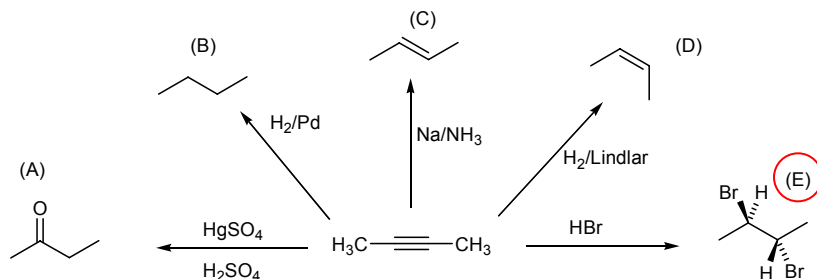
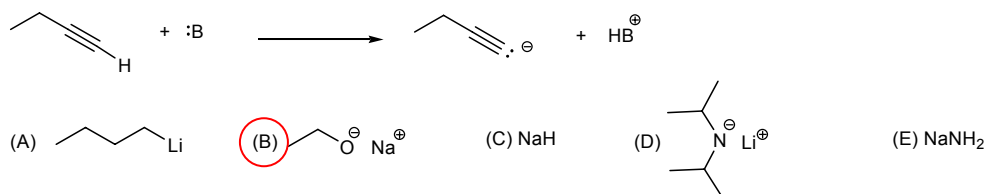


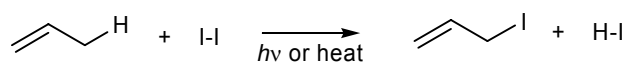
Multiple Choice Questions. 60 points Select the best answer to each of the questions.

1. Choose the *incorrect* reaction.

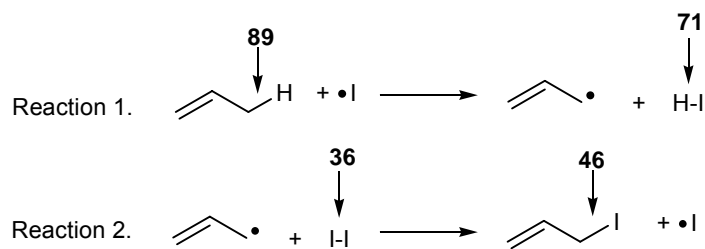
2. Choose the species that could not be used as the base in the following reaction.



3. Professor Lee proposed the following reaction for the preparation of 3-iodo-1-propene from propene.



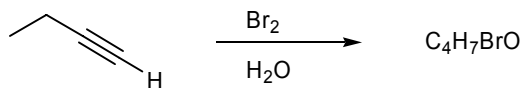
The following two propagation steps were hypothesized. The relevant bond energies in kcal/mole are shown.

Choose the *incorrect* statement.

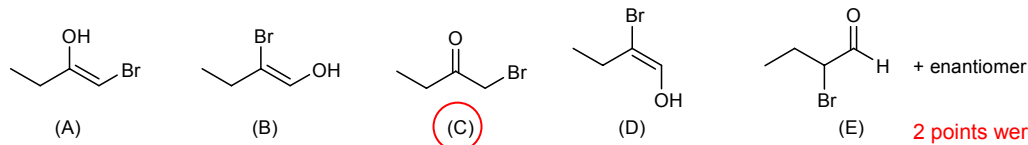
- (A) The first reaction is endothermic. (B) The second reaction is exothermic.
 (C) The overall reaction is exothermic. (D) The I-I bond is weaker than the H-I bond.
 (E) The proposed reaction is not a good method for the preparation of 3-iodo-1-propene from propene.

Source

4. Here is a reaction that we did not cover in the lectures.

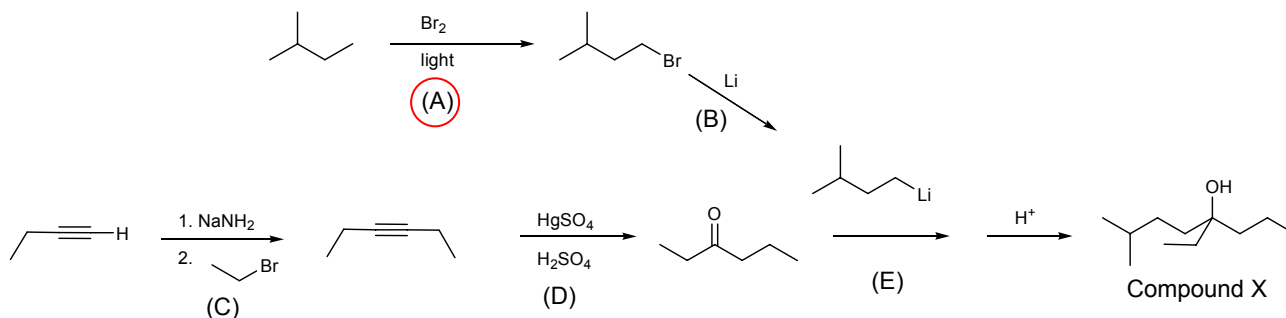


Use your knowledge of mechanisms to choose the most likely product from among the following compounds.



