CHEMISTRY

BOOKS - MS CHOUHAN

HYDROCARBONS (ALKANES)

Level 1

1. On halogenation, an alkane gives only one monohalogenated product.

The alkane may be:

A. 2-methyl butane

B. 2, 2-dimethyl propane

C. cyclopentane

D. both (b) and (c)

Answer: D

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2. Which of the fallowing compounds can be best prepared by wurtz-reaction?

A. Iso-butane

B. n-butane

C. n-pentane

D. Iso-pentane

Answer: B

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3. A hydrocarbon A(V.D=36)forms only one monochloro substitution product.A will be:

A. iso-pentane

B. neo-pentane

C. cyclohexane

D. methyl-cyclohexane

Answer: B

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4. Ethyl iodide and n-propyl iodide are allowed to under go wurtz reaction. The alkane which will not be obtained in this reaction is

A. butane

B. propane

C. pentane

D. hexane

Answer: B

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5. $CH_3 - \underset{\underset{CH_3}{|}}{CH} - CH_2 - CH_3 \xrightarrow[h\nu]{Cl_2}$

Number of chiral centers generated during monochlorination in the above reaction :

A. 1

B. 2

C. 3

D. 4

Answer: B

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6. $CH_3Cl \rightarrow CH_4$ Above conversion can be achieved by :

A. Zn / H^+

B. $LiAlH_4$

C. Mg/(ether) then H_2O

D. all of these

Answer: D

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7. n-Butane $\xrightarrow{Cl_2 / hv}$

Give the total number of monochloro products (including stereoisomers), which are possible in the above reaction.

A. 2

B. 3

C. 4

D. 5

Answer: B

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8. $CH_4 + Cl_2 \xrightarrow{hv} CH_3Cl + HCl$ to obtain high yields of CH_3Cl , the ratio of CH_4 to Cl_2 must be

A. high

B. low

C. equal

D. Can't be predicted

Answer: A

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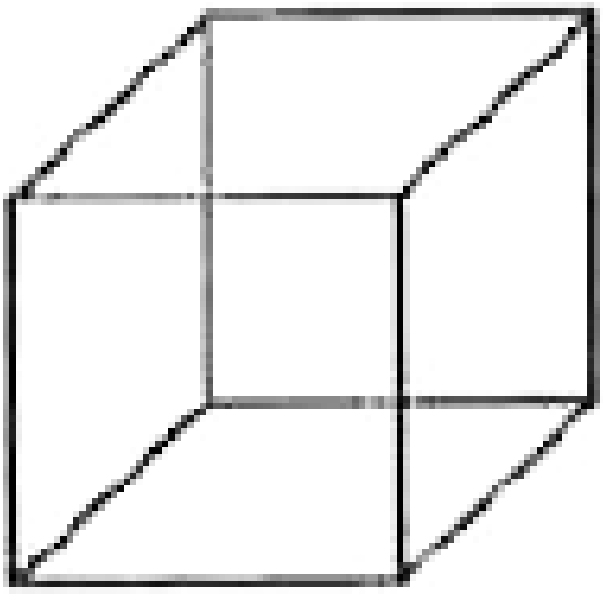
9. Double bond equivalent of cubane is :



Cubane

A. 4

B. 5

C. 6

D. 7

Answer: B

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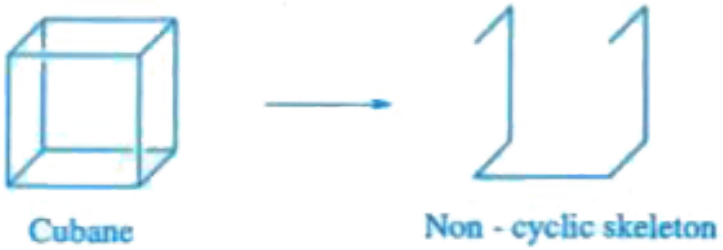
10. How many bond cleavages are required to convert cubane into non-cyclic skeleton?



A. 2

B. 3

C. 4

D. 5

Answer: D

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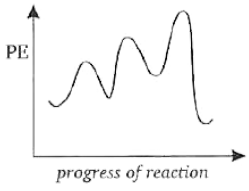
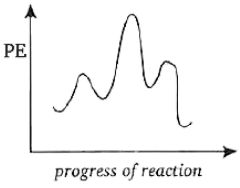
11. Draw an energy profile diagram for a three step-reaction in which first step is slowest and last step is fastest. (Assume that reaction is exothermic)

A. 

B. 

C. 

D. None of these

Answer: C

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12. $CH_3 - \underset{\underset{CH_3}{|}}{CH} - CH_2 - CH_3 \xrightarrow[h\nu]{Cl_2} (x)$ = Number of monochloro product including stereoisomers.

A. 4

B. 5

C. 6

D. 7

Answer: C

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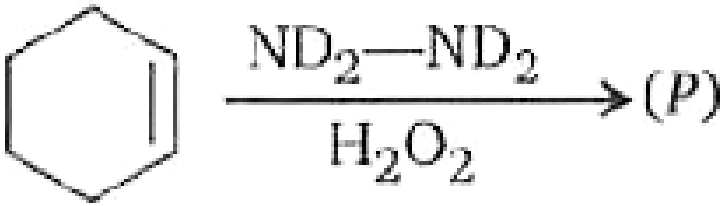
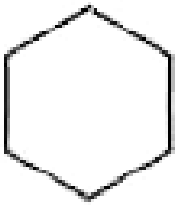
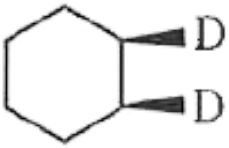
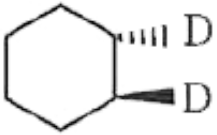
13. 

Product (P) is :

A. 

B. 

C. 

