CHEMISTRY

BOOKS - MS CHOUHAN CHEMISTRY (HINGLISH)

RADICAL REACTIONS

Solved Problem

1. Classify each of the following radicals as being $1^{\circ}, 2^{\circ},$ or 3°, and rank them in order of decreasing stability

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2. If the goal of a synthesis is to prepare chloromethane (CH_3Cl). Its formation can be maximized and the formation of $CH_2Cl_2, CHCl_3$ and CCl_4 minimized by using a large excess of methane in the reaction mixture. Explain why this is possible.

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3. When methane is chlorinated, among the products found are traces of chloroethane. How is it formed? Of what significance is its formation?

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4. An alkane with the formula C_5H_{12} undergoes chlorination to give only one product with the formula $C_5H_{11}Cl$. What is the structure of this alkane?

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5. Consider the bromination of butane using sufficient bromine to cause dibromination. After these reaction is over, you separate all the dibromobutane isomers by gas chromatography or by fractional distillation. How many fractions would you obtain, and what compounds would the individual fractions contain? Which if any of the fractions would be optically active?

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6. Show how phenylacetylene $(C_6H_5C \equiv CH)$ could be synthesized from ethylbenzene (phenylethane). Begin by writing a retrosynthetic analysis, and then write reactions needed for the synthesis.

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7. Which of the following alkanes would be produced in high yield in Wurtz reaction?

A. 

B. 

C. 

D. 

Answer: A

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8. Can methane (CH_4) be prepared by Wurtz reaction?

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9. Classify each of the following radicals as being $1^{\circ}, 2^{\circ}, \text{ or } 3^{\circ}$, and rank them in order of decreasing stability

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14. Show how phenylacetylene $(C_6H_5C \equiv CH)$ could be synthesized from ethylbenzene (phenylethane). Begin by writing a retrosynthetic analysis, and then write reactions needed for the synthesis.

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15. Which of the following alkanes would be produced in high yield in Wurtz reaction?

A. 

B. 

C. 

D. 

Answer: A

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16. Can methane (CH_4) be prepared by Wurtz reaction?

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Practice Problem

1. Benzylic radicals, due to the adjacent benzene ring, have even greater possibility for delocalization than allylic radicals. Draw contributing resonance structures that show this delocalization for the benzylic radical derived from methylbenzene.

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Additional Objective Questions Single Correct Choice Type

1. A mixture of ethyl iodide and n-propyl iodide is subjected to Wurtz reaction. The hydrocarbon that will not be formed is

A. n-butane

B. n-propane

C. n-pentane

D. n-hexane

Answer: B

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2. In the presence of peroxide, hydrogen chloride and hydrogen iodide do not give anti-Markovnikov addition to alkene because

A. both are highly ionic

B. one is oxidizing and the other is reducing

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

D. All the steps are exothermic in both cases.

Answer: C

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3. Which of the following is the major product of the chlorination of methane if a large excess of methane is used?

A. CH_3Cl

B. CH_2Cl_2

C. CH_3CH_2Cl

D. CCl_4

Answer: A

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4. Consider the following reactions

$$H_3C - \underset{D}{CH} - \underset{CH_3}{CH} - CH_3 + \dot{B}r \rightarrow X + HBr$$

Identify the structure of the major product X.

A. $H_3C - \underset{D}{CH} - \underset{CH_3}{CH} - C\dot{H}_2$

B. $H_3C - \underset{D}{CH} - \underset{CH_3}{\dot{C}} - CH_3$

C. $H_3C - \underset{D}{\dot{C}} - \underset{CH_3}{CH} - CH_3$

D. $H_3C - \dot{C}H - \underset{CH_2}{CH} - CH_3$

Answer: B

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5. Which of the following acids adds to propene in the pressence of peroxide to give anti-Markovnikov product?

A. HF

B. HCl

C. HBr

D. HI

Answer: C

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6. When 1-bromo-3-chlorocylobutane is treated with two equivalents fo Na, in the presence of ether which of the following will be formed?

A. 

