Name: KEY

Chapter 3 Test Review

Vocabulary (3 Questions)

Term	Definition	Example
Alkene	An organic molecule with at least 1 dble bond	C_nH_{2n} (IF 1 DBLE BOND)
Alkyne	An organic molecule with at least 1 triple bond	C_nH_{2n-2} (IF 1 Triple Bond).
Conjugated	~~Bon~~ alternating single & multiple bonds	C=C-C=C-C≡C
Cumulated	Double bonds right next to each other	C=C=C
Non-Conjugated/Isolated	multiple bonds separated by more than 1 single bond	C=C-C-C≡C

Naming Alkenes/Alkynes (6 Questions)

1. $CH_3CH_2=CH_2=CH_3$

2-butene

2. $CH_3CH_2CH_2CH=CH_2$

1-pentene

3. $CH_3CH_2CH_2C\equiv CCH_3$

2-hexyne

4. CH3CH2≡CH2CH2C≡CH

1,4-hexadiyne

5. $CH_3=CH_2CH_2CH_2C\equiv CH$

hex-1-ene-5-yne

6. 4-Nonyne

C-C-C-C≡C-C-C-C-C

7. 3-Hexene

C-C-C=C-C-C

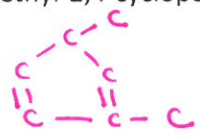
8. Why is 6-decene not possible? What would this molecule be called? Draw it.

C-C-C-C-C-C=C-C-C-C
4 3 2 1

4-decene

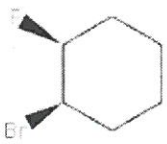
count to give the double bond the lowest #.

9. Draw 1,3-dimethyl-2,4-cyclopentadiene



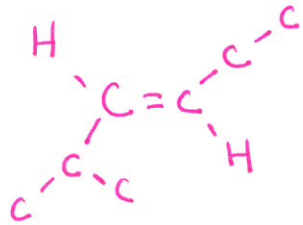
Cis/Trans (1 Question)

1. Name the molecule below.

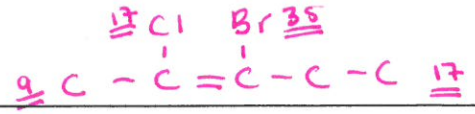


cis-1-bromo-2-fluoro-cyclohexane

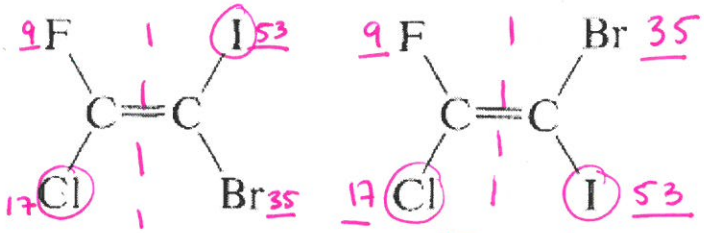
2. Draw the molecule trans-2-methyl-3-hexene



E/Z Naming (2 Questions)



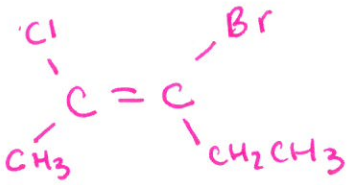
1. Name the molecules below.



E - 1-bromo-2-chloro-2-fluoro-1-iodo-ethene

Z - 1-bromo-2-chloro-2-fluoro-1-iodo-ethene

2. Draw (Z)-3-bromo-2-chloro-2-pentene

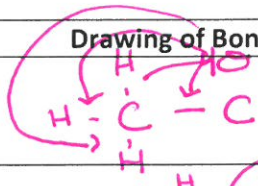
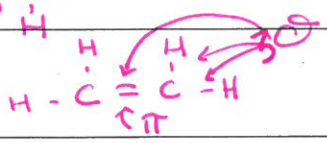
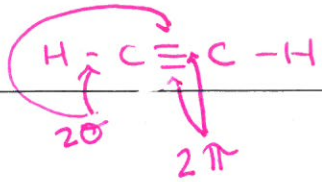


Bond Chart (2 Questions)

Features	Alkene	Alkyne
Rotation	Limited	None
Bond Length	Medium	Long
Bond Angle	120°	180°
Geometry	Trigonal Planar	Linear

Orbitals and Bonds (2 Questions)

Type of Bond	What types of Organic Molecules contain these bonds?	Strength of bond
Sigma	Alkanes, Alkenes, + Alkynes	Strongest
Pi	Alkenes + Alkynes	Weaker

Organic Molecule	Type of Bond Hybridization	Drawing of Bond Types Present
Alkane	sp^3	
Alkene	sp^2	
Alkyne	sp	

Distillation (2 Questions)

1. What occurs during distillation? A mixture of alcohol is separated into different concentrations/fractions at different temperatures

2. If you have high weight oil, where will it condense? fall to the bottom

3. If you have low weight oil, where will it condense? boil off 1st & rise to the top

4. As temperature increases throughout the distillation process, are you seeing more alcohol or water?

How do you know? Water. The boiling point of water is 100°C while the boiling point of ethanol is much lower around 78.5°C.