D. both (b) and (c)

Answer: B

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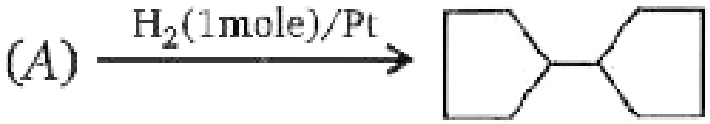
14.



Double bond equivalent (degree of Unsaturation) of (A) is :

A. 1

B. 2

C. 3

D. 4

Answer: C

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15. Arrange the following alkanes in decreasing order of their heats of combustion.

(i) $CH_3 - \underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}} - CH_3$

$(\text{Neo-pentane})\ (i)$

(ii) $CH_3 - \underset{\underset{CH_3}{|}}{CH} - CH_2 - CH_3$

$(\text{Iso- pentane})\ (ii)$

(iii) $\underset{(\text{n-pentane})}{CH_3 - CH_2 - CH_2 - CH_2 - CH_3}$

A. $(i) > (ii) > (iii)$

B. $(iii) > (i) > (ii)$

C. $(iii) > (ii) > (i)$

D. $(i) > (iii) > (ii)$

Answer: C

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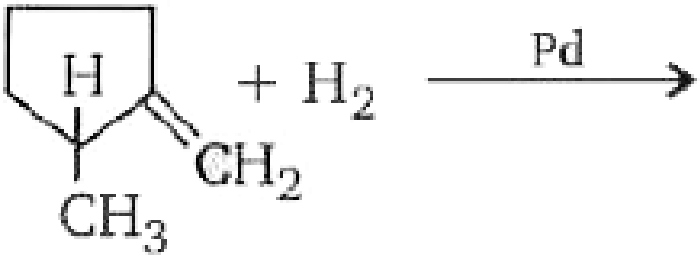

16.

Product of the above reaction will be :

A. Racemic mixture

B. Diastereomers

C. Meso

D. Constitutional isomers

Answer: B

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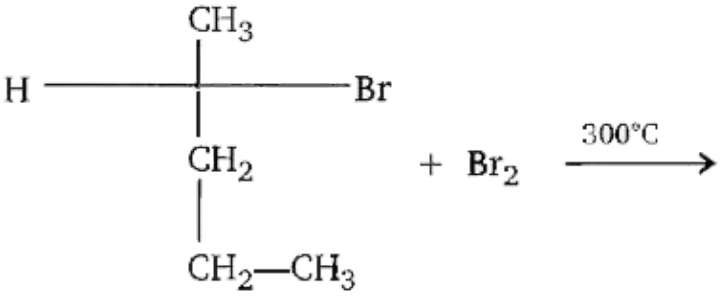
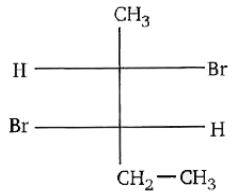
17.

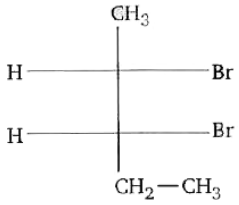


Which of the folowing compound will not be obtained as a product in the above reaction ?

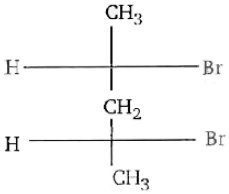
A.



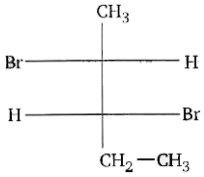
B.



C.



D.



Answer: D

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18. Following are the structures of four isomer of hexane. Among the names given below, which correctly identifies the fifth isomer ?

$CH_3CH_2CH_2CH_2CH_2CH_3$

$(CH_3)_3CCH_2CH_3$

$(CH_3)_2CHCH_2CH_2CH_3$

$(CH_3)_2CHCH(CH_3)_2$

A. 2-methyl pentane

B. 2-Ethyl butane

C. 2, 3-Dimethyl butane

D. 3-Methyl pentane

Answer: D

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19. Which of the fallowing describes the best relationship between the methyl groups in the chair conformation of the substance shown below?

A. Trans

B. Anti

C. Gauche

D. Eclipsed

Answer: C

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20. compare the stabilities of the fallowing two compounds (A) and(B)

A: cis:-1-ethyl-3-methyl cyclohexane B: trans -1-ethyl -3-methyl cyclohexane

A. A is more stable

B. B is more stable

C. A and B are of equal stability

D. No comparison can be made

Answer: A

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21. Which conformation of ethane has the lowest potential energy?

A. Eclipsed

B. Skew

C. Staggered

D. All will have equal potential energy

Answer: C

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22. Ethane is subjected to combustion processes. During the combustion the hybrid state of carbon changes from

A. sp^2 to sp^3

B. sp^3 to sp

C. sp to sp^3

D. sp^2 to sp^2

Answer: B

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23. The reaction $CH_3 - CH_2 - CH_2 - CH_3 \xrightarrow[AlCl_3]{HCl \ \text{Gas}}$

$CH_3 - \underset{\underset{CH_3}{|}}{CH} - CH_3$, is an example of

A. isomerization

B. polymerization

C. cracking

D. de-hydrogenation

Answer: A

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24. Which of the fallowing has highest chlorine content?

A. Pyrene

B. DDT

C. Chloral

D. Gammaxene

Answer: A

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25. Pure methane can be prepared by:

A. Wurtz reaction

B. Kolbe electrolysis method

C. soda-lime de-carboxylation

D. reduction with H_2

Answer: C

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26. Calcium carbide + heavy water $\rightarrow$? The product of the above reaction is

A. C_2H_2

B. CaD_2

C. $Ca(OD)_2$

D. CD_4

Answer: C

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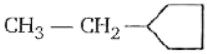
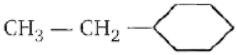
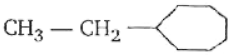
27. 
Ethyl cyclopentane
(I)


Ethyl cyclohexane
(II)


Ethyl cycloheptane
(III)

Arrange the compounds I, II and III in decreasing order of their heats of combustion :

A. $II > I > III$

B. $I > II > III$

C. $III > II > I$

D. $III > I > II$

Answer: C

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28. An alkane with mol.mass = 86 on bromination gives only two monobromo derivatives (excluding stereoisomers). The alkane is

A. $CH_3 - \underset{\underset{CH_3}{|}}{CH} - CH_2 - CH_2 - CH_3$

B. $CH_3 - \underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}} - CH_2 - CH_3$

C. $CH_3 - \underset{\underset{CH_3}{|}}{CH} - \underset{\underset{CH_3}{|}}{CH} - CH_3$

D. $CH_3 - \underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}} - CH_3$

Answer: C

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29. Order of the bond strength of C – H bonds involving sp, sp^2 and sp^3 hybridized carbon atom is :

A. $sp > sp^2 > sp^3$

B. $sp^3 > sp^2 > sp$

C. $sp^2 > sp^3 > sp$

D. $sp^2 > sp > sp^3$

Answer: A

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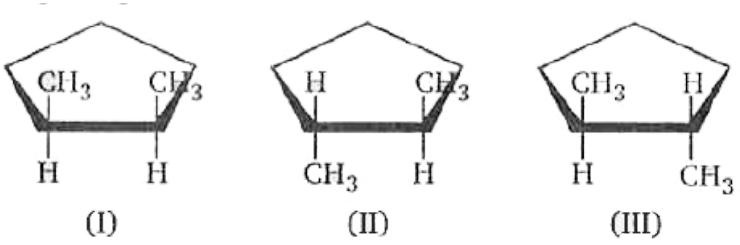
30.



Among the structures given, select the enantiomers :

A. I and II

B. I and III

C. II and III

D. I, II and III

Answer: C

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31.  (I)  (II)  (III)

The correct order of reactivity of I, II & III towards addition reactions is :

A. $I > III > II$

B. $I > II > III$

C. $III > II > I$

D. $III > I > II$

Answer: B

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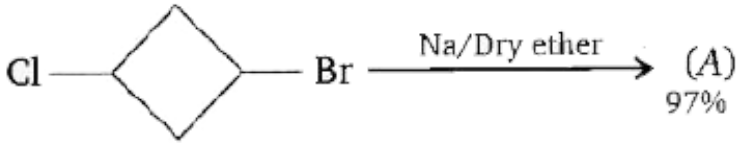
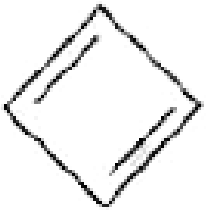
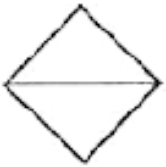
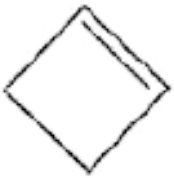
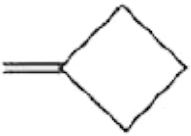
32. 

Product (A) of above reaction is :

A. 

B. 

C. 

D. 

Answer: B

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33. Which of the following reactants is suitable for preparation of methane and ethane by using one step only ?

A. $H_2C = CH_2$

B. CH_3OH

C. $CH_3 - Br$

D. $CH_3 - CH_2 - OH$

Answer: C

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34. How many carbon atoms does an alkane (not a cycloalkane) need before it can exist in enantiomeric form?

A. 4

B. 5

C. 6

D. 7

Answer: D

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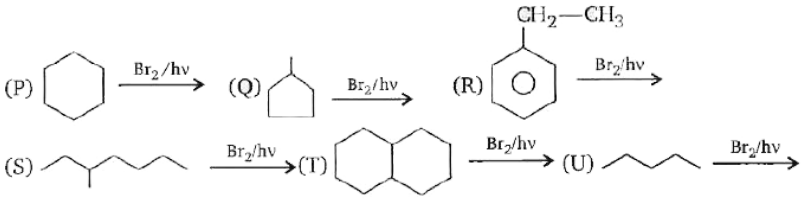
35. Among the following free radical bromination reactions, select those in which 2° halide is the major product-



A. P, Q, R, S

B. P, R, U

C. P, R, S, T

D. P, Q, R, S, T

Answer: B

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36. $(A) + Cl_2 \xrightarrow{h\nu}$ monochloro product

To maximise the yield of monochloro product in the above reaction ?

A. Cl_2 must be added in excess

B. Reactant (A) must be added in excess

C. Reaction must be carried out in dark

D. Reaction must be carried out with equimolar mixture of Cl_2 and A

Answer: B

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37. $CH_3 - \overset{\overset{CH_3}{|}}{CH} - CH_2 - CH_3 + Br_2 \xrightarrow{h\nu}$

Major organic product of the reaction is

A. Racemic mixture

B. Meso

C. Diastereomers

D. Constitutional isomers

Answer: A

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38. Select the chain propogation steps in the free-radical chlorination of methane

1) $Cl_2 \rightarrow 2Cl^{\cdot}$ 2) $Cl^{\cdot} + CH_4 \rightarrow CH_3Cl + H^{\cdot}$

3) $Cl^{\cdot} + CH_4 \rightarrow CH_3^{\cdot} + HCl$ 4)$H^{\cdot} + Cl_2 \rightarrow HCl + Cl^{\cdot}$

5) $CH_3^{\cdot} + Cl_2 \rightarrow CH_3Cl + Cl^{\cdot}$

A. 2, 3, 5

B. 1, 3, 6

C. 3, 5

D. 2, 3, 4

Answer: C

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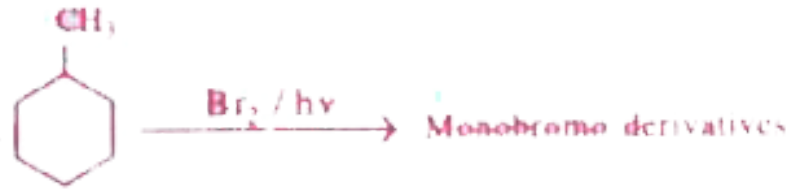

39.

