Butane

D. All of these

Answer: B

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36. The appropriate reagent for the transformation is

A. NH_2NH_2, OH^-

B. $Zn(Hg), HCL$

C. H_2 / Ni

D. $NaBH_4$

Answer: A

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37. Which of these has the lowest boiling point?

A. 2-Methylpentane

B. 3-Methylpentane

C. 2, 2-Dimethylbutane

D. 2, 3-dimethylbutane

Answer: C

Watch Video Solution

38. Which of the following carbides librates methane gas by the action of water?

(i) Calcium carbide

(ii) Aluminiun carbide

(iii) Megnesium carbide

(iv) Beryllium carbide

A. (i), (ii)

B. (ii),(iii)

C. (ii),(iv)

D. (iii),(iv)

Answer: C

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39. Monochlorination of.....is a more practical reaction than the monochlorination of others.

(i) CH_4

(ii) CH_3CH_3

(iii) $CH_3CH_2CH_3$

(iv) $CH_3CH_2CH_2CH_3$

A. (i), (ii)

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

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

D. (iii),(iv)

Answer: A

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40. An alkane with the molecular formula C_6H_{14} forms only three monochloro derivatives on chlorination. The name of the alkane is

A. neohexane

B. 3-methylpentane

C. 2, 3-dimethylbutane

D. isohexane

Answer: A

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41. The addition of O_2 gas to a reaction mixture of CH_4 and Cl_2 undergoing photochlorination will

A. not effect the rate for some time

B. retard the reaction for some time

C. accelerate the reaction for some time

D. accelerate or retard the reaction dependidng upon the experimental conditions

Answer: B

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42. Photochlorination of propane gives 48% n-propylchloride and 52% isopropyl chloride. The relative reactivity of perimary and secondary hydrognes on a per-hydrogen basis is expected to be

A. $1:4,43$

B. $1:3.25$

C. $1:5$

D. $1:2.5$

Answer: B

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43. Which of the following decolorizes Potassium permanganate?

A. Isobutane

B. Butane

C. Propane

D. Methane

Answer: A

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44. The dihedral angle of the most stable anti-conformation of n-butane is

A. 180°

B. 120°

C. 60°

D. 0°

Answer: A

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45. How many gauche conformations are possible for n-butane?

A. Just one

B. Four

C. Two

D. Three

Answer: C

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46. Which of the following reducing agents causes the reduction of an alkyl halide by means of nascent hydrogen?

A. Zn and CH_3COOH

B. Zn and $dilHCl$

C. $Zn - Cu$ couple and C_2H_5OH

D. Zn and $NaOH$

Answer: D

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47. $0.46g$ of a compound active hydrogen (molar mass $= 92mol^{-1}$) on treatment with excess of CH_3MgI releases $336ml$ of a gas at STP ($1atm$ pressure). The number of active H atoms per molecule of compound is

A. 3

B. 4

C. 2

D. 1

Answer: A

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48. The method of estimation of active H atoms in a compound by reaction with excess of CH_3MgI is known as

A. Victor-Meyer method

B. Zeisel method

C. Heigsenberg method

D. Zerewitinoff method

Answer: D

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49. How many hydrocarbons are formed when a mixture of methylbromide and ethylbromide is subejected to the Wurtz reaction?

A. Five

B. Four

C. Six

D. Three

Answer: A

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50. In the Frankland reaction, when an alkyl halide (particularly iodide) is heated with.....powder, higher alkane is formed.

A. Zn

B. Ag

C. Mg

D. Cu

Answer: A

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51. Which of the following reactions is not feasible?

A. $(CH_3CH_2)_2CuLi + CH_3CH_2C(CH_3)_2Br \rightarrow$

B. $\left[(CH_3)_3C\right]_2CuLi + CH_3CH_2CH_2Br \rightarrow$

C. $\left[CH_3CH_2C(CH_3)_2\right]_2CuLi + CH_3CH_2Br \rightarrow$

D. $\left[(CH_3)_2CH\right]_2CuLi + (CH_3)_2CHCH_2Br \rightarrow$

Answer: A

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52. In the laboratory, methane is prepared by heating a mixture of sodium acetate and soda-lime in the ratio of ..... in a Cu tube.

A. $4:1$

B. $1:4$

C. $1:3$

D. $3:1$

Answer: B

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53. Which of the following carboxylic acids undergoes decarboxylation most easily ?

A. CH_3COCO_2H

B. $CH_3COCH_2CO_2H$

C. $C_6H_5CO_2H$

D. $CH_3CH_2CO_2H$

Answer: B

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54. Which of the following reactions proceeds through an alkylsodium intermediate ?

A. $RX + Na \xrightarrow{Et_2O}$

B. $RCOONa + NaOH \xrightarrow[\Delta]{CaO}$

C. both (1) and (2)

D. $RCOONa(aq.) \xrightarrow{\text{Electrolysis}}$

Answer: C

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55. Consider the following reaction:

$$CH_3CH = CH_2 \xrightarrow{B_2H_6} A \xrightarrow{CH_3COOH} B$$

The end product is

A. 

B. 

C. 