Cracking (1 Question)

1. What molecules do you begin with in the cracking process? Long alkanes

2. What two molecules do you end with? A shorter alkane & a alkene

3. Crack $C_{12}H_{26}$

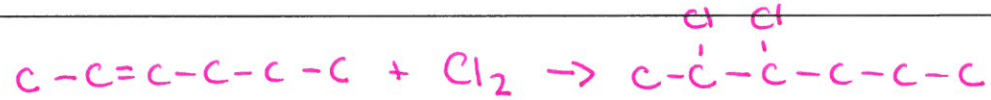
C_nH_{2n+2} alkane C_6H_{14}

C_nH_{2n} alkene C_6H_{12}

Alkene Reactions (5 Questions)

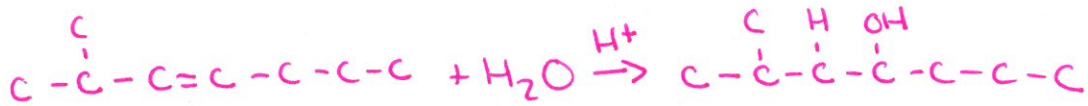
1. Halogen Addition Reactions:

2 hexene +Cl_2



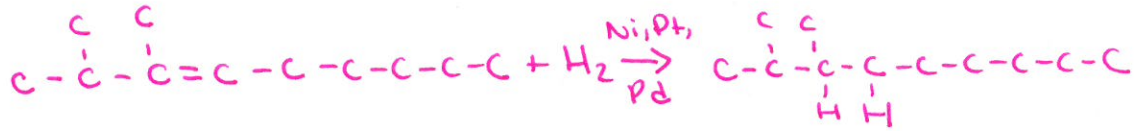
2. Hydration Reactions

2-methyl-3-heptene +H_2O



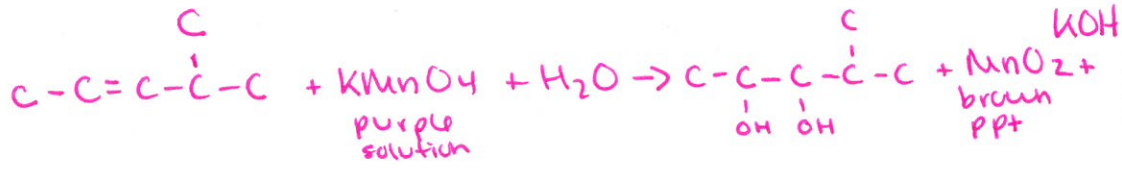
3. Hydrogenation Reactions

2,3-dimethyl-3-nonene + H_2



4. Oxidation Reactions

4-methyl-2-pentene + $KMnO_4$



5. Ozonolysis

4-methyl-2-pentene

Markovinokoff's Rule (3 Questions)

1. Explain Markovnikoff's Rule - The most electropositive (electrophile) element portion of the reagent (typically H) bonds to the carbon with the greater number of Hydrogen.

2. Did any of the problems from the previous section of alkene reactions display a need for Markovnikoff's rule? If yes, explain which one(s). no. All C had equal amounts of hydrogen when encountering an unsummetrical reagent such as H_2O.

Carbocations (1 Question)

1. Determine the type of carbocation in each problem below.

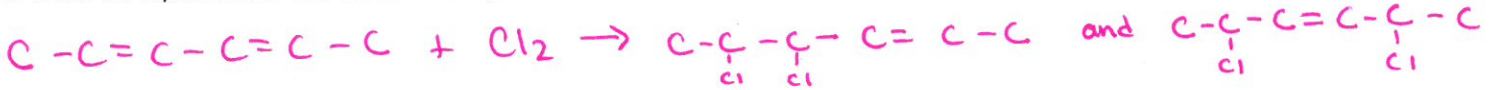
- $CH3{=}CH2CH\overset{+}{C}H2C{\equiv}CH$ 2°
- $\overset{+}{C}H2CH2CH2CH2C{\equiv}CH$ 1°

2. Which is more stable? Why? 2°, it is connected to the most carbons allowing the carbon with more H to accept the electrophile.