The number of possible monobromo products is (excluding stereoisomers)

A. 4

B. 5

C. 8

D. 10

Answer: B

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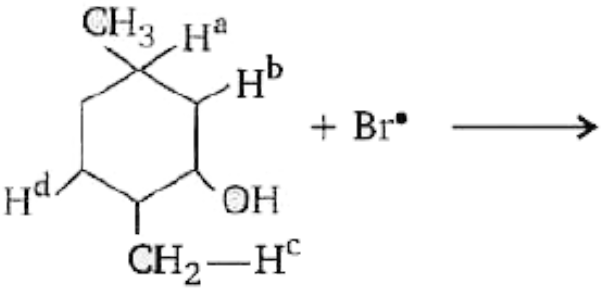
40.



$Br^{\cdot}$ will abstract which of the hydrogen most readily ?

A. a

B. b

C. c

D. d

Answer: A

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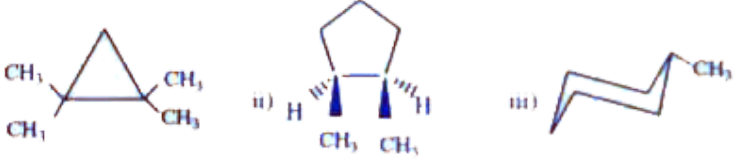
41. Arrange the following compounds in decreasing order of their heats of combustion



A. $(iii) > (ii) > (i)$

B. $(ii) > (i) > (iii)$

C. $(iii) > (i) > (ii)$

D. $(i) > (ii) > (iii)$

Answer: D

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42. $\underset{a}{CH_3} - \underset{b}{CH_2} - \underset{c}{CH_2} - \underset{d}{CH_2} - F$

Arrange the hydrogens a, b, c, d, in decreasing order of their reactivities towards chlorination :

A. $a > b > c > d$

B. $b > c > d > a$

C. $b > c > a > d$

D. $c > b > a > d$

Answer: C

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43. On catalytic reduction with H/Pt how many alkenes will give n-butane?

A. 1

B. 2

C. 3

D. 4

Answer: C

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44. On catalytic reduction (H_2/Pt) how many alkenes will give 2-methylbutane ?

A. 1

B. 2

C. 3

D. 4

Answer: C

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45. 

How many dichloro products are formed in the above reaction (including stereoisomers)

A. 5

B. 6

C. 7

D. 9

Answer: C

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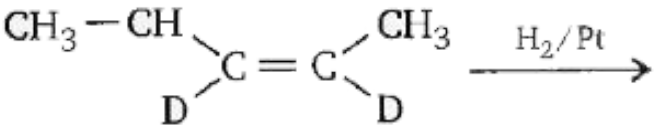

46.

Product of the above reaction will be :

A. Racemic mixture

B. Diastereomers

C. Meso

D. Constitutional isomers

Answer: A

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47. $Ph - CH_2 - \underset{\underset{D}{|}}{CH} - CH_3 \xrightarrow{Br_2 / hv}$ Product of the above reaction will be :

A. Diastereomers

B. Racemic mixture

C. Meso

D. Constitutional isomers

Answer: A

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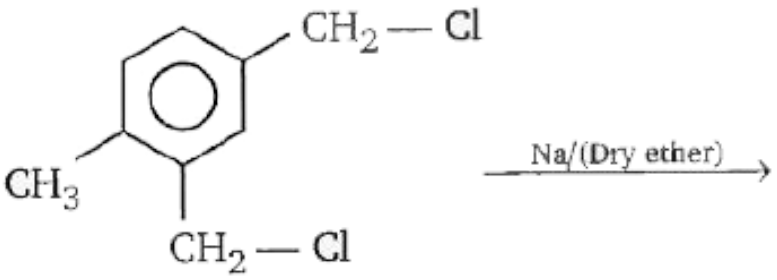
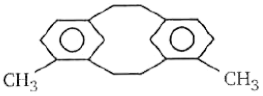
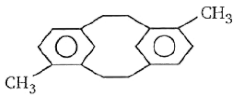
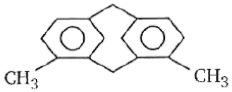
48.



Product obtained in above Wurtz reaction is :

A. 

B. 

C. 

D. Both (a) and (b)

Answer: D

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49. Rank the transition states that occur during the following reaction steps in order of increasing stability (least $\rightarrow$ most stable) :

1. $H_3C - \overset{+}{O}H_2 \rightarrow CH_3^+ + H_2O$

2. $(CH_3)_3C - \overset{+}{C}H_2 \rightarrow (CH_3)_3C^+ + H_2O$

3. $(CH_3)_2CH - \overset{+}{O}H_2 \rightarrow (CH_3)_2CH^+ + H_2O$

A. $1 < 2 < 3$

B. $2 < 3 < 1$

C. $1 < 3 < 2$

D. $2 < 1 < 3$

Answer: C

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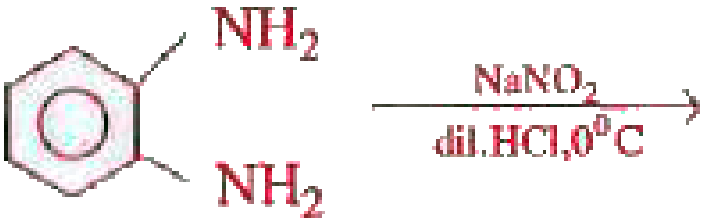
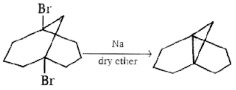
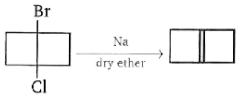
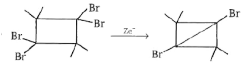
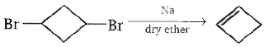
50. The major product of the reaction is



A. 