D. 

Answer: C

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56. Consider the reaction

The end product of the reaction is

A. 

B. 

C. 

D. 

Answer: B

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57. Which of the follwing alkanes has the lowest melting point?

A. CH_4

B. CH_3CH_3

C. $CH_3CH_2CH_3$

D. $CH_3(CH_2)_2CH_3$

Answer: C

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58. How many haloalkanes are obtained when ethane is subjected to chlorination?

A. Six

B. Nine

C. Eight

D. Seven

Answer: B

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59. Consider the following reaction:

$$CH_3\underset{\underset{D}{|}}{C}H - \underset{\underset{CH_3}{|}}{C}HCH_3 + \dot{B}r \rightarrow X + HBr$$

Identify the structure of the major products (X) from among the following :

A. $\dot{C}H_2 - \underset{\underset{D}{|}}{C}H - \underset{\underset{CH_3}{|}}{C}HCH_3$

B. $CH_3 - \underset{\underset{D}{|}}{\dot{C}} - \underset{\underset{CH_3}{|}}{C}HCH_3$

C. $CH_3\underset{\underset{D}{|}}{C}H - \underset{\underset{CH_3}{|}}{\dot{C}} - CH_3$

D. $CH_3\underset{\underset{D}{|}}{C}H - \underset{\underset{CH_3}{|}}{C}H - \dot{C}H_2$

Answer: C

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60. The relative reactivity of $1^\circ : 2^\circ : 3^\circ H's$ to brominate is $1 : 82 : 1600$, respectively. In the reaction

$$CH_3 - \underset{\text{Excess}}{\overset{CH_3}{\overset{|}{C}}H}CH_3 + Br_2 \xrightarrow{h\nu} CH_3\overset{CH_3}{\overset{|}{\underset{Br}{\underset{|}{C}}}}CH_3 + \underset{(B)}{\overset{CH_3}{\overset{|}{C}}H_3CHCH_3Br}$$
(A)

the percentage yield of the products (A) and (B) are expected to be

A. $72, 28$

B. $80, 20$

C. $99.4, 0.6$

D. $4.65, 35$

Answer: C

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61. Which of the following initiates the chlorination of CH_4 in the dark at $150^\circ C$?

A. $PbCO_3$

B. O_2

C. Hydroquinone

D. $Pb(C_2H_5)_4$

Answer: D

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62. $CH_3CH_3 + CH_2N_2 \xrightarrow[\text{or } \Delta]{h\nu}$

The product of the reaction is

A. 

B. $CH_3CH = CH_2$

C. $CH_3CH_2CH_3$

D. 

Answer: C

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63. $(CH_3)_3CH + CCl_4 \xrightarrow[\Delta]{(CH_3)_3C-O-O-C(CH_3)_3}$

The compound formed in the reaction is

(i) $(CH_3)_3COH$

(ii) $(CH_3)_3CCl$

(iii) $CHCl_3$

(iv) CCl_4

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

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

C. (ii),(iii)

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

Answer: D

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64. Consider the reaction

$$RH + (CH_3)_3C - O - Cl \xrightarrow{\text{Heat}}$$

The expected major products are

A. $(CH_3)_3COH$ and RCl

B. $ROCl$ and $(CH_3)_3CH$

C. ROH and $(CH_3)_3CCI$

D. $(CH_3)_3COR$ and HCl

Answer: A

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65. Vapour-phase nitration of isopentane yields ..... nitroalkanes.

A. nine

B. eight

C. seven

D. six

Answer: A

Watch Video Solution

66. Natromethane may be prepared by boiling an aqueous solution of sodium nitrite with

A. CH_3Cl

B. CH_3COCl

C. CH_2Cl_2

D. $ClCH_2CO_2H$

Answer: D

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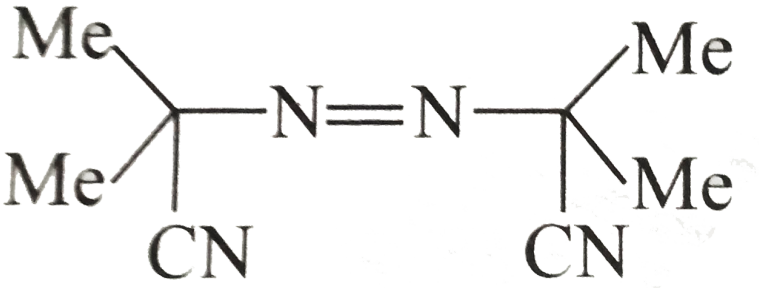
67. An alkyl halide is reduced to the corresponding alkane by tributyl stannane $(C_4H_9)_3SnH$ and by a free radical menchanism in the presence of an initiator, an azo compound



that breaks down to N_2 and a radical. Give the mechanism of the reaction.

A. carbene

B. free radical

C. cationoic

D. anionic

Answer: B

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68. The magnitude of the rotational barrier in propane arising on account of torsional strain is about

A. $12.54KJmol^{-1}$

B. $13.79KJmol^{-1}$

C. $14.86KJmol^{-1}$

D. $17.86KJmol^{-1}$

Answer: B

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69. How many extreme conformations can be drawn for n-butane if we consider rotation about the C_2 and C_3 bonds?