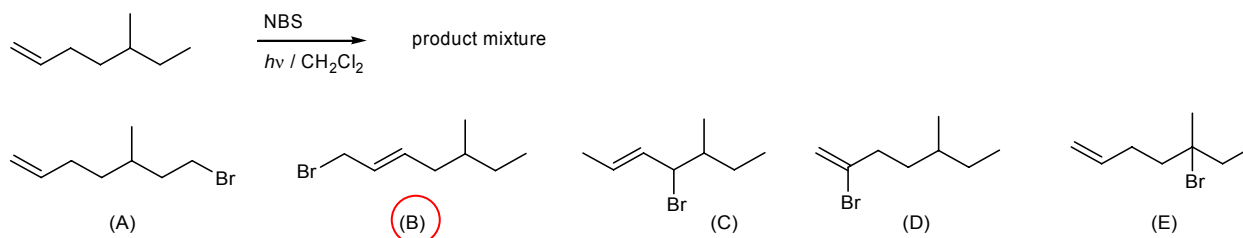
2 points were given for this answer

5. On the final exam in CHE 321 a student was asked to propose a synthesis of compound X and came up with the scheme shown below.



The TA grading the problem thought most of the steps were just fine, but she took off a couple of points because she knew that one step would not work. Choose the reaction of the proposed synthesis that is least likely to be successful.

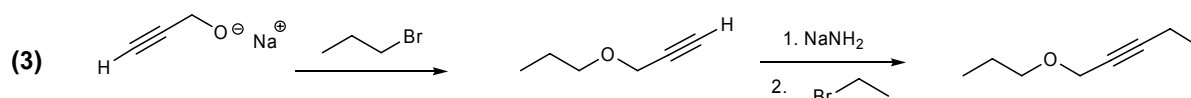
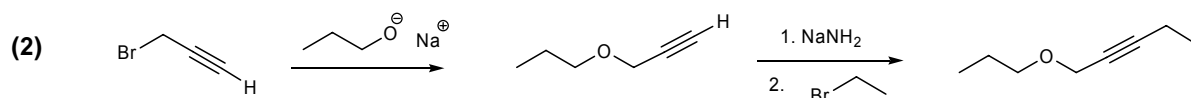
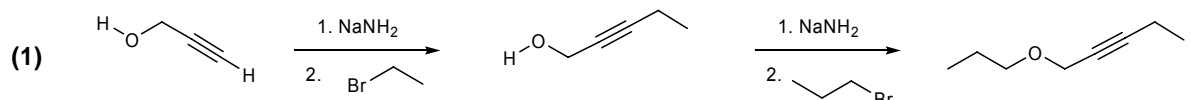
6. The NBS bromination of the compound shown below gives a mixture of products.



Choose the compound that should be the main product of this reaction.

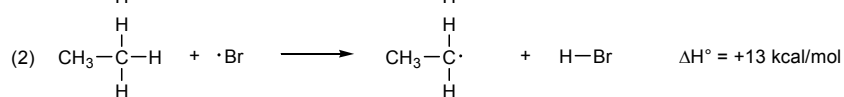
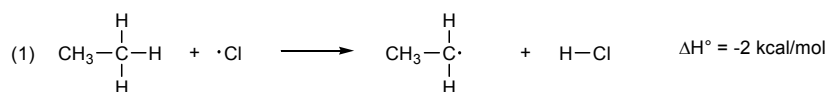
Source

7. Which of the following schemes will proceed to give the compound indicated as the major product.



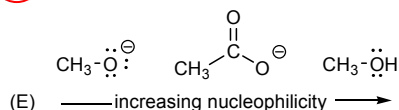
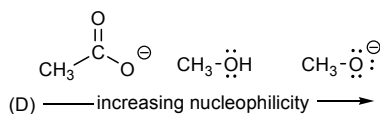
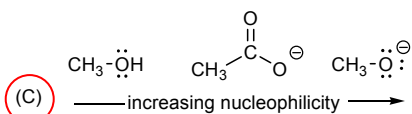
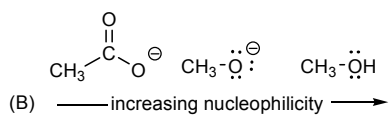
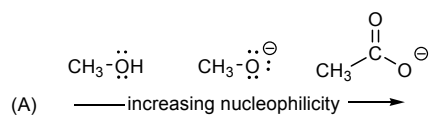
- (A) (1) only (B) (1) and (2) (C) (1) and (3) (D) (2) and (3) (E) all of them

