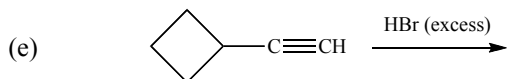
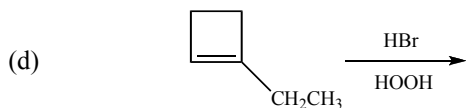
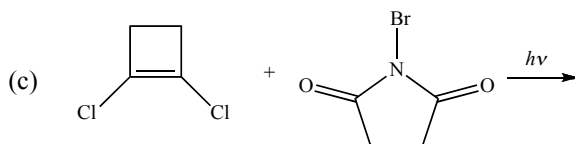
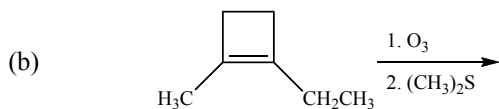
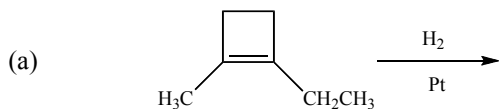
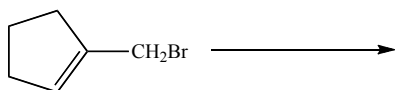


1. (15) Write the major product(s) of the following reactions. If no reaction occurs write "NR." Do not include any mechanism details.



2. (2) Complete this sentence by adding **no more than twenty words**: A significant difference between the E1 and E2 mechanisms is...

3. (4) Use the molecule below to illustrate a hydroboration-oxidation reaction by writing the appropriate reactants and product(s).

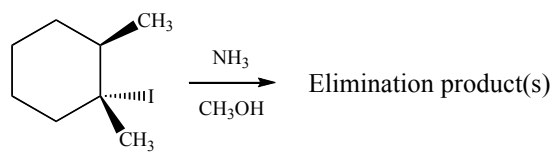


4. (2) Question 3's reaction stereochemistry is (circle one): Syn addition Anti addition A mixture

5. (2) Question 3's reaction regioselectivity is (circle one):

Markovnikov Anti-Markovnikov A mixture None of these

Questions 6–10 refer to the elimination reaction between molecule **A**, ammonia, and methanol:



Molecule **A**

6. (7) Assuming molecule **A** reacts with ammonia and methanol by an E2 process, write the reaction mechanism and the major product. Include a clear three-dimensional drawing of the transition state structure for the slowest step of this mechanism.
7. (1) Which describes the major product of question 6? Circle one: Zaitsev Hofmann Markovnikov
8. (2) Which describes the alkene of question 6? Circle all that apply: cis trans *E* *Z*
9. (9) Assuming molecule **A** reacts with ammonia and methanol by an E1 process, write the reaction mechanism and the major product. Include a clear three-dimensional drawing of the transition state structure for the slowest step of this mechanism.
10. (4) Circle the more likely mechanism for the reaction of molecule **A** with NH₃ and CH₃OH: E2 E1

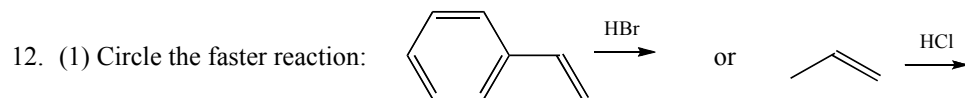
Complete this explanation by adding **up to thirty words**. This is the most likely mechanism for this reaction because...

-
11. (4) Complete each statement by adding **up to twenty words** in each case.

(a) A significant similarity between the reactions of alkenes and alkynes is....

(b) A significant difference between the reactions of alkenes and alkynes is...

Questions 12–15 refer to a comparison between the reactions of styrene ($\text{PhCH}=\text{CH}_2$) with HBr versus propene ($\text{CH}_3\text{CH}=\text{CH}_2$) and HCl.



13. (4) By adding *up to twenty words* in each case, complete two distinctly different reasons for your choice of faster reaction in question 12.

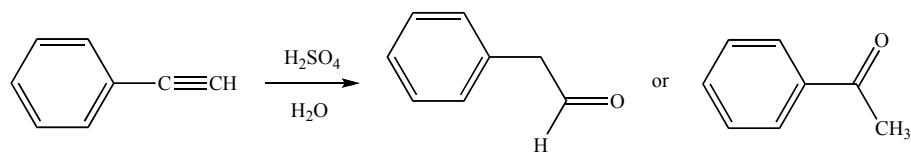
Reason #1: This is the faster reaction because...

Reason #2: This is the faster reaction because...

14. (7) Write the major product for the faster reaction you selected in question 12, and the mechanism for its formation.

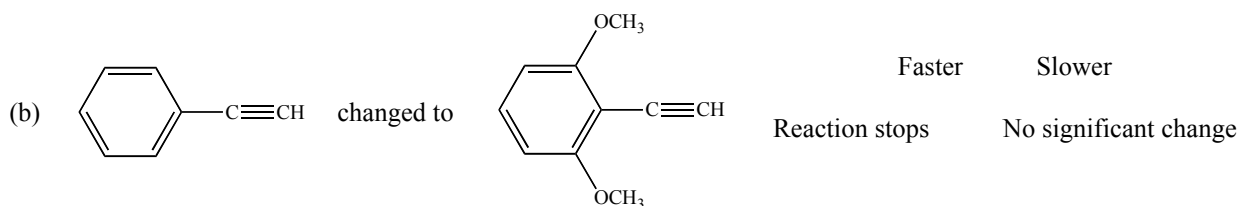
15. (1) Does the faster reaction obey Markovnikov's Rule? Circle one: Yes No

16. (10) Circle the major product of the following reaction, and write a mechanism for its formation.

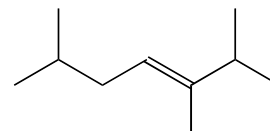


17. (4) Circle the effect of the following changes on the rate of the reaction shown in question 16.

(a) H_2SO_4 changed to H_2O : Faster Slower Reaction stops No significant change

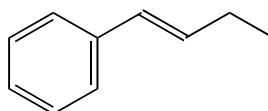


18. (2) On the following molecule, draw in the hydrogen atoms whose C-H bond has the lowest bond dissociation enthalpy (BDE):



19. (9) In lecture we learned that radicals have three common reaction fates. Write the names of these three radical fates, and illustrate each **using only the molecules shown below**. Include the corresponding curved arrows. If the fate can occur more than one way, write only the most likely pathway. **Hint: Initiation is not a radical fate.**

Molecules to illustrate radical fates:



and $\text{HO}\cdot$

Name of radical fate #1: _____

Illustration:

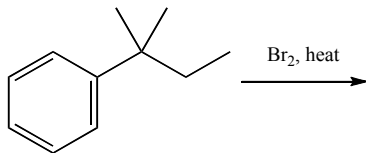
Name of radical fate #2: _____

Illustration:

Name of radical fate #3: _____

Illustration:

20. (6) Write the major organic product of the following reaction, plus the mechanism for its formation.



21. (2) Complete this sentence by adding ***no more than five words***: The main phenomenon that allows a small quantity of a CFC to destroy a large quantity of ozone in the ozone layer is...
22. (2) Which question or answer on part A of this exam includes an enol? Write a number (and letter if the question has multiple parts): _____. *If there are no enols on part A of this exam write "no enol" in the blank.*