



CHEMISTRY

BOOKS - MS CHOUHAN CHEMISTRY (HINGLISH)

HYDROCARBONS (ALKANES)

Exercise

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 following 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-butane

C. cyclopentane

D. methyl-cyclohexane

Answer: B



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4. Ethyle iodide and n-propyl iodide are allowed to undergo Wurtz reaction. The alkane which will not be obtained in this reaction is:

A. butane

B. propane

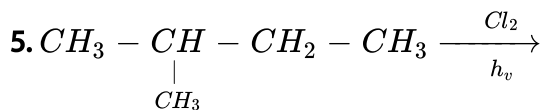
C. pentane

D. hexane

Answer: b



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Number of chiral generated during monochlorination in the above reaction:

- A. 1
- B. 2
- C. 3
- D. 4

Answer: b

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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. $n - bu \text{ tan } e \xrightarrow{Cl_2 / h\nu}$

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

A. 2

B. 3

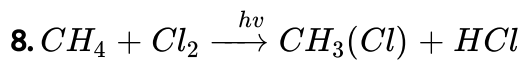
C. 4

D. 5

Answer: b



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To obtain high yields of CH_3Cl , the ratio of CH_4 to Cl_2 must be:

A. high

B. low

C. equal

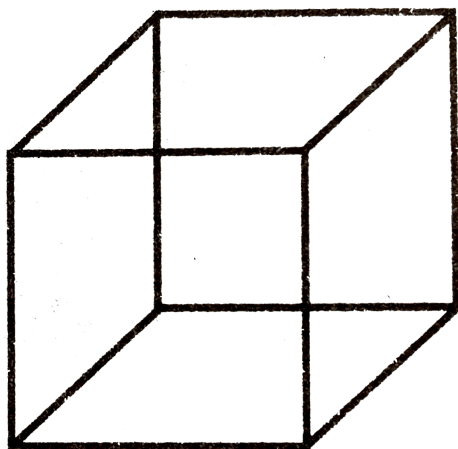
D. can't be predicted

Answer: a



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9. Double bond equivalent of cubane is :



Cubane

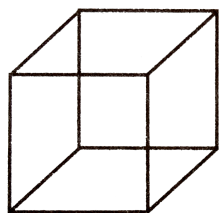
- A. 4
- B. 5
- C. 6
- D. 7

Answer: b



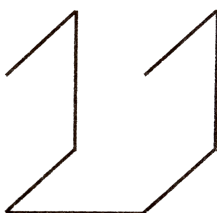
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10. How many bond cleavages are required to convert cubane into non-cyclic skeleton?



Cubane

(b) 3



Non-cyclic skeleton

(c) 4

A. 2

B. 3

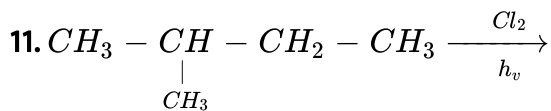
C. 4

D. 5

Answer: d



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Number of monochloro product including stereoisomers.

A. 4

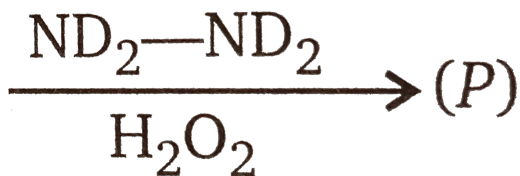
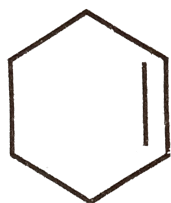
B. 5

C. 6

D. 7

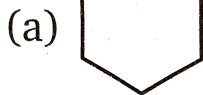
Answer: c

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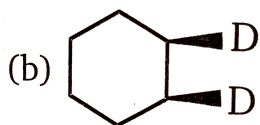


12.

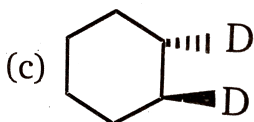
Product (P) is :



A.



B.



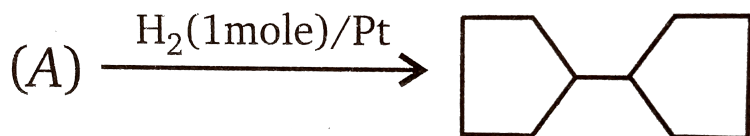
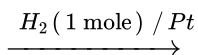
C.

D. both (b) and (c)

Answer: b

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13.



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

A. 1

B. 2

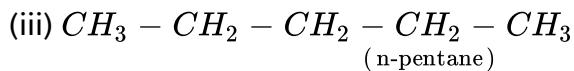
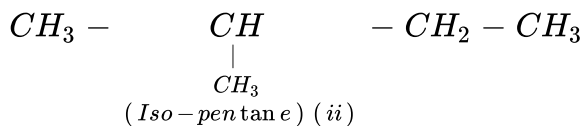
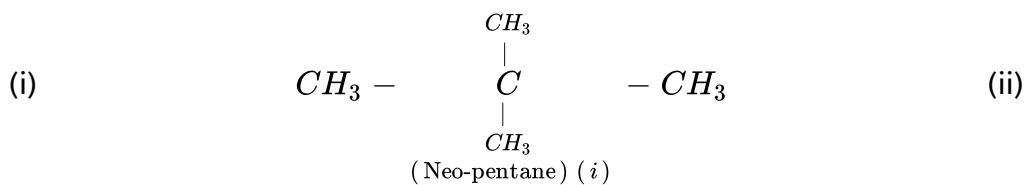
C. 3