B. 

C. 

D. 

Answer: D

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7. The number of possible enantiomeric pairs that can be produced during monochlorination of 2-methyl butane is

A. 2

B. 3

C. 4

D. 1

Answer: A

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8. In the radical chlorination of methane, one propagation step in shown as $Cl\cdot + CH_4 \rightarrow HCl + \cdot CH_3$

Why do we eliminate the possibility that this step goes as shown below?

$Cl\cdot + CH_4 \rightarrow CH_3Cl + H\cdot$

A. Because in the next propagation step, $H\cdot$ would have to react with Cl_2 to form $Cl\cdot$ and $HCl\cdot$, this reaction is not feasible.

B. Because this alternative step has a more endothermic ΔH° than the first

C. Because free hydrogen atoms cannot exist

D. Because this alternative step is not consistent with the high photochemical efficiency of this reaction

Answer: B

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9. On mixing a certain alkane with chlorine and irradiating it with ultraviolet light, it forms only one monochloroalkane. This alkane could be

A. propane

B. pentane

C. isopentane

D. neopentane

Answer: D

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10. In which of the following reactions, enantiomer is formed?

A. 

B. 

C. 

D. 

Answer: B

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11. Choose the incorrect statement about the following two reactions

(i)

$$CH_3-\overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}}-H+\cdot Cl\rightarrow CH_3-\overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}}\cdot+H-Cl\quad \Delta H^\circ=-2$$

kcal/mol

(ii)

$$CH_3 - \overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}} - H + \cdot Br \rightarrow CH_3 - \overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}} \cdot + H - Br \quad \Delta H^\circ = +13$$

kcal/mol

A. Reaction (i) would be expected to be faster than reaction (ii)

B. According to Hammound's postulate the transition state of reaction (ii) resembles the product

C. According to Hammound's postulate the transition state of reaction (i) resembles the reactant

D. The $C - H$ bond of reaction (ii) is completely broken in the transition state.

Answer: D

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12. A mixture of ethyl iodide and n-propyl iodide is subjected to Wurtz reaction. The hydrocarbon that will not be formed is

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13. In the presence of peroxide, hydrogen chloride and hydrogen iodide do not give anti-Markovnikov addition to alkene because

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14. Which of the following is the major product of the chlorination of methane if a large excess of methane is used?

A. CH_3Cl

B. CH_2Cl_2

C. CH_3CH_2Cl

D. CCl_4

Answer: A

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15. Consider the following reactions

$$H_3C - \underset{D}{CH} - \underset{CH_3}{CH} - CH_3 + \dot{B}r \rightarrow X + HBr$$

Identify the structure of the major product X.

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B. $H_3C - \underset{D}{CH} - \underset{CH_3}{\dot{C}} - CH_3$

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Answer: B

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16. Which of the following acids adds to propene in the pressence of peroxide to give anti-Markovnikov product?

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C. Because free hydrogen atoms cannot exist

D. Because this alternative step is not consistent with the high photochemical efficiency of this reaction

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20. On mixing a certain alkane with chlorine and irradiating it with ultraviolet light, it forms only one monochloroalkane. This alkane could be

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B. pentane

C. isopentane

D. neopentane

Answer: D

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21. In which of the following reactions, enantiomer is formed?

A. 

B. 

C. 

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Answer: B

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22. Choose the incorrect statement about the following two reactions

(i)

$$CH_3-\overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}}-H+\cdot Cl\rightarrow CH_3-\overset{\overset{H}{|}}{\underset{\underset{H}{|}}{C}}\cdot+H-Cl\quad \Delta H^\circ=-2$$

kcal/mol

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Additional Objective Questions Integer Type

1. How many chiral compounds are possible on monochlorination of 2-methyl butane?

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2. n-Pentane $\xrightarrow[h\upsilon]{Cl_2}(A)$ The number of monochloro products (including stereoisoers) for the above reaction is

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Additional Objective Questions Matrix Match Type

1. 

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2. 

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3. 

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4. 

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5. 

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6. 

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