



# CHEMISTRY

## BOOKS - CENGAGE CHEMISTRY

### HYDROCARBONS

#### Mandatory Exercise Exercise Set I

1. Cylindrical shape of an alkyne is due to

A. three  $\sigma$  carbon-carbon bonds

B. three  $\pi$  carbon-carbon bonds

C. two  $\sigma$  carbon-carbon and one  $\pi$  carbon-carbon bond

D. one  $\sigma$  carbon-carbon and two  $\pi$  carbon-carbon bonds

**Answer: D**



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2. What are the hybridisations of carbon 1 and carbon 2 in the hydrocarbon



A.  $sp^3$ ,  $sp$

B.  $sp^3$ ,  $sp^2$

C.  $sp^2$ ,  $sp^2$

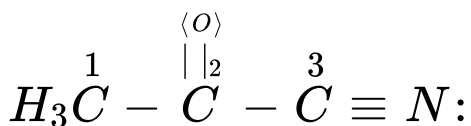
D.  $sp$ ,  $sp^2$

**Answer: B**



**View Text Solution**

3. In the given compound, identify the type of hybrid orbitals used by the carbon atoms labelled 1, 2 and 3.



A.  $sp^3$ ,  $sp$ ,  $sp$

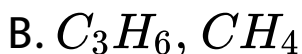
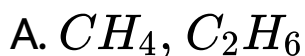
B.  $sp^2$ ,  $sp^2$ ,  $sp$

C.  $sp^3$ ,  $sp^2$ ,  $sp$

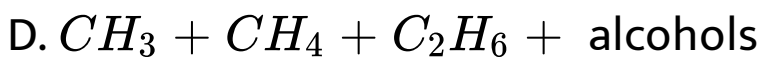
D.  $sp^3$ ,  $sp^2$ ,  $sp$

**Answer: C**

4. On cracking of petrol, we get:



C. Both of the above



**Answer: C**

5. Photochemical chlorination of alkane is initiated by a process of:

- A. Pyrolysis
- B. Substitution
- C. Hemolysis
- D. Peroxidation

**Answer: C**



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6. Lead tetraethyl is used as:

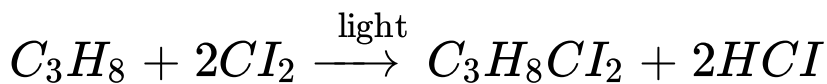
- A. Fire extinguisher
- B. Pain killer
- C. Petroleum additive
- D. Mosquito repellent

**Answer: C**



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7. The following reaction is an example of:



- A. An addition reaction
- B. A substitution reaction
- C. An oxidation reaction
- D. Elimination reaction

**Answer: B**



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8. Petroleum consists mainly of:

A. Aliphatic hydrocarbons

B. Aromatic hydrocarbons

C. Aliphatic alcohols

D. None of the above

**Answer: A**



**View Text Solution**

9. By coal-tar distillation which of the following is not obtained:

A. Light oil

B. Middle oil

C. Heavy oil

D. Mobile oil

**Answer: D**



**View Text Solution**

10. Highest boiling point is expected for:

A. Isooctane

B. *n*-octane

C. 2, 2, 3, 3-tetra methyl butane

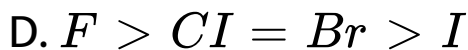
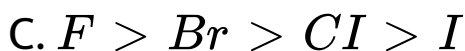
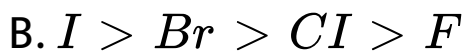
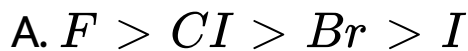
D. *n*-Butane

**Answer: B**



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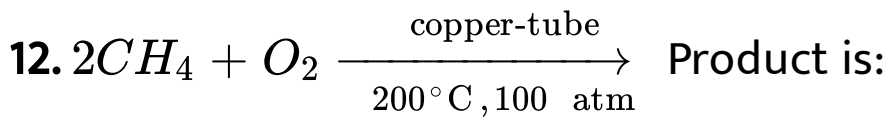
11. The order of reactivity of halogens in substitution reaction in polar protic solvent is:



**Answer: A**



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A. Formaldehyde and  $H_2$

B. Acetic acid

C. Carbon dioxide

D. Methanol

**Answer: D**



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13. Which of the following compounds should undergo chlorination faster than the remaining three?