D. 4

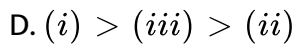
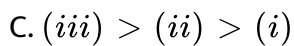
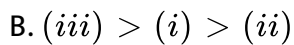
Answer: c

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

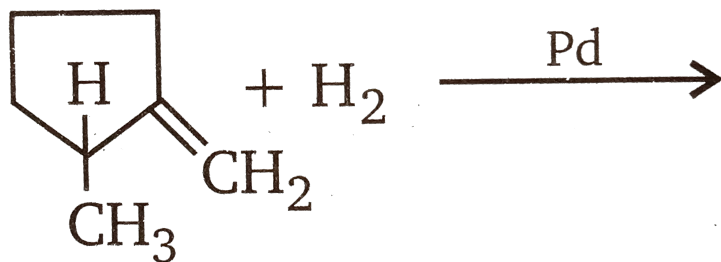


A. (i) > (ii) > (iii)



Answer: c

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Product of the above reaction will be:

A. Racemic mixture

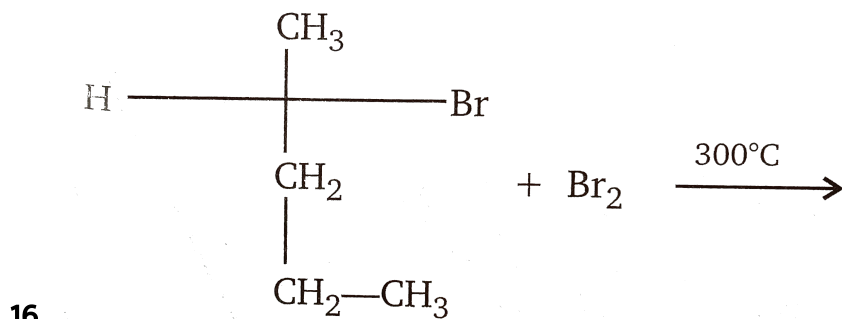
B. Diastereomers

C. Meso

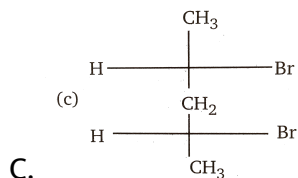
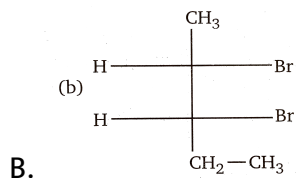
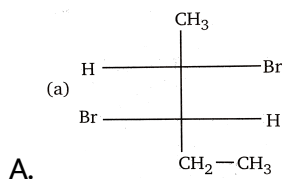
D. Constitutional isomers

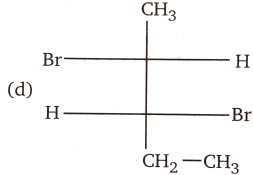
Answer: b

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



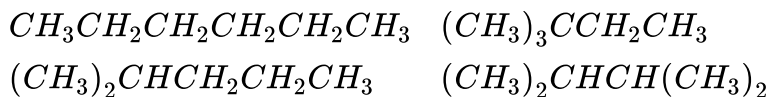


D.

Answer: d

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



A. 2-Methyl pentane

B. 2-Ethyl butane

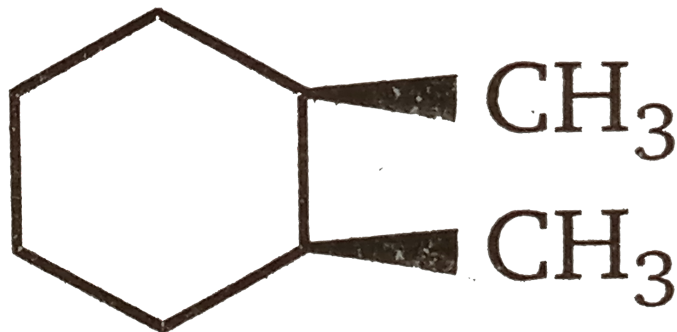
C. 2,3-Dimethyl butane

D. 3-Methyl pentane

Answer: d

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18. Which of the following 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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19. Compare the stabilities of the following two compounds :

A : cis-1-Ethyl-3-methylcyclohexane

B : trans-1-Ethyl-3-methylcyclohexane

- 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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20. 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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21. Ethane is subjected to combustion process. During the combustion the hybrid state of carbon changes from:

A. sp^2 to sp^3

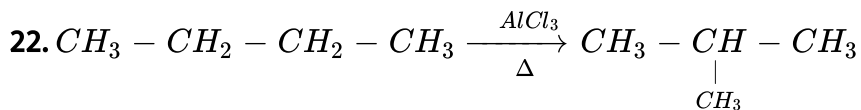
B. sp^3 to sp

C. sp to sp^3

D. sp^2 to sp^2

Answer: B

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Above reaction is an example of:

- A. isomerization
- B. polymerization
- C. cracking
- D. de-hydrogenation

Answer: a



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23. Which of the following has highest chlorine content?

- A. Pyrene
- B. DDT
- C. Chloral

D. Gammoxene

Answer: a

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24. Pure methane can be prepared by:

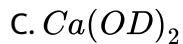
- A. Wurtz reaction
- B. Kolbe electrolysis method
- C. soda-lime de-carboxylation
- D. reduction with H_2

Answer: c

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25. Calcium carbide + heavy water \rightarrow ?

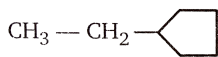
The product of the above reaction is :



Answer: c

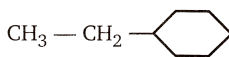


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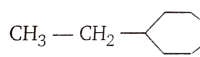
Ethyl cyclopentane

(I)



Ethyl cyclohexane

(II)

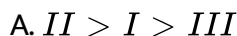


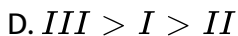
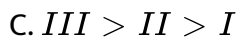
Ethyl cycloheptane

(III)

26.

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

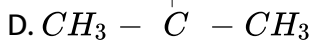
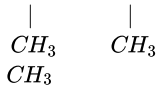
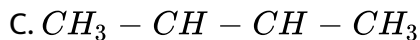
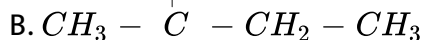




Answer: c

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27. An alkane (mol. Wt. = 86) on bromination gives only two monobromo derivatives (excluding stereoisomers). The alkane is:



Answer: C



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28. 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. $sp^3 > sp^2 > sp$

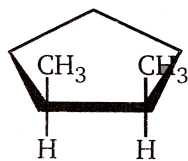
C. $sp^2 > sp^3 > sp$

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

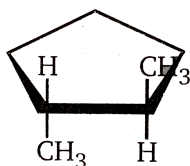
Answer: a



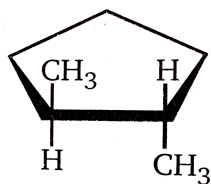
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(I)



(II)



(III)

29.

Among the structures given, select the enantiomers:

A. I and II

B. I and III

C. II and III

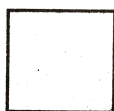
D. I, II and III

Answer: c

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(I)



(II)



(III)

30.

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

A. I gt III gt II

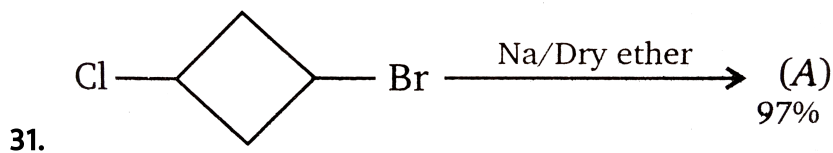
B. I gt II gt III

C. III gt II gt I

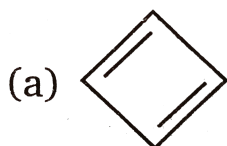
D. III gt I gt II

Answer: b

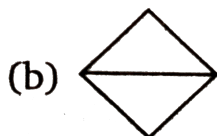
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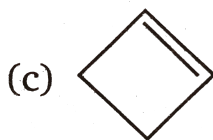
Product (A) of above reaction is:



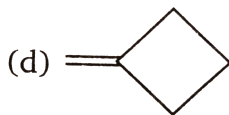
A.



B.



C.

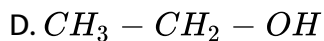
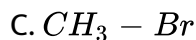
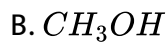
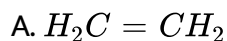


D.

Answer: b

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



Answer: c



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33. How many carbon atoms does not an alkane (not a cycloalkane) need before it is capable to exist in enantiomeric form?

A. 4

B. 5

C. 6

D. 7

Answer: d



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

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

A. Cl_2 must be added in excess

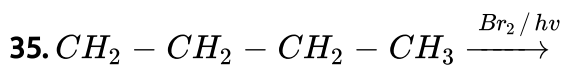
B. Reactant (A) must be added in excess

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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Major product in the above reaction is:

A. Racemic mixture

B. Meso

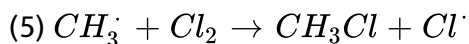
C. Diastereomers

D. Constitutional isomers

Answer: A

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36. Select the chain propagation steps in the free-radical chlorination of methane.



A. 2, 3, 5

B. 1, 3, 6

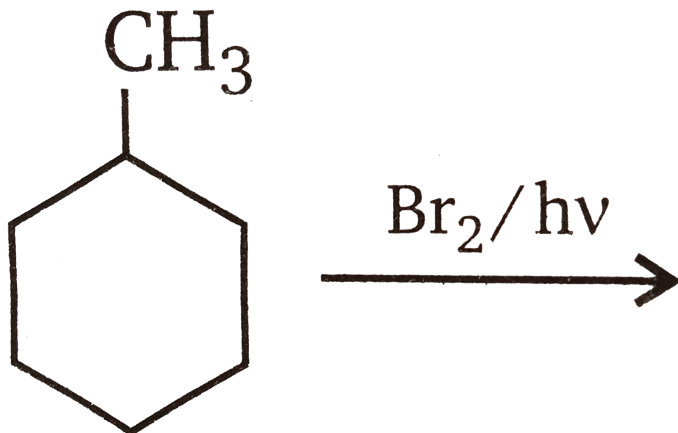
C. 3, 5

D. 2, 3, 4

Answer: C



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37.

Monobromo derivatives

The number of possible monobromo products is (excluding stereoisomers):

A. 4

B. 5

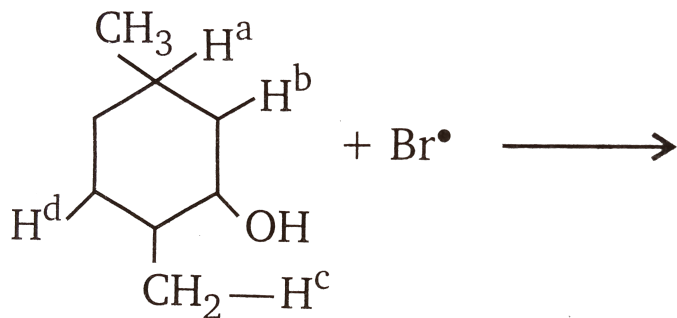
C. 8

D. 10

Answer: B



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Br^* will abstract which of the hydrogen most readily?

A. *a*

B. *b*

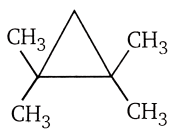
C. *c*

D. *d*

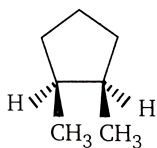
Answer: a

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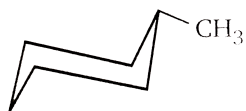
39. Arrange the following compounds in decreasing order of their heats of combustion:



(i)



(ii)



(iii)

A. (ii) > (ii) > (i)

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

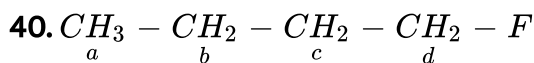
C. (iii) > (i) > (ii)

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

Answer: d



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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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41. On catalytic reduction with H_2/Pt how many alkenes will give n-butane?

A. 1

B. 2

C. 3

D. 4

Answer: c

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42. 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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43.

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

A. 5

B. 6

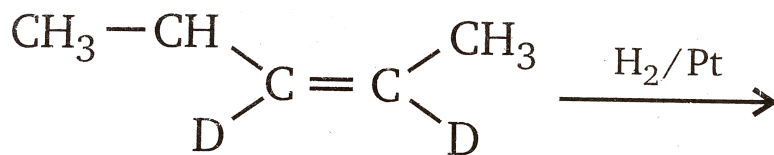
C. 7

D. 9

Answer: c

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44.



Product of the above reaction will be:

A. Racemic mixture

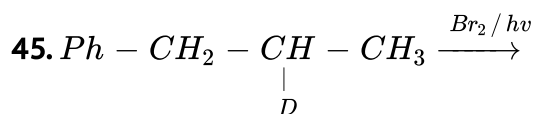
B. Diastereomers

C. Meso

D. Constitutinal isomers

Answer: a

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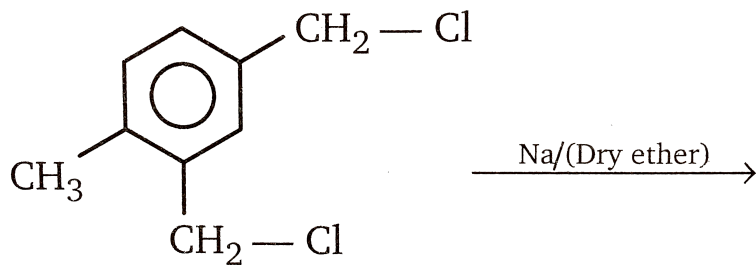


Product the above reactio will be :

- A. Diastereomers
- B. Racemic mixture
- C. Meso
- D. Constitutinal isomers

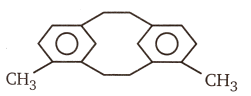
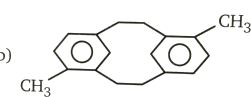
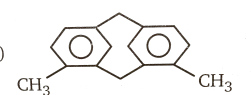
Answer: a

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46.

Product of the above Wurtz reaction is:

- (a) 
- A. 
- B. 
- C.

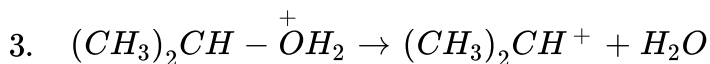
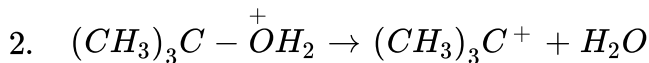
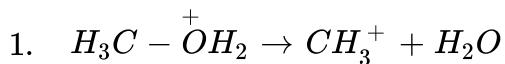
D. Both (a) and (b)

Answer: d



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



A. $1 < 2 < 3$

B. $2 < 3 < 1$

C. $1 < 3 < 2$

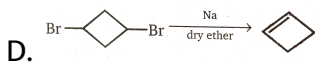
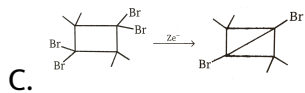
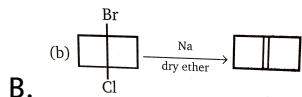
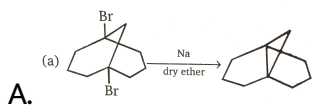
D. $2 < 1 < 3$

Answer: c



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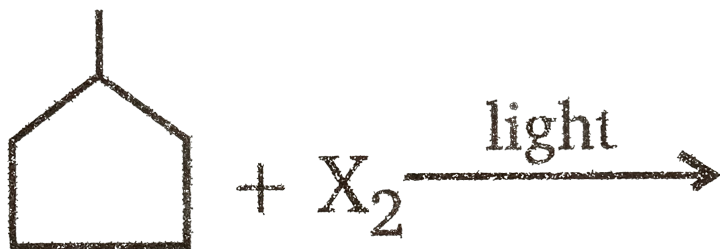
48. Which of the following does not represent major product of that reaction?