Conjugated Diene (3 Questions)

1 Mole

1. Write an equation for the reaction of 2,4-hexadiene and 1 mole of chlorine.



2. Show both possible carbocations including resonance structures for 2,4-hexadiene and 1 mole of chlorine.

2 Moles

1. Write an equation for the reaction of 2,4-hexadiene and 2 moles of chlorine.

Alkyne Additions (1 Question)

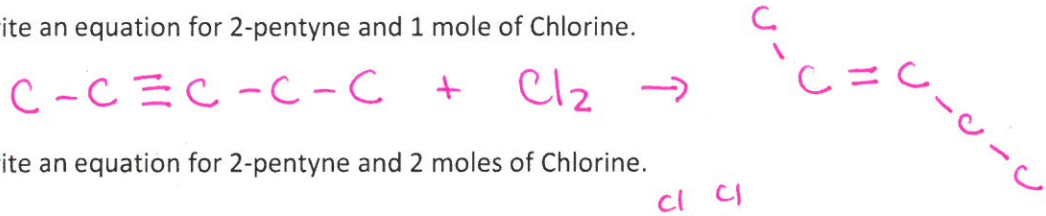
Symmetrical

1. What type of geometric isomer is seen in a normal symmetrical addition to produce an alkene? TRANS

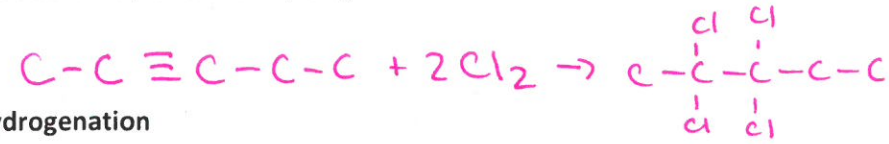
2. How many steps are required to make an alkyne an alkene? 1

3. How many steps are required to make an alkyne an alkane? 2

4. Write an equation for 2-pentyne and 1 mole of Chlorine.



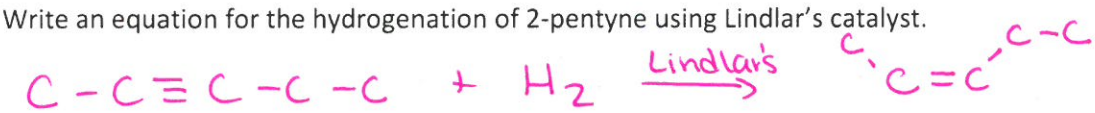
5. Write an equation for 2-pentyne and 2 moles of Chlorine.



Hydrogenation

1. What type of geometric isomer is seen in a hydrogenation of an alkyne to produce an alkene? CIS

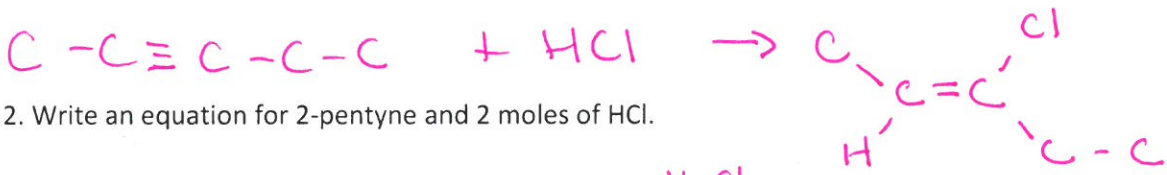
2. Write an equation for the hydrogenation of 2-pentyne using Lindlar's catalyst.



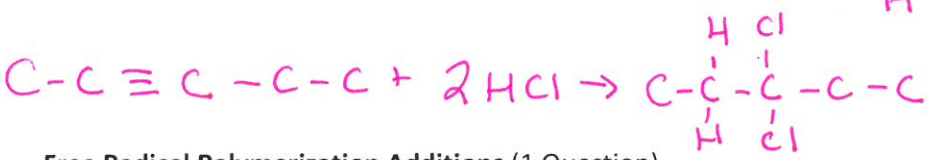
3. Write an equation for the hydrogenation of 2-pentyne using Ni, Pd, and Pt as catalysts.

Unsymmetrical

1. Write an equation for 2-pentyne and 1 mole of HCl.



2. Write an equation for 2-pentyne and 2 moles of HCl.



Free Radical Polymerization Additions (1 Question)

1. What are the three steps of free radical polymerization?

① Initiation
② Propogation
③ Termination.

2. What makes this free radical process different from other radical driven reactions we have already examined?

Termination is uncertain and depends on the amount of the alkene you start with.

3. Show me the polymerization steps for C-C-O-O-C-C and ethene.

Initiation:

propogation: