

# Mini Quizzes

Week 2 — Chapter 15

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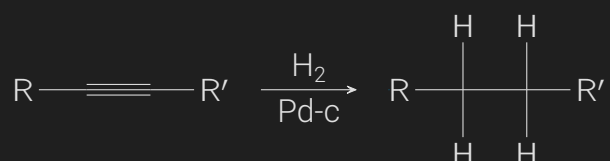
Week 1 — Chapter 14

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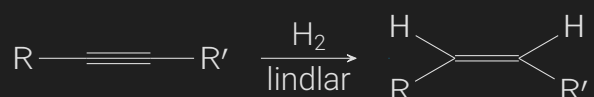
## Week 2 – Chapter 15

1. The reagent needed to convert 2-butyne to cis-2-butene is

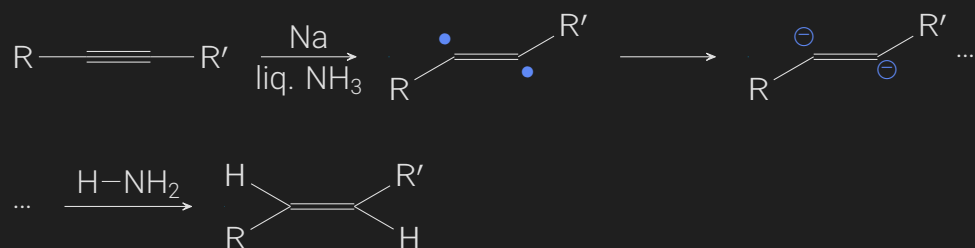
- $\text{H}_2/\text{Pd}-\text{C}$
- $\text{Li}/\text{NH}_3$
- $\text{Na}/\text{NH}_3$
- $\text{H}_2/\text{LindlarCatalyst}$
- Complete hydrogenation of an alkyne:



- Alkyne  $\rightarrow$  cis-alkene; use of lindlar catalyst (Pd-c poisoned with lead) limits further reduction by controlling hydrogens available:



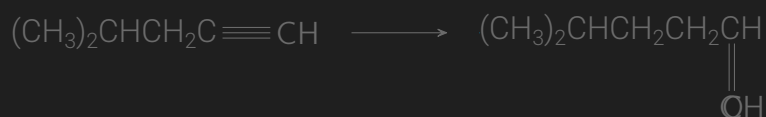
- Alkyne  $\rightarrow$  trans-alkene; using generation of free radicals (•, single electron) that pair up with another electron generated by the dissociation of  $\text{Na} \rightarrow \text{Na}^+ + \text{e}^-$  to create a free pair of electrons that than receive a hydrogen from  $\text{NH}_3$ :



2. A mixture of 1-heptyne, 2-heptyne, and 3-heptyne was hydrogenated in the presence of a palladium catalyst until hydrogen uptake stopped. If one assumes that the hydrogenation went to completion for all the reactants present in the mixture, how many distinct seven-carbon isomers were produced?

- Only 1
- 2
- 4
- 6
- $\text{H}_2/\text{Pd}-\text{c}$  (palladium catalyst) generates completely saturated alkenes, thus the location of the double bond in a heptyne will make no difference overall.

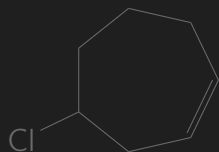
3. Give the best reagents for the reaction



- $\text{H}_2\text{O}$ ,  $\text{H}_2\text{OSO}_4$ ,  $\text{HgSO}_4$
  - $\text{BH}_3$ ,  $\text{H}_2\text{O}_2$ ,  $\text{NaOH}$
  - $\text{K}_2\text{Cr}_2\text{O}_7$
  - $\text{H}_2$ , Lindlar Catalyst
  - First, this is a hydration reaction, so that limits just the first two options.
  - Hydration using  $\text{H}_2\text{O}$  and  $\text{H}_2\text{OSO}_4$  or  $\text{HgSO}_4$  does have difference, but both follow Markovnikov's rule and end produce internal enols and thus internal ketones.
  - Hydroboration-oxidation reaction follows anti-Markovnikov rule and produces a terminal enol and thus an aldehyde, which is the desired product.
4. Which of the alkyne addition reactions below involves an enol intermediate?
- Hydroboration/oxidation
  - dil.  $\text{H}_2\text{SO}_4$  in  $\text{HgSO}_4$
  - Hydrogenation
  - Both hydroboration/oxidation and dil.  $\text{H}_2\text{SO}_4$  in  $\text{HgSO}_4$
  - See question three, both hydroboration/oxidation and dil.  $\text{H}_2\text{SO}_4$  in  $\text{HgSO}_4$  are used in hydration, which have enol intermediates.
  - Hydrogenation only has to do with adding hydrogens to saturate the alkyne through elimination reactions, which question one covers.

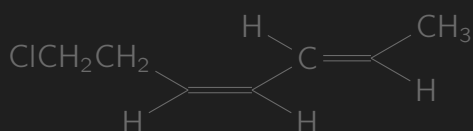
## Week 1 – Chapter 14

1. Name the structure:



- 1-chloro-3-cycloheptene
- 4-chloro-1-cycloheptene
- 4-chloro-1-cyclohexene
- 6-chloro-1-cycloheptene
- When numbering the parent chain, the double bond should receive the lowest number possible; **k=1**
  - Note: define the location *k* of the double bond as being the number of its first carbon, not at the end.
- The locant (*k*) of the double bond should be placed right before the suffix of “ene,” though, it was previously recommended before the parent (both are acceptable), e.g., 2-pentene = pent-2-ene; **1-cycloheptene**
- Name and the side groups (other than hydrogen) according to the appropriate rules; **chloro**
- Define the position of each side group as the number of the chain carbon it is attached to; **4-**

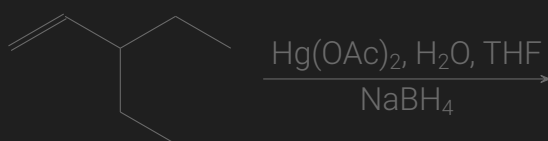
2. Name the structure:



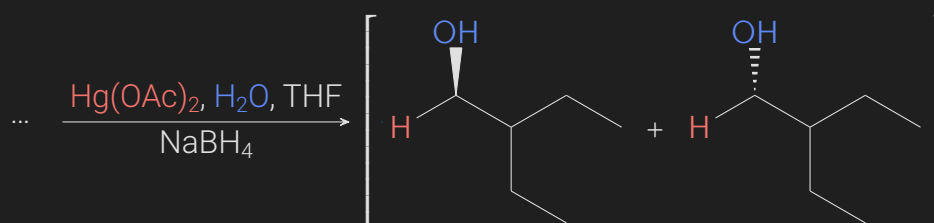
- (2E,4E)-7-chloro-2,4-heptadiene
- (2Z,4Z)-7-chloro-2,4-heptadiene
- (2Z,4E)-7-chloro-2,4-heptadiene
- (2E,4Z)-7-chloro-2,4-heptadiene
- **E-Z notation:** recommended instead of *cis* and *trans* in order to account for cases that has more than two different groups attached to the double bond by first determining the priority using the Cahn-Ingold-Prelog System.
  - **E, entgegen, “opposite”.**

- Z, zusammen, "together"; "on ze zame zide."
- When numbering the parent chain, the double bond should receive the lowest number possible;  $k=2$
- The two highest priority groups are on opposite sides; 2E
- There is more than one double bond;  $k_2 = 4$
- The two highest priority groups are on same side; 4Z

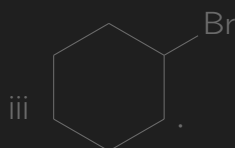
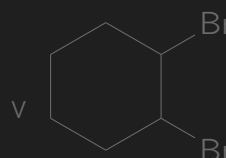
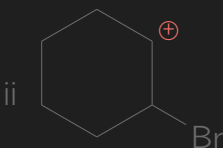
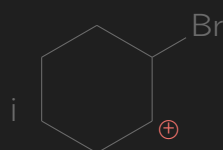
3. How many stereoisomeric product(s) do you get in the reaction below.



- Oxymercuration-demercuration reactions follow Markovnikov's rule, i.e.,  $\text{H}^+$  is added to the carbon with the greatest number of hydrogen atoms while the  $\text{X}^-$  component is added to the carbon with the fewest hydrogen atoms.
- Drawing the intermediate is not necessary, and no chiral centers are found in the products:



4. Which reaction intermediate is formed when  $\text{Br}_2/\text{CCl}_4$  reacts with cyclohexene?



- **Halogenation:** a reaction that involves the addition of one or more halogens to a compound or material.

- The addition of halogens to alkenes proceeds via **intermediate halonium ions**.
- **Halonium ion**: any onium ion containing a halogen atom carrying a positive charge. This cation has the general structure:  $R \cdot + X \cdot R'$
- **Onium ion**: a **cation** formally obtained by the protonation of mononuclear parent hydride of a pnictogen (group 15 of the periodic table), chalcogen (group 16), or halogen (group 17);  $Br^{\oplus}$  in our case.