Answer: d

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



monohalogenation product

Light is involved in which step of the reaction:

A. Initiation

B. Termination only

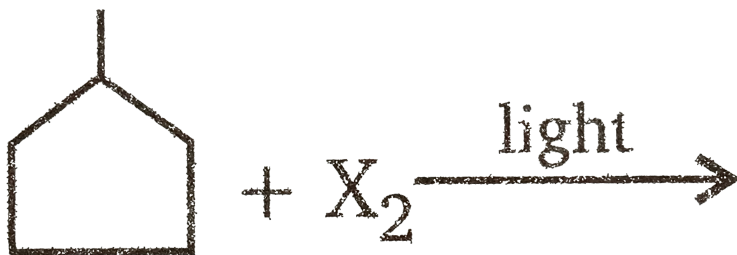
C. Propagation only

D. Propagation and Termination

Answer: a

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



monohalogenation product

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

A. F_2

B. Cl_2

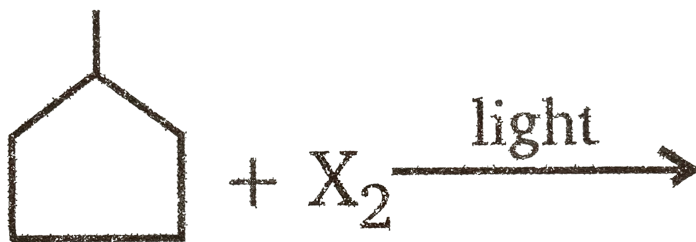
C. Br_2

D. I_2

Answer: c

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



monohalogenation product

How many monohalo derivatives are possible (excluding stereoisomers)?

A. 3

B. 4

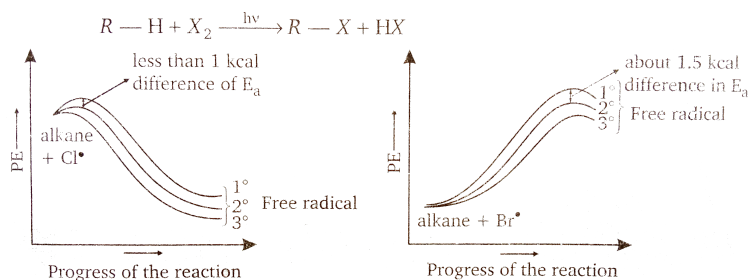
C. 5

D. 6

Answer: B

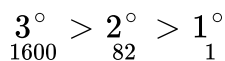
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52. Halogenation is a substitution reaction, where halogen replaces one or more hydrogens of hydrocarbon



Chlorine free radical make 1° , 2° , 3° 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 selective whereas chlorine is less selective and more reactive.

The relative rate of abstraction of hydrogen by Br^\bullet is



$$3^{\circ}_5 > 2^{\circ}_{3.8} > 1^{\circ}_1$$

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

A. Br_2

B. Cl_2

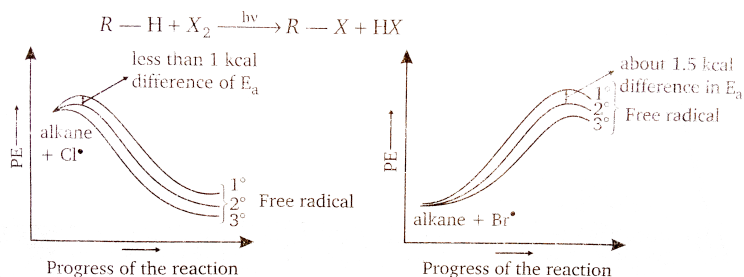
C. I_2

D. can't be predicted

Answer: b

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



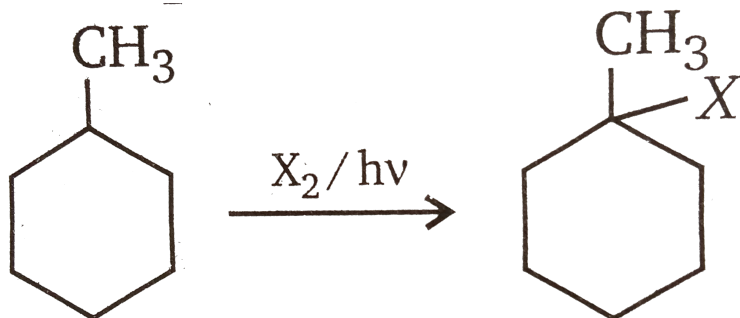
Chlorine free radical make 1° , 2° , 3° radicals with almost equal ease,

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

The relative rate of abstraction of hydrogen by Br^* is

$$\frac{3^\circ}{1600} > \frac{2^\circ}{82} > \frac{1^\circ}{1}$$

$$\frac{3^\circ}{5} > \frac{2^\circ}{3.8} > \frac{1^\circ}{1}$$



Above product will be obtained in better yield if X is

A. Cl_2

B. I_2

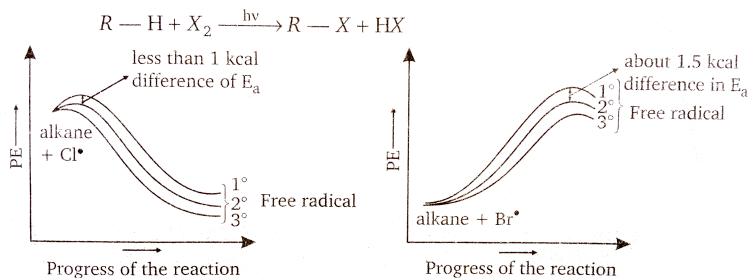
C. Br_2

D. can't be predicted

Answer: c



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

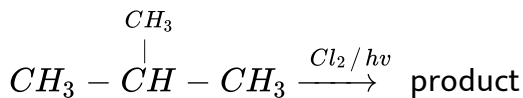


Chlorine free radical make 1° , 2° , 3° radicals with almost equal ease, whereas bromine free radicals have a clear preference for the formation of tertiary free radicals. So, bromine is less reactive, and more selective whereas chlorine is less selective and more reactive.