B. 

C. 

D. 

Answer: D

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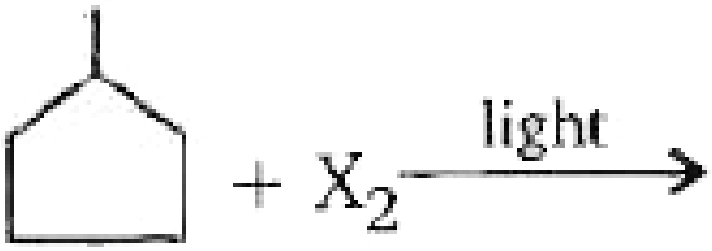
Level 2 1 Comprehension

1. For the given question (1, 2, 3), consider the following reaction.



monohalogenation product

Light in involved in which step of the reaction :

A. Initiation only

B. Termination only

C. Propagation only

D. Propagation and Termination

Answer: A

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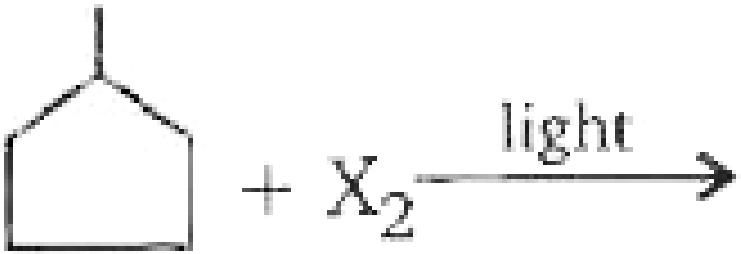
2. For the given question (1, 2, 3), consider the following reaction.



monohalogenation product

Which halogen will give the best yield of a single monohalogenation product ?

A. F_2

B. Cl_2

C. Br_2

D. I_2

Answer: C

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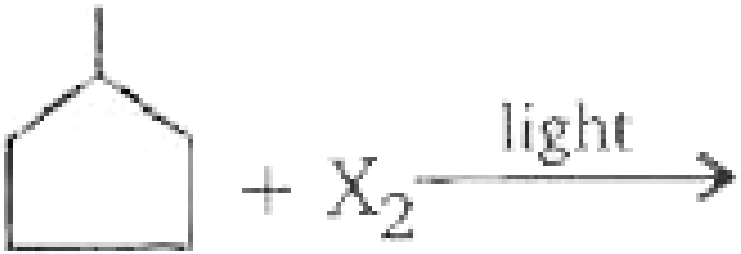
3. For the given question, consider the following reaction.



monohalogenation product

How many monohalo derivatives are possible (excluding stereoisomers) ?

A. 3

B. 4

C. 5

D. 6

Answer: B

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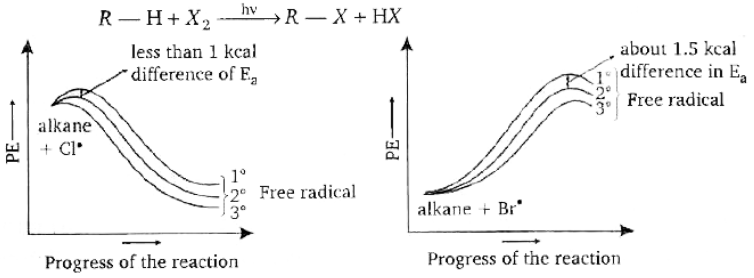
Level 2 2 Comprehension

1. Halogenation is a substitution reaction, where halogen replaces one or more hydrogens of hydrocarbon.



Chlorination is exothermic and transition state resembles with products

Bromination is endothermic and transition state resembles with products

Chlorine free radical make $1^{\circ}, 2^{\circ}, 3^{\circ}$ radicals with almost equal ease, whereas bromine free radicals have a clear preference for the formation of tertiary free radicals. So, bromine is less reactive, and more slective whereas chlorine is less selective and more reactive.

The relative rate of abstraction of hydrogen by Br is

$$\underset{(1600)}{3^{\circ}} > \underset{(82)}{2^{\circ}} > \underset{(1)}{1^{\circ}}$$

The relative rate of abstraction of hydrogen by Cl is

$$\underset{(5)}{3^{\circ}} > \underset{(3.8)}{2^{\circ}} > \underset{(1)}{1^{\circ}}$$

1-halo-2, 3-dimethyl butane will be obtained in better yields, if halogen is :

A. Br_2

B. Cl_2

C. I_2

D. Can't be predicted

Answer: B

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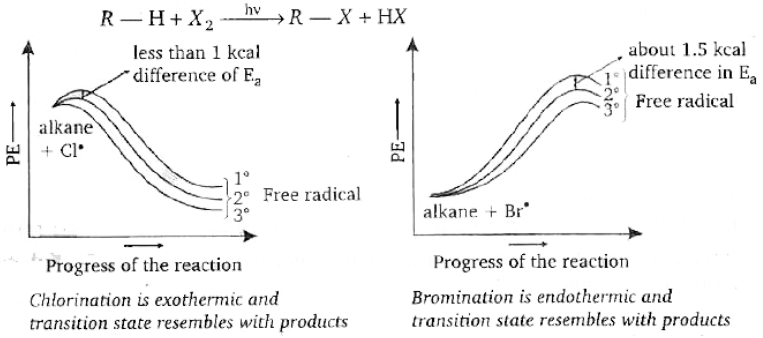
2. Halogenation is a substitution reaction, where halogen replaces one or more hydrogens of hydrocarbon.