A. *n*-Pentane

B. Neopentane

C. Isopentane

D. *n*-Butane

**Answer: C**



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14. Which of the following reagents cannot be used for preparing an alkane from a ketone?

(i)  $Zn / Hg + \text{conc. } HCl$

(ii) Red  $P + I_2$

(iii)  $H_2NNH_2$  and  $C_2H_5O$

(iv)  $NaBH_4$

A. A and B

B. A and C

C. B and D

D. C and D

**Answer: C**



**View Text Solution**

**15.** The main constituents of LPG gas are:

A. Methane + Ethane

B. Isobutane +  $n$  – Butane

C. Propane +  $n$  – Butane

D. Methane + Ethane + Propane

**Answer: C**





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16. Which of the following gases is present as chief constituent in fire damp?

A. CO

B.  $CH_4$

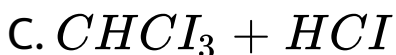
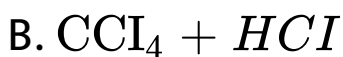
C.  $C_2H_2$

D.  $H_2S$

**Answer: B**



17. Methane reacts with excess chlorine in direct sunlight to form:



**Answer: B**



18. Which of the following process is suitable for converting methanoic acid to a paraffin?

A. Electrolysis of sodium salt

B. Reduction with red  $P + HI$

C. Decarboxylation

D. Reduction with  $LiAlH_4$

**Answer: B**



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19. How much air should be required for complete combustion of 44 grams of propane at normal temperature and pressure?

A. 25L

B. 15L

C. 5 moles

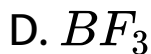
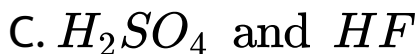
D. 10 moles

**Answer: C**



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20. The catalyst used to convert alkanes containing 6 to 10 carbon atoms into benzene and its homologous at nearly  $600^{\circ}\text{C}$  are

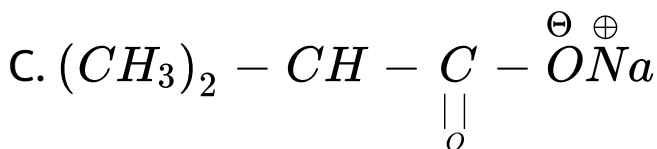
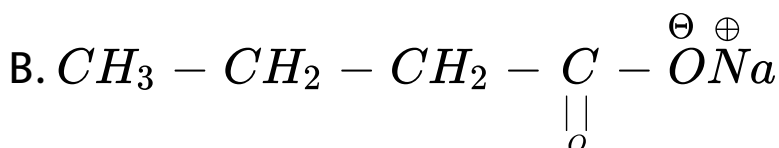
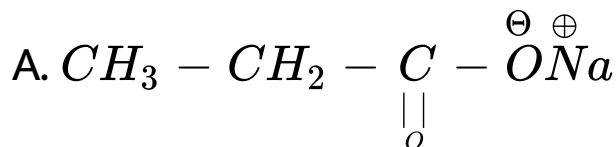


**Answer: A**



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21. Which sodium salt will be heated soda lime to obtain propane?



D. Both (B) and (C)

**Answer: D**



**View Text Solution**

22. Which sodium salt will be heated soda lime to obtain propane?

A. Alkanes

B. Alkenes

C. Alkynes

D. Cyclic compounds

**Answer: A**



**View Text Solution**

23. Which sodium salt will be heated soda lime to obtain propane?

A. *n*-pentane

B. Isopentane

C. Neopentane

D. *n*-hexane

**Answer: C**



**View Text Solution**



24. Which sodium salt will be heated soda lime to obtain propane?

A. Hydrocarbons

B.  $CO_2$

C. Both

D. None

**Answer: C**



**View Text Solution**

25. Which sodium salt will be heated soda lime to obtain propane?

A. Ethene

B. Propyne

C. Propene

D. Propane

**Answer: D**



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## Mandatory Exercise Exercise Set II

1. How can alkanes be prepared from an alkene



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2. How can alkanes be prepared from an alkyl halide?