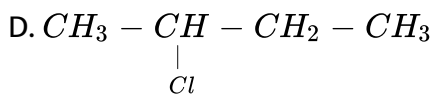
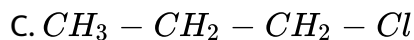
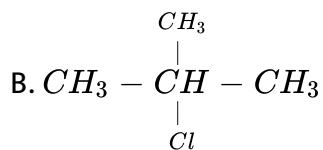
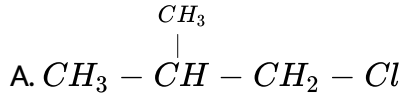
The relative rate of abstraction of hydrogen by Br^\bullet is

$$\frac{3^\circ}{1600} > \frac{2^\circ}{82} > \frac{1^\circ}{1}$$

$$\frac{3^\circ}{5} > \frac{2^\circ}{3.8} > \frac{1^\circ}{1}$$



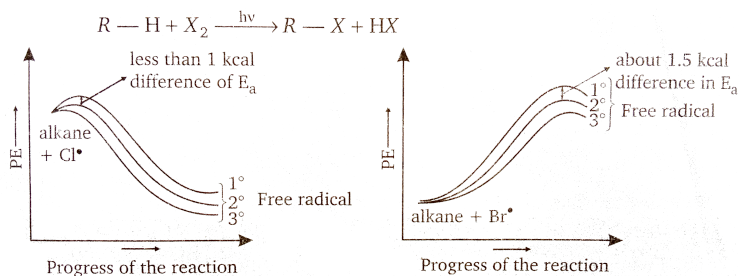
Major product in the above reactio is:



Answer: a

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



Chlorine free radical make 1[°], 2[°], 3[°] 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 selective whereas chlorine is less selective and more reactive.

The relative rate of abstraction of hydrogen by Br^* is

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

1600 82 1

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

5 3.8 1

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

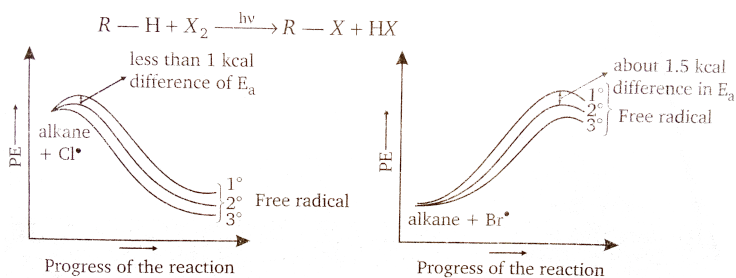
- A. n-pentane
- B. Iso-pentane
- C. 2-methyl-pentane
- D. 3-Methyl pentane

Answer: c



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

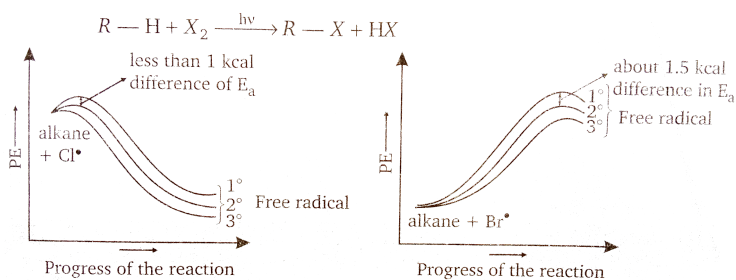


Chlorine free radical make 1° , 2° , 3° radicals with almost equal ease, whereas bromine free radicals have a clear preference for the formation of tertiary free radicals. So, bromine is less reactive, and more selective whereas chlorine is less selective and more reactive.

The relative rate of abstraction of hydrogen by Br^\bullet is

$$\frac{3^\circ}{1600} > \frac{2^\circ}{82} > \frac{1^\circ}{1}$$

$$\frac{3^\circ}{5} > \frac{2^\circ}{3.8} > \frac{1^\circ}{1}$$



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

A. 18 %

B. 82 %

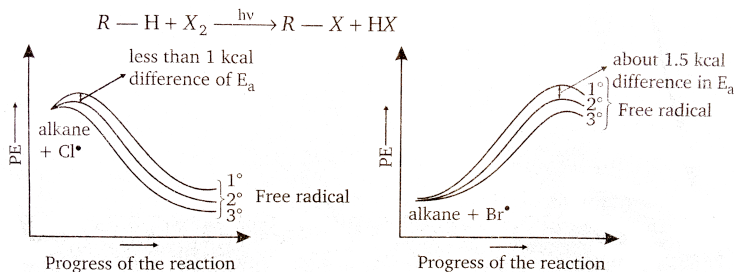
C. 90 %

D. 60 %

Answer: c

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



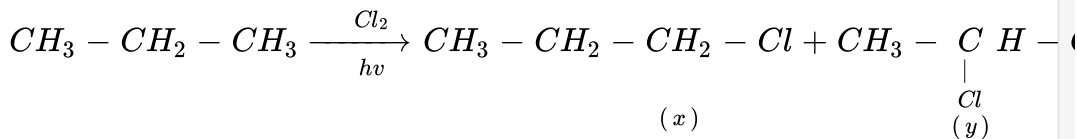
Chlorine free radical make 1° , 2° , 3° radicals with almost equal ease, whereas bromine free radicals have a clear preference for the formation of tertiary free radicals. So, bromine is less reactive, and more selective whereas chlorine is less selective and more reactive.