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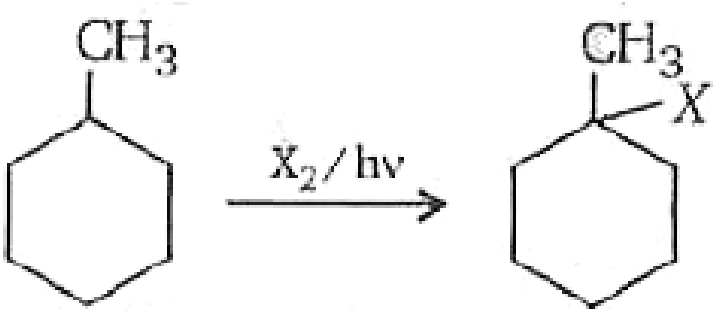
$3^{\circ} > 2^{\circ} > 1^{\circ}$

$(1600) \quad (82) \quad (1)$

The relative rate of abstraction of hydrogen by Cl is

$3^{\circ} > 2^{\circ} > 1^{\circ}$

$(5) \quad (3.8) \quad (1)$



Above product will obtained in better yield if X is

A. Cl_2

B. I_2

C. Br_2

D. Can't be predicted

Answer: C

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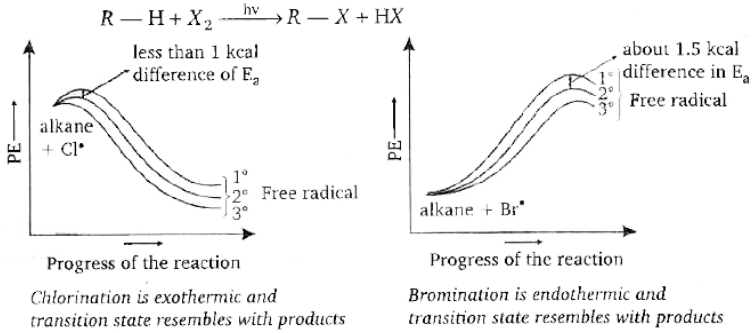
3. Halogenation is a substitution reaction, where halogen replaces one or more hydrogens of hydrocarbon.



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The relative rate of abstraction of hydrogen by Cl is

$$\underset{(5)}{3^\circ} > \underset{(3.8)}{2^\circ} > \underset{(1)}{1^\circ}$$

$$CH_3-\overset{\overset{CH_3}{|}}{CH}-CH_3 \xrightarrow{Cl_2/hv} \text{Product}$$

Major product in the above reaction is :

A. $CH_3 - \underset{\displaystyle CH_3}{\underset{|}{CH}} - CH_2 - Cl$

B. $CH_3 - \underset{\displaystyle Cl}{\overset{\displaystyle CH_3}{\overset{|}{\underset{|}{CH}}}} - CH_3$

C. $CH_3 - CH_2 - CH_2 - Cl$

D. $CH_3 - \underset{\displaystyle Cl}{\overset{\displaystyle Cl}{\overset{|}{\underset{|}{CH}}}} - CH_2 - CH_3$

Answer: A

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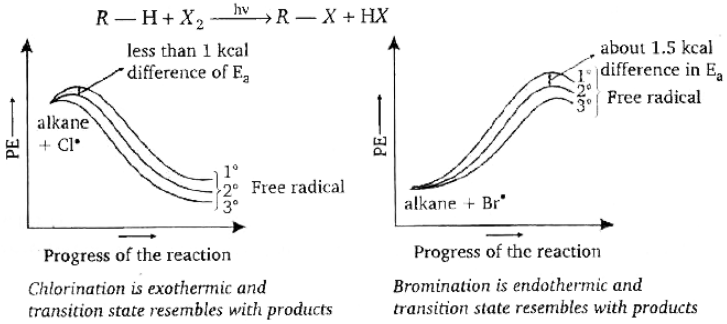
4. Halogenation is a substitution reaction, where halogen replaces one or more hydrogens of hydrocarbon.



Chlorination is exothermic and transition state resembles with products

Bromination is endothermic and transition state resembles with products

Chlorine free radical make $1^\circ, 2^\circ, 3^\circ$ radicals with almost equal ease,

whereas bromine free radicals have a clear preference for the formation of tertiary free radicals. So, bromine is less reactive, and more slective whereas chlorine is less selective and more reactive.

The relative rate of abstraction of hydrogen by Br is

$$\underset{(1600)}{3^\circ} > \underset{(82)}{2^\circ} > \underset{(1)}{1^\circ}$$

The relative rate of abstraction of hydrogen by Cl is

$$\underset{(5)}{3^\circ} > \underset{(3.8)}{2^\circ} > \underset{(1)}{1^\circ}$$

Which of the following will give five monochloro prodcuts, when allowed to react with Cl_2 in presence of sun light (excluding stereoisomers) ?

A. n-pentane

B. Iso-pentane

C. 2-methyl-pentane

D. 3-methyl pentane

Answer: C

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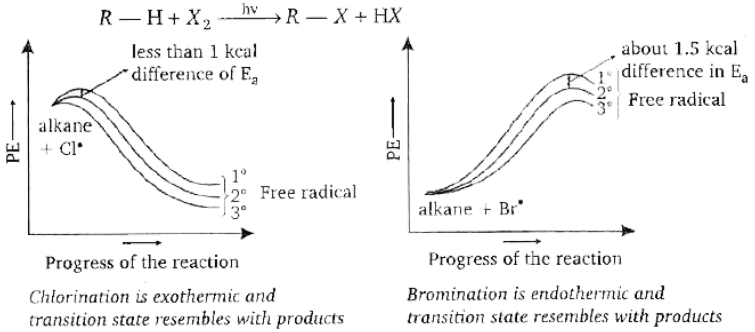
5. Halogenation is a substitution reaction, where halogen replaces one or more hydrogens of hydrocarbon.



Chlorination is exothermic and transition state resembles with products

Bromination is endothermic and transition state resembles with products

Chlorine free radical make $1^\circ, 2^\circ, 3^\circ$ radicals with almost equal ease, whereas bromine free radicals have a clear preference for the formation of tertiary free radicals. So, bromine is less reactive, and more slective whereas chlorine is less selective and more reactive.