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3. How can ethane be prepared from ethanol



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4. How can ethane be prepared from ethyl iodide?



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5. Compare the melting point/boiling point of alkynes with other hydrocarbons and give

reasons for the behavior  $r$ .

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6. What is the effect of branching on the melting point of an alkane?

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7.  $C_2H_4 + H_4 + H_2 \xrightarrow{Ni} CH_3 - CH_3$ . The reaction is called as

A. Wurtz reaction

B. synthesis

C. Sabetier-Senderen's reaction

D. laboratory preparation

**Answer: C**



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8. Dehydrohalogenation of bromoethane results in the formation of

A. ethyne

B. ethene

C. propene

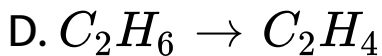
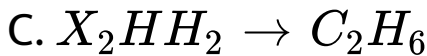
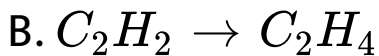
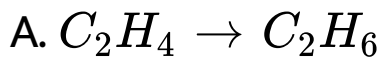
D. ethane

**Answer: B**



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9. Which one of the following conversions involves partial hydrogenation?



**Answer: B**



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**10.** Methane is prepared by the \_\_\_ of sodium acetate with soda lime.



A. substitution

B. carboxylation

C. addition

D. decarboxylation

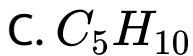
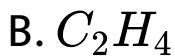
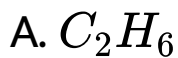
**Answer: D**



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**11.** Which formula represents an alkyne?

(Assume all are non-cyclic).



**Answer: D**



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**12.** Conversion of  $CH_4$  to  $CH_3Cl$  is an example of ..... Reaction

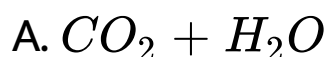
- A. Free radical substitution
- B. Free radical addition
- C. Electrophilic substitution
- D. Nucleophilic substitution

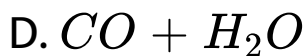
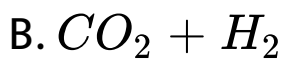
**Answer: A**



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**13.** The complete combustion of  $CH_4$  gives





**Answer: A**



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**14.** Which hydrocarbon are not formed by the wurtz reaction of ethyl iodide and  $n$  – propyl iodide

A.  $n$  – Butane

B.  $n$  – Heptane

C.  $n$  – pentane

D.  $n$  – Hexane

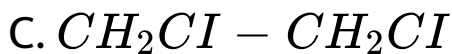
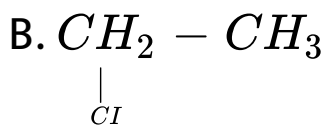
**Answer: B**



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15.  $CH_2 = CH_2$  reacts with HCl to form:

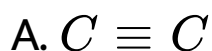
A.  $CICH = CH - CI$



**Answer: B**

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**16.** Hydrocarbon containing following bond is most reactive towards electrophile?



B.  $C = C$

C.  $C - C$

D. All

**Answer: B**



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17. When Propene reacts with hydrogen bromide in the presence of peroxide, the product formed is:

A. *n* – Propyl alcohol

B. Propylene peroxide

C. *n* – Propyl bromide

D. 1, 3 – dibromo propane

**Answer: C**



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**18.** Ethylene from ethyl bromide is obtained by treating it with



A. Hydrogen

B. Alcoholic caustic potash

C. Aqueous caustic potash

D. Aqueous caustic soda

**Answer: B**



**View Text Solution**

**19.** Ethylene can be prepared by electrolysis of an aqueous solution of:

- A. Sodium acetate
- B. Sodium succinate
- C. Sodium propionate
- D. None of these

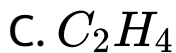
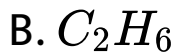
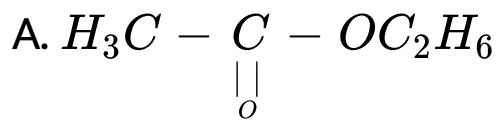
**Answer: B**



**View Text Solution**

**20.** Ethyl alcohol is heated with cone.  $H_2SO_4$ .

The product formed is:



**Answer: C**



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**21. Conjugated double bond is present in:**