The relative rate of abstraction of hydrogen by Br^\bullet is

$$\frac{3^\circ}{1600} > \frac{2^\circ}{82} > \frac{1^\circ}{1}$$

$$\frac{3^\circ}{5} > \frac{2^\circ}{3.8} > \frac{1^\circ}{1}$$

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



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

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

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

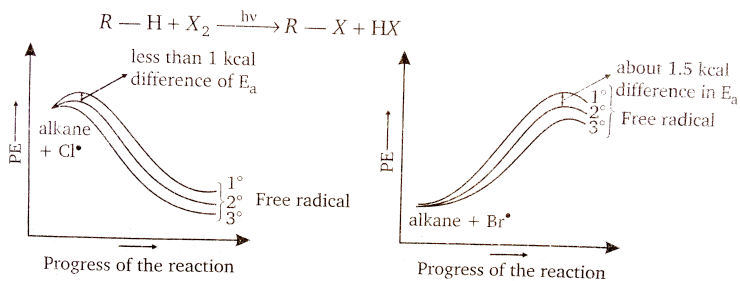
D. $\frac{1}{9}$

Answer: b



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



Chlorine free radical make 1° , 2° , 3° 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 selective whereas chlorine is less selective and more reactive.

The relative rate of abstraction of hydrogen by Br^\bullet is

$$\frac{3^\circ}{1600} > \frac{2^\circ}{82} > \frac{1^\circ}{1}$$

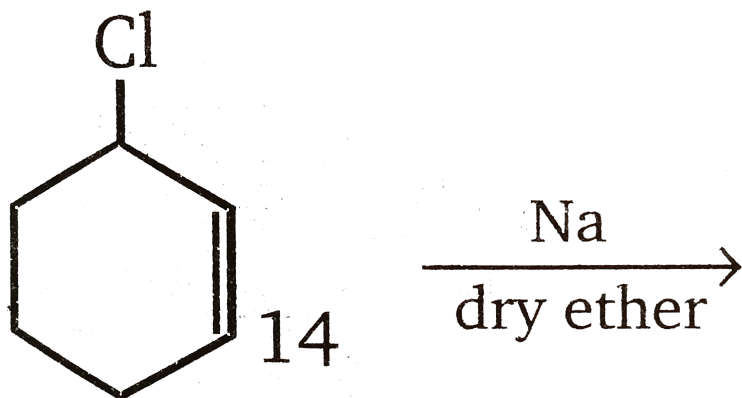
$$\frac{3^\circ}{5} > \frac{2^\circ}{3.8} > \frac{1^\circ}{1}$$

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

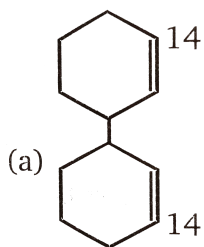
Answer: c

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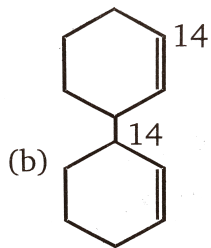


59.

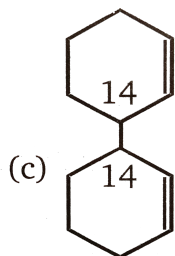
$\xrightarrow[\text{dry ether}]{Na}$ (A), product (A) is:



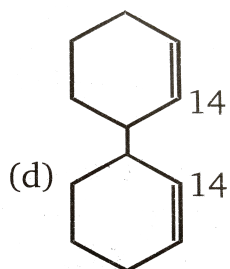
A.



B.



C.

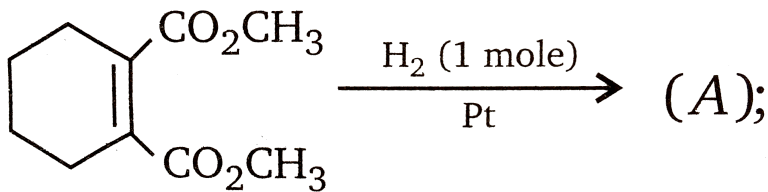


D.

Answer: a,b,c



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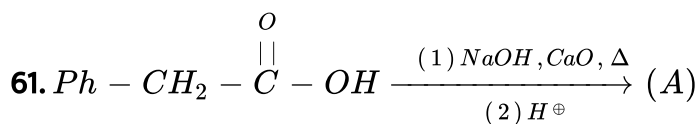


$\xrightarrow[\text{Pt}]{\text{H}_2 (1 \text{ mole})}$ (A), product (A) is:

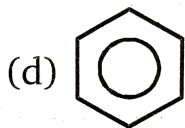
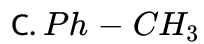
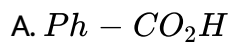
- A. Meso compound
- B. Racemic mixture
- C. Diastereomers
- D. Optically active

Answer: a

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Product (A) is:




D.