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The relative rate of abstraction of hydrogen by Cl is

$$\underset{(5)}{3^\circ} > \underset{(3.8)}{2^\circ} > \underset{(1)}{1^\circ}$$

$$CH_3-\overset{\overset{CH_3}{|}}{\underset{\underset{CH_3}{|}}{C}}-CH_2-\overset{\overset{CH_3}{|}}{CH}-CH_3 \xrightarrow{Br_2/hv} CH_3-\overset{\overset{CH_3}{|}}{\underset{\underset{CH_3}{|}}{C}}-CH_2-\overset{\overset{CH_3}{|}}{\underset{\underset{Br}{|}}{C}}-CH$$

2, Bromo-2, 5, 5 trimethyl pentane (x%)

What is the value of x (% yield of product) ?

A. 0.18

B. 0.82

C. 0.9

D. 0.6

Answer: C

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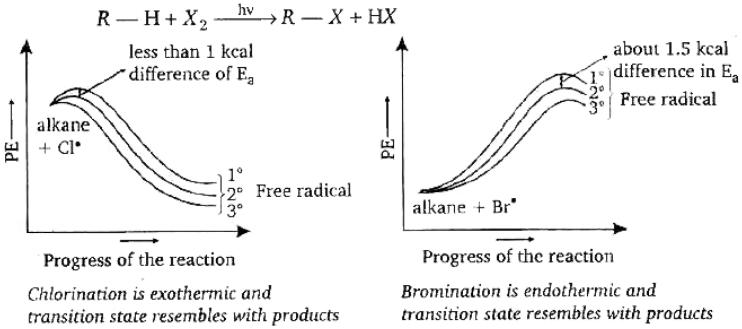
6. Halogenation is a substitution reaction, where halogen replaces one or more hydrogens of hydrocarbon.



Chlorination is exothermic and transition state resembles with products

Bromination is endothermic and transition state resembles with products

Chlorine free radical make $1^{\circ}, 2^{\circ}, 3^{\circ}$ radicals with almost equal ease, whereas bromine free radicals have a clear preference for the formation of tertiary free radicals. So, bromine is less reactive, and more slective

whereas chlorine is less selective and more reactive.

The relative rate of abstraction of hydrogen by Br is

$$\begin{array}{ccccc} 3^\circ & > & 2^\circ & > & 1^\circ \\ (1600) & & (82) & & (1) \end{array}$$

The relative rate of abstraction of hydrogen by Cl is

$$\begin{array}{ccccc} 3^\circ & > & 2^\circ & > & 1^\circ \\ (5) & & (3.8) & & (1) \end{array}$$

What would be the product ratio x/y in the chlorination of propane if all the hydrogen were abstracted at equal rate ?

$$CH_3 - CH_2 - CH_3 \xrightarrow[h\nu]{Cl_2} CH_3 - CH_2 - CH_2 - Cl + CH_3 - \underset{\underset{(y)}{Cl}}{\overset{|}{CH}} - C$$

A. $\frac{1}{3}$

B. $\frac{3}{1}$

C. $\frac{9}{1}$

D. $\frac{1}{9}$

Answer: B

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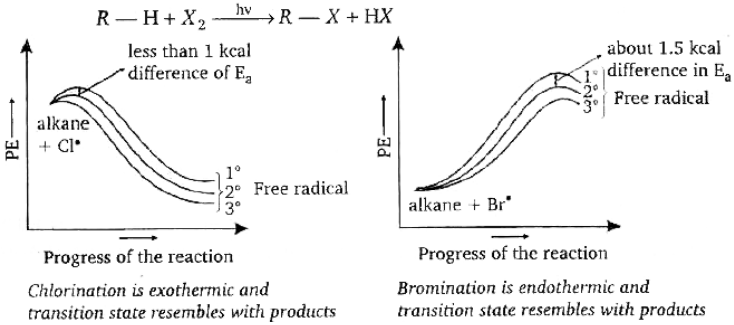
7. Halogenation is a substitution reaction, where halogen replaces one or more hydrogens of hydrocarbon.



Chlorination is exothermic and transition state resembles with products

Bromination is endothermic and transition state resembles with products

Chlorine free radical make $1^\circ, 2^\circ, 3^\circ$ radicals with almost equal ease, whereas bromine free radicals have a clear preference for the formation of tertiary free radicals. So, bromine is less reactive, and more slective whereas chlorine is less selective and more reactive.

The relative rate of abstraction of hydrogen by Br is

$$\underset{(1600)}{3^\circ} > \underset{(82)}{2^\circ} > \underset{(1)}{1^\circ}$$

The relative rate of abstraction of hydrogen by Cl is

$$\underset{(5)}{3^\circ} > \underset{(3.8)}{2^\circ} > \underset{(1)}{1^\circ}$$

How many dichloro products (including stereoisomers) will be formed when R-2-chloropentane reacts with Cl_2 in presence of UV radiation ?

A. 5

B. 6

C. 7

D. 8

Answer: C

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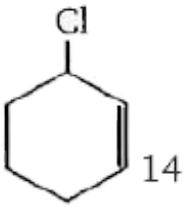
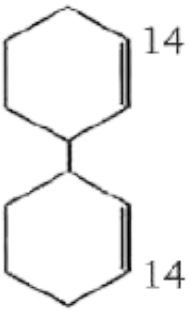
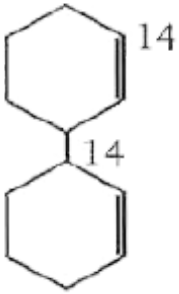
Level 2

1. 

