Chapter 9 Reaction of Alkanes:

Alkanes have low reactivity because ________________________________
thus they are called ______________

Alkanes will react with ______________ and ______________

Not ______________ because ________________________________

Not ______________ because ________________________________

(see page 345 to see actual $\Delta H$ values)

Mechanism of Chlorination and Bromination:

Initiation Step:

Propagation Steps:

Termination Steps:
9.3 Factors that Determine Product Distribution

Radical Stability:

Relative rates:

Bromination is more ___________________________ than chlorination.

Reactivity-Selectivity Principle:

**Prediction Probablity:**

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Figure 9.1
(a) Reaction coordinate diagrams for the formation of primary, secondary, and tertiary alkyl radicals as a result of abstraction of a hydrogen atom by a chlorine radical. The transition states have relatively little radical character because they resemble the reactants.
(b) Reaction coordinate diagrams for the formation of primary, secondary, and tertiary alkyl radicals as a result of abstraction of a hydrogen atom by a bromine radical. The transition states have a relatively high degree of radical character because they resemble the products.

9.5 Radical Substitution of Benzylic and Allylic Hydrogens:
9.6 Stereochemistry

If you make a new asymmetric carbon, you will get a mixture of _______ and _______.

If there was an asymmetric carbon already and you make a new asymmetric carbon, you get ___________________________

Final Review
Sunday
3pm!!
Practice finals handed out at Review
Do lots of book problems.
Call me if you have questions.
Good luck - you'll do great.

 liked
Chapter 9 Reaction of Alkanes:

Alkanes have low reactivity because they have strong C bond - no Ti bonds thus they are called stable.

Alkanes will react with Br radicals and Cl radicals.

Not F* because too reactive - blow up

Not I* because not reactive enough + Δ H

(see page 345 to see actual Δ H values)

Mechanism of Chlorination and Bromination:

\[ \text{CH}_4 + \text{Br}_2 \xrightarrow{\Delta \text{or} \text{hv}} \text{CH}_3\text{Cl} + \text{HCl} \]

Initiation Step:

\[ \text{Br} \xrightarrow{\text{hv}} \text{Br}^* \quad \text{homolytic bond cleavage} \]

Propagation Steps:

\[ \text{Br}^* + \text{CH}_3\text{C}-\text{H} \rightarrow \text{H}_2\text{C}^* + \text{HBr} \]

\[ \text{H}_2\text{C}^* + \text{Br} \rightarrow \text{H}_3\text{C}-\text{Br} + \text{Br}^* \]

Termination Steps:

\[ \text{Br}^* + \text{Br} \rightarrow \text{Br}_2 \]

\[ \text{CH}_3\cdot + \text{CH}_3 \rightarrow \text{CH}_3\cdot \text{CH}_3 \]

\[ \text{CH}_3\cdot + \text{Br} \rightarrow \text{CH}_2\cdot \text{Br} \]
9.3 Factors that Determine Product Distribution

Radical Stability:

\[ \text{Benzyl} > \text{Methyl} > \text{Vinyl} \]

Relative rates:

\[ \frac{Br}{Cl} \]

Bromination is more highly regioselective than chlorination.

Reactivity-Selectivity Principle: the greater the reactivity of a species, the less selective it would be.

Prediction Probability:

9.5 Radical Substitution of Benzylic and Allylic Hydrogens:
\[
\begin{align*}
\text{H} + \text{Br}_2 & \rightarrow \text{Br} \\
\text{CH}_3\text{CH}_2\text{CH}_3 + \text{Br}_2 & \rightarrow \text{CH}_3\text{-CH}-\text{CH}_3 \\
\text{CH}_3\text{-CH}-\text{CH}_3 + \text{Cl}_2 & \rightarrow \text{CH}_3\text{Cl}-\text{CH}-\text{CH}_3 \\
\text{CH}_3\text{Cl}-\text{CH}-\text{CH}_3 + \text{Br} & \rightarrow \text{CH}_3\text{Cl}-\text{CH}-\text{CH}_3 \\
\text{Cl} + \text{Cl}_2 & \rightarrow \text{Cl} \\
\text{Cl} \end{align*}
\]
If you make a new asymmetric carbon, you will get a mixture of R and S.

If there was an symmetric carbon already and you make a new asymmetric carbon, you get a pair of diastereomers.