Answer: c



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

Column (I) Compound		Column (II)		Column (III)	
		Mono-chloro products (excluding stereoisomerism)		Monochloro products (including stereoisomerism)	
(a)		(p)	1	(w)	1
(b)	$\begin{array}{c} \text{CH}_3 - \text{CH} - \text{CH}_2 - \text{CH}_3 \\ \\ \text{CH}_3 \end{array}$	(q)	2	(x)	3
(c)	$\begin{array}{c} \text{CH}_3 \quad \text{CH}_3 \\ \quad \\ \text{CH}_3 - \text{C} - \text{C} - \text{CH}_3 \\ \quad \\ \text{CH}_3 \quad \text{CH}_3 \end{array}$	(r)	3	(y)	5
(d)	$\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CH}_3$	(s)	4	(z)	6

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63. Complete the following reaction

A.	$\text{R-2-chloropentane} \xrightarrow[h\nu]{\text{Cl}_2} \text{Optically active di-chloro products (P)}$
B.	$\boxed{\phantom{\text{R-2-chloropentane}}} \xrightarrow[h\nu]{\text{Cl}_2} \text{Optically active dichloro products (Q)}$
C.	$\text{R-2-chlorobutane} \xrightarrow[h\nu]{\text{Cl}_2} \text{Optically active di-chloro products (R)}$

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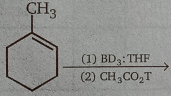

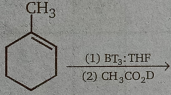

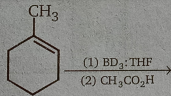

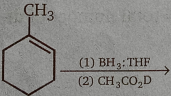

64. Match the column I and II

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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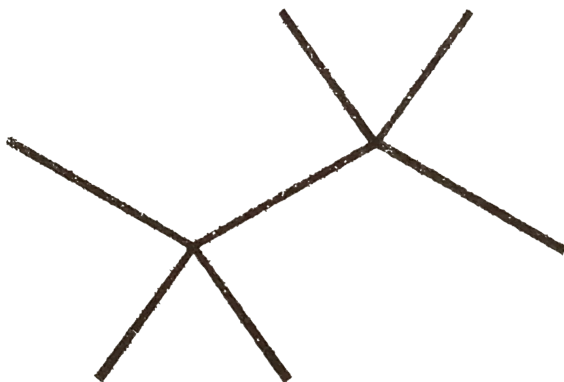
65. Match the column I and II

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

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66. 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

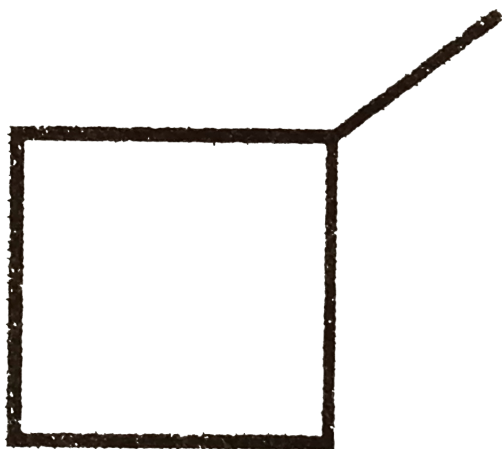
D. 4

Answer: a

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67. How many distinct monochlorinated products, (including stereoisomers) may be obtained when the alkane shown below is heated

in the presence of Cl_2 ?



A. 2

B. 4

C. 5

D. 6

Answer: c

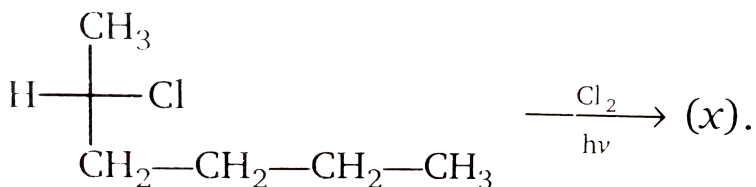


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68. Match the column I and II

Column (I)		Column (II)	
	Wurtz reaction		Number of dimerization product
(a)	$\text{CH}_3 - \text{Cl} \xrightarrow[\text{dry ether}]{\text{Na}} \rightarrow$	(p)	5
(b)	$\text{CH}_3 - \text{Cl} + \text{CH}_3 - \text{CH}_2 - \text{Cl} \xrightarrow[\text{dry ether}]{\text{Na}} \rightarrow$	(q)	6
(c)	$\text{CH}_3 - \text{Cl} + \text{CH}_3 - \text{CH}_2 - \text{Cl}$ $+ \text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{Cl} \xrightarrow[\text{dry ether}]{\text{Na}} \rightarrow$	(r)	3
(d)	$\text{H}_2\text{C} = \text{CH} - \text{CH} = \text{CH} - \text{CH}_2 - \text{Cl}$ $+ \text{CH}_3 - \text{CH}_2 - \text{Cl} \xrightarrow[\text{dry ether}]{\text{Na}} \rightarrow$	(s)	1

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S-2-chloro hexane

69.

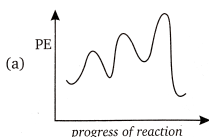
= total

number of di-chloro product s-2-chloro hexane

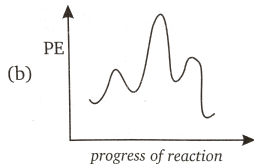
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Level 1 Q 1 To Q 30

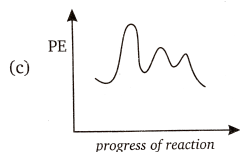
1. Draw an energy profile diagram for a three step reaction in which first step is slowest and last step is fastest. (Assume that reaction is exothermic)



A.



B.



C.

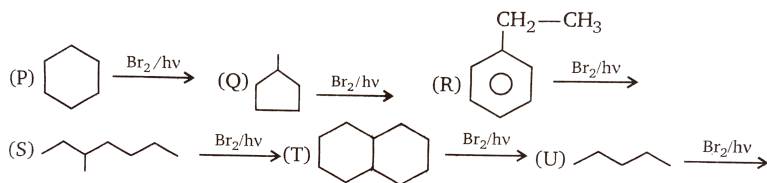
D. None of these

Answer: c

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Level 1 Q 31 To Q 50

1. 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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