A. Propylene

B. Isobutylene

C. 1, 3-Butadiene

D. Butylene

**Answer: C**



**View Text Solution**

22. A compound "X" on ozonolysis forms two molecules of HCHO. "X" is:

A.  $C_2H_4$

B.  $C_2H_2$

C.  $C_2H_6$

D.  $C_6H_6$ .

**Answer: A**



**View Text Solution**

**23.** The products of oxidative ozonolysis of an unsymmetrical alkene are:

A. alcohol and/or acids

B. aldehydes and/or acids

C. ketones and/or acids

D. aldehydes and/or ketones

**Answer: C**



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**24.** In the presence of peroxide, hydrogen chloride and hydrogen iodide don't give anti Markovnikov's addition to alkene because:

A. both are highly ionic

B. one is oxidising and other is reducing

C. one of the steps is endothermic in both  
the case

D. all the steps are exothermic in both the  
case

**Answer: C**



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25. The acetylene molecule contains:

- A. 5 sigma bonds
- B. 4 sigma and 1 pi bonds
- C. 3 sigma and 2 pi bonds
- D. 2-sigma and 3 pi bonds

**Answer: C**



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26. Polymerization of acetylene leads to the formation of:

A. Benzene

B. Butane

C. Naphthalene

D. Octane

**Answer: A**



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27. Acidic hydrogen is present in:

A. Ethyne

B. Ethene

C. Benzene

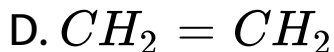
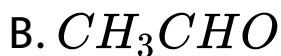
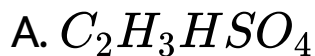
D. Ethane

**Answer: A**



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28. Acetylene reacts with 42%  $H_2SO_4$  containing 1%  $HgSO_4$  to give:



**Answer: B**



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29. Propyne and Propene can be distinguished by:

A. Conc.  $H_2SO_4$

B.  $Br_2$  in  $CCl_4$

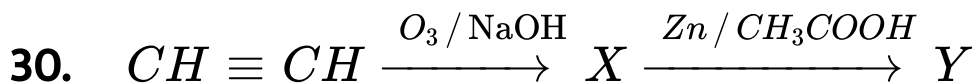
C. Dilute  $KMnO_4$

D.  $AgNO_3$  in Ammonia

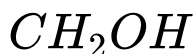
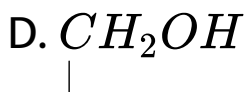
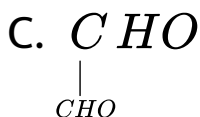
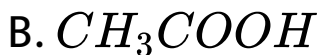
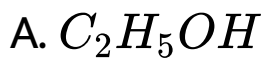
**Answer: D**



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compound Y is:



**Answer: D**



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31. Propyne can react with two moles of HCl to form:

- A. propylidene dichloride
- B. iso propylidene dichloride
- C. ethylidene dichloride
- D. butylidene dichloride

**Answer: B**



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32. Which of the following reagents should be suitable for converting propyne to propanone?

A. Ozone

B. Dilute  $H_2SO_4 + HgSO_4$

C. Acidified  $KMnO_4$

D. Di alkylborane followed by alkaline  $H_2O_2$

**Answer: B**



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**33.** The ascending order of solubility in water is:

A. Ethane It Ethyne It Ethene

B. Ethene It Ethane It Ethyne

C. Ethyne It Ethene It Ethane

D. Ethane It Ethene It Ethyne

**Answer: D**



**View Text Solution**



34. Acetylene can be prepared from

A. Potassium fumarate

B. Calcium carbide

C. Ethylene bromide

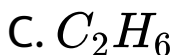
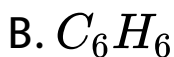
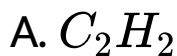
D. All

**Answer: D**



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35. A compound is treated with  $NaNH_2$  to give sodium salt. Identify the compound



**Answer: A**



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## Mandatory Exercise Exercise Set Iii

1. Which one of the following compounds on dehydration gives ethene?

A. Acetylene

B. Ethanol

C. Ethyl bromide

D. Calcium carbide

**Answer: B**



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2. Methane is converted to formaldehyde by

A. complete combustion

B. incomplete combustion

C. catalytic oxidation

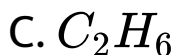
D. partial oxidation

**Answer: D**



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3. Which one of the following compounds undergoes electrophilic as well as nucleophilic addition?