A. Two

B. Six

C. Four

D. Eight

Answer: B

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70. The anti-conformation of n-butane is more stable than its fully eclipsed conformation by about

A. $16KJmol^{-1}$

B. $25.49KJmol^{-1}$

C. $13KJmol^{-1}$

D. $19KJmol^{-1}$

Answer: D

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71. The anti-conformation of n-butane is more stable than its gauche conformation by about

A. $5KJmol^{-1}$

B. $3.8KJmol^{-1}$

C. $6.2KJmol^{-1}$

D. $4.5KJmol^{-1}$

Answer: B

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Archives

1. Of the isomeric haexanes, the isomers that give the minimum and maximum number of monochloro derivatives are, respectively,

A. 3-methylpentane and 2, 3-dimethylbutane

B. n-hexane and 2, 3-dimethylbutane

C. 2, 3-dimethylbutane and 2-methylpentane

D. 2, 2-dimethylbutane and 2-methylpentane

Answer: C

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2. $CH_3CH_3 + HNO_3 \xrightarrow{675K}$

A. $CH_3CH_2NO_2$

B. $CH_3CH_2NO_2 + CH_3NO_2$

C. $2CH_3NO_2$

D. $CH_2 = CH_2$

Answer: B

Watch Video Solution

3. The treatment of CH_3MgX with $CH_3 \equiv CH$ produces

A. CH_4

B. $CH_3CH = CH_2$

C. $CH_3C \equiv CCH_3$

D. $CH_3CH = CHCH + (3)$

Answer: A

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4. $CH_3CH_2CH_2CH_3 \xrightarrow{\text{Catalyst}} CH_3\underset{\underset{CH_3}{|}}{C}HCH_3$

The catalyst used in the above conversion is

A. $ZnCl_2 / HCl$

B. $AlCl_3 / HCl$

C. $PdCl_2 / HCl$

D. $CuCl / HCl$

Answer: B

Watch Video Solution

5. When 1-chlorobutane and 2-chloropropane are treated with metallic sodium in ether, one of the products, we get is

A. 2-methylhexane

B. 1, 1-dimethylpropane

C. 5-methylpentane

D. 5-methylhexane

Answer: A

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6. Alkyl halides react with.....reagents to give alkanes

A. dialkylcopperlithium

B. dialkylmagnesium

C. dialkylcopper

D. dialkylzinc

Answer: A

Watch Video Solution

7. 2-Mrthyl butane reacting with Br_2 in sunlight mainly gives:

A. 1-bromo-2-methylbutane

B. 2-bromo-2-methylbutane

C. 2-bromo-3-methylbutane

D. 1-bromo-3-methylbutane

Answer: B

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8. Photochemical chlorination is initiated by a process of

A. pyrolysis

B. substitution

C. cracking

D. homolysis

Answer: D

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9. An alkane, C_7H_{16} , is produced by the reaction of di -(3-pentyl) lithium cuprate with ethyl bromide. What is the structure of the alkane ?

A. 3-ethylpentane

B. 2-methylpentane

C. heptane

D. 3-methylhexane

Answer: A

Watch Video Solution

10. When ethylbromide and propyl bromide are allowed to reacts with sodium in ether, they form

A. single alkane

B. mixture of two alkanes

C. mixture of three alkanes

D. mixture of four alkanes

Answer: C

Watch Video Solution

11. The chemical and the reaction conditions required for the preparation of ethane are

A. CH_3CH_2I, $Zn - Cu$, C_2H_5OH

B. CH_3Cl, Na, H_2O

C. $KOOC - CH - CH - COOK$, electrolysis

D. CH_3CO_2Na, $NaOH$, CaO, Δ

Answer: A

Watch Video Solution

12. On treating a mixture of two alkyl halides with sodium metal in dry ether, 2-methylpropane was obtained. The alkyl halides are

A. 2-chloropropane and chloromethane

B. 2-chloropropane and chloroethane

C. chloroethane and chloromethane

D. chloroethane and 1-chloropropane

Answer: A

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13. When a mixture of methane and oxygen is passed through heated molybdenum oxide, the main product formed is

A. methanoic acid

B. ethanal

C. methanol

D. methanal

Answer: D

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14. Name of the compound given below.

A. 5-Ethyl-6-methyloctane

B. 4-Ethyl-3-methyloctane

C. 3-Methyl-4-ethyloctane

D. 2, 3-Dimethylheptane

Answer: B

Watch Video Solution

15. Hydrocarbon that is liquid at room temperature is:

A. pentane

B. butane

C. propane

D. ethane

Answer: A

Watch Video Solution

16. Which of the following methods is most appropriate for the manufacture of methane?

A. Reduction of CH_2Cl_2

B. Wurtz reaction

C. Liquefaction of natural gas

D. none of these

Answer: C

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17. In the Wurtzreaction, the reagent used is

A. Na

B. $Na / liq.\ NH_3$

C. $Na / dryether$

D. $Na / dryalcohol$

Answer: C

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