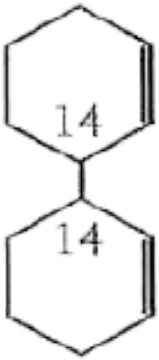
$\xrightarrow[\text{dry ether}]{\text{Na}}$ (A); Product (A) is :

A. 

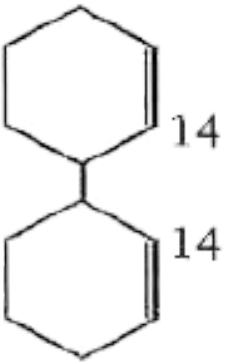
B.



C.



D.



Answer: A::B::C

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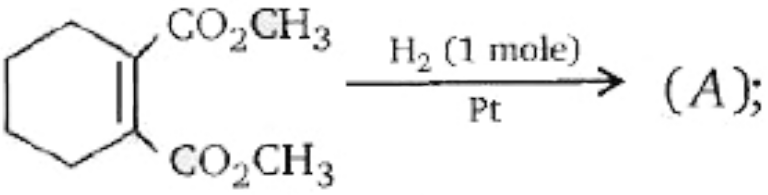
2. 

Product (A) is :

A. Meso compound

B. Racemic mixture

C. Diastereomers

D. Optically active

Answer: A

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3. $Ph - CH_2 - \overset{O}{\overset{||}{C}} - OH \xrightarrow[(2)\,H^{\oplus}]{(1)\,NaOH\,,CaO\,,\,\Delta} (A)$

Product (A) is :

A. $Ph - CO_2H$

B. $Ph - CH_2 - OH$

C. $Ph - CH_3$

D. 

Answer: C

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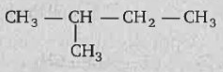
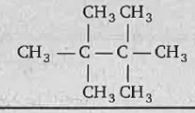
4. Match the column I with column II and with column III.

Column (I)		Column (II)		Column (III)	
Compound		Mono-chloro products (excluding stereoisomerism)		Monochloro products (including stereoisomerism)	
(a)		(p)	1	(w)	1
(b)		(q)	2	(x)	3
(c)		(r)	3	(y)	5
(d)		(s)	4	(z)	6

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5.

A.	*R*-2-chloropentane $\xrightarrow[h\nu]{Cl_2}$ Optically active di-chloro products (*P*)
B.	 $\xrightarrow[h\nu]{Cl_2}$ Optically active dichloro products (*Q*)
C.	*R*-2-chlorobutane $\xrightarrow[h\nu]{Cl_2}$ Optically active di-chloroproducts (*R*)

Sum P + Q + R is :

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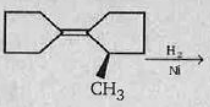
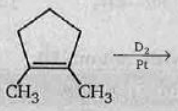
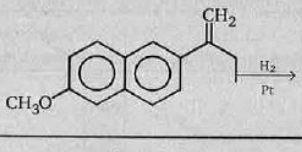
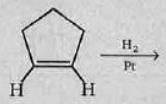
6. Match the column I and II.

Column (I)		Column (II)	
Reaction		Type of Reaction	
(a)		(p)	Meso compound
(b)		(q)	Diastereomers
(c)		(r)	Racemic
(d)		(s)	Optically inactive due to absence of chiral center

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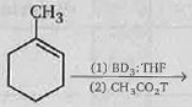
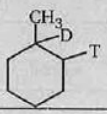
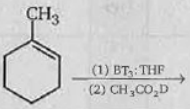
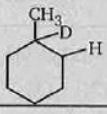
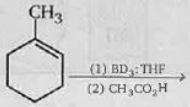
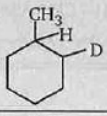
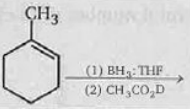
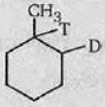
7. Match the column :

Column (I)		Column (II)	
Reaction		Product	
(a)		(p)	
(b)		(q)	
(c)		(r)	
(d)		(s)	

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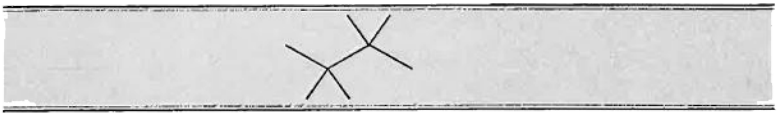
8. How many distinct monochlorinated products, (including stereoisomers) may be obtained when the alkane shown below is heated in the presence of Cl_2 ?



A. 1

B. 2

C. 3

D. 4

Answer: A

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9. How many distinct monochlorinated products, (including steroisomers) may be obtained when the alkane shown below is heated in the presence of Cl_2 ?

A. 2

B. 4

C. 5

D. 8

Answer: D

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10. Match the column :

	Column (I)		Column (II)
	Wurtz reaction		**Number of dimerization product**
(a)	$CH_3-Cl \xrightarrow[\text{dry ether}]{Na}$	**(p)**	5
(b)	$CH_3-Cl+CH_3-CH_2-Cl \xrightarrow[\text{dry ether}]{Na}$	**(q)**	6
(c)	$CH_3-Cl+CH_3-CH_2-Cl$ $+CH_3-CH_2-CH_2-Cl \xrightarrow[\text{dry ether}]{Na}$	**(r)**	3
(d)	$H_2C=CH-CH=CH-CH_2-Cl$ $+CH_3-CH_2-Cl \xrightarrow[\text{dry ether}]{Na}$	**(s)**	1

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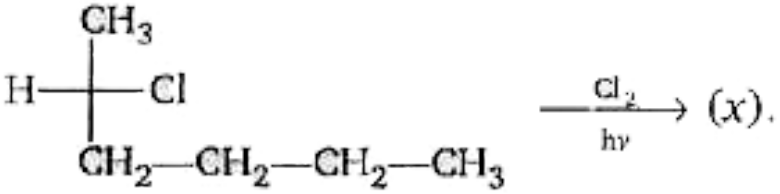

11. (x) = total

number of di-chloro product

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