**Answer: D**



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4. During the complete combustion of methane,  $CH_4$ , what change in hybridisation does the carbon atom undergo?

A.  $sp^3$  to  $sp$

B.  $sp^3$  to  $sp^2$

C.  $sp^2$  to  $sp$

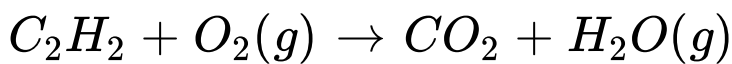
D.  $sp^2$  to  $sp^3$

**Answer: A**



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5. Acetylene,  $C_2H_2$ , reacts with oxygen according to the unbalanced equation



What is the ratio of  $O_2 / C_2H_2$  in the balanced equation?

A. 2/1

B. 3/1

C. 4/1

D. 5/2

**Answer: D**



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## Consolidated Exercise

1. Answer the following questions.

A hydrocarbon containing two double bonds on reductive ozonolysis gave glyoxal, ethanal and propanone. Elucidate the structure of the hydrocarbon along with its IUPAC name.



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2. Answer the following questions.

An alkene gives propanone and butanal on ozonolysis. What is its structural formula?



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3. Answer the following questions.

The reductive ozonolysis of an alkene gave butanone and ethanal. Compute the structure and IUPAC name of the alkene.



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## 4. Answer the following questions.

Match the following:

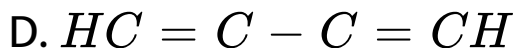
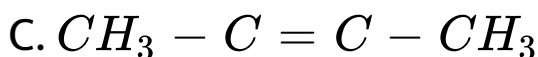
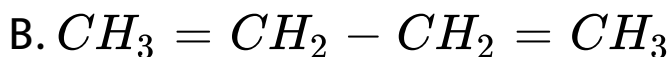
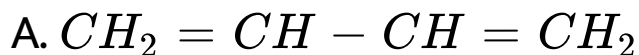
Column A	Column B
(i) $\text{CH}_2=\text{CH}-\text{CH}=\text{CH}_2$	(p) Addition Reaction
(ii) $\begin{array}{c} \text{CH}_2 - \text{Br} \\   \\ \text{CH}_2 - \text{Br} \end{array} + \text{Zn} \xrightarrow[\text{-ZnBr}_2]{\Delta/\text{CH}_3\text{OH}} \text{CH}_2 = \text{CH}_2$	(q) Markownikoff's rule
(iii) $\text{CH}_2 = \text{CH} - \text{CH}_3 + \text{HC} \rightarrow \begin{array}{c} \text{CH}_3\text{CH} - \text{CH}_3 \\   \\ \text{Cl} \end{array}$	(r) Baeyer's reagent
(iv) Cold dilute alkaline $\text{KMnO}_4$	(s) Elimination reaction
	(t) Substitution reaction
	(u) Resonance
	(v) $sp^2 - sp^2 - sp^2 - sp^3$



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**Consolidated Exercise Multiple Choice Questions  
With One Or More Than One Correct Answer**

1. Which of the following have only one type of hybrid carbon?



**Answer: (A), (B), and (D)**



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2. Ethane may be obtained by

A. elimination reaction

B. Wurtz reaction

C. decarboxylation

D. hydrogenation

**Answer: (B), (C), and (D)**



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**Challenging Exercise**

1. Predict the major products for the reaction of 2,3-dimethylbut-2-ene with the following reagents:

A. cold alkaline potassium permanganate

B. aqueous bromine

C. hydrogen in the presence of a nickel catalyst

D. hydrogen bromide

**Answer:**



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2. How do you convert acetylene to  
but-1-yne

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3. How do you convert acetylene to  
but-2-yne?

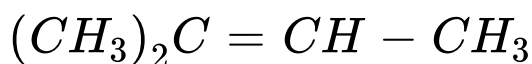
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4. Predict the major product of the following compounds with excess of hydrogen chloride:



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5. Predict the major product of the following compounds with excess of hydrogen chloride:



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6. Predict the major product of the following compounds with excess of hydrogen chloride:



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7. How will you separate a mixture of ethane, ethylene, and acetylene?



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1. Which of the following statements is not true for ethane?

- A. It can be chlorinated with chlorine
- B. It can be catalytically hydrogenated
- C. When oxidized produces  $O_2$  and  $H_2O$
- D. It is a homologue of iso-butane

**Answer: B**



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2. Ethene when treated with  $Br_2$  in the presence of  $CCl_4$  which compound is formed

A. 1, 2-dibromoethane

B. 1-bromo-2-chloroethane

C. Both (A) and (B)

D. 1, 1, 1-tribromoethane

**Answer: A**



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3. In which of the following, addition of HBr does not take place against Markownikoffs rule or Anti-Markownikoff addition of HBr is not observed for

A. Propene

B. But-1-ene

C. But-2-ene

D. Pent-2-ene

**Answer: C**



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4. When ethyl iodide and propyl iodide react with Na in the presence of ether, they form

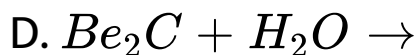
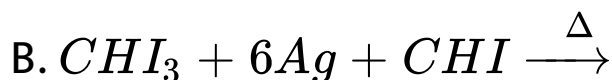
- A. One alkane
- B. Two alkanes
- C. Four alkanes
- D. Three alkanes

**Answer: D**



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5. Acetylene can be obtained by the reaction



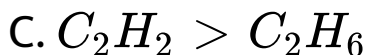
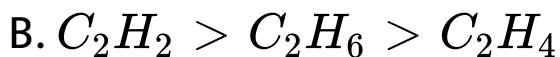
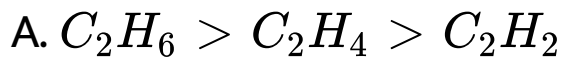
**Answer: B**



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6. Order of reactivity of

$C_2H_6$ ,  $C_2H_4$  and  $C_2H_2$  is



D. All are equally reactive

**Answer: C**



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7. A mixture of 1-chloropropane and 2-chloropropane when treated with alcoholic KOH gives

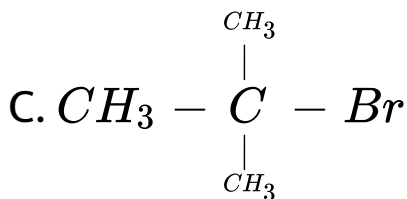
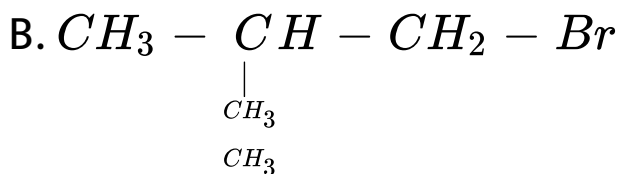
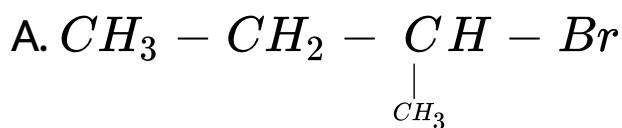
- A. 1-propene
- B. 2-propene
- C. Isopropylene
- D. All of the above

**Answer: A**



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8. What is the chief product obtained when *n*-butane is treated with bromine in the presence of light at 130°C



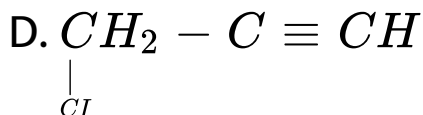
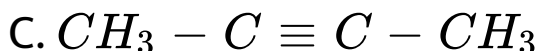
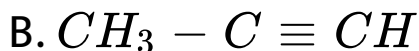
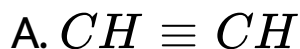
**Answer: A**



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9. Which of the following does not give white precipitate with ammoniacal  $AgNO_3$



**Answer: C**



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10. 2-chlorobutane is heated with alcoholic NaOH, the product formed in larger amount is

A. 1-Butene

B. 1-Butyne

C. 2-Butene

D. All of these

**Answer: C**



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