8. Choose the *incorrect* statement about the following two reactions.



- (A) Reaction (1) would be expected to be faster than reaction (2).
 (B) According to Hammond's postulate the transition state of reaction (2) resembles the product.
 (C) According to Hammond's postulate the transition state of reaction (1) resembles the reactant.
 (D) The C-H bond of reaction (2) is completely broken in the transition state.
 (E) The reaction of ethane with the fluorine radical ($\cdot\text{F}$) would be expected to be faster than either (1) or (2).

9. Choose the answer that has the following nucleophiles correctly arranged with respect to increasing reactivity.

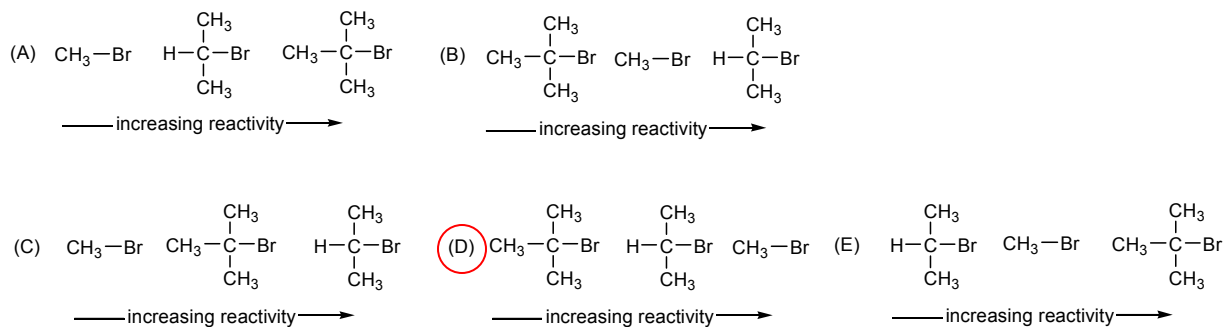


Source

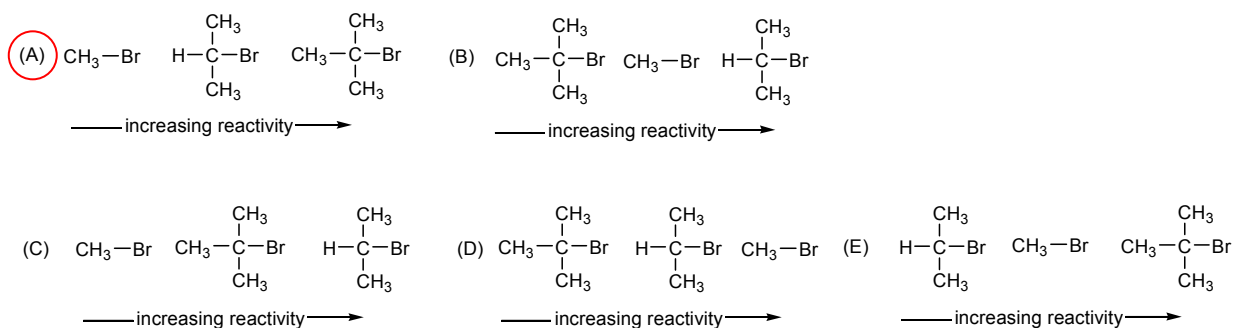
10. Choose the *incorrect* statement about organohalogen compounds.

- A) Organohalogen compounds, such as the polychlorinated biphenyls (PCBs), are persistent in our environment and are often found in the hydrophobic lipid bilayers of our cell membranes.
- (B) Organohalogen compounds are also produced by living organisms, particularly in the marine environment.
- (C) Technology has produced commonly used materials containing organohalogen compounds.
- (D) Based upon periodic table considerations, the C-Cl bond is predicted to be stronger than the C-I bond.
- (E) Based upon periodic table considerations, the C-Cl bond is predicted to be longer than the C-I bond.

11. Choose the order that has the following alkyl bromides correctly arranged with respect to increasing reactivity in a S_N2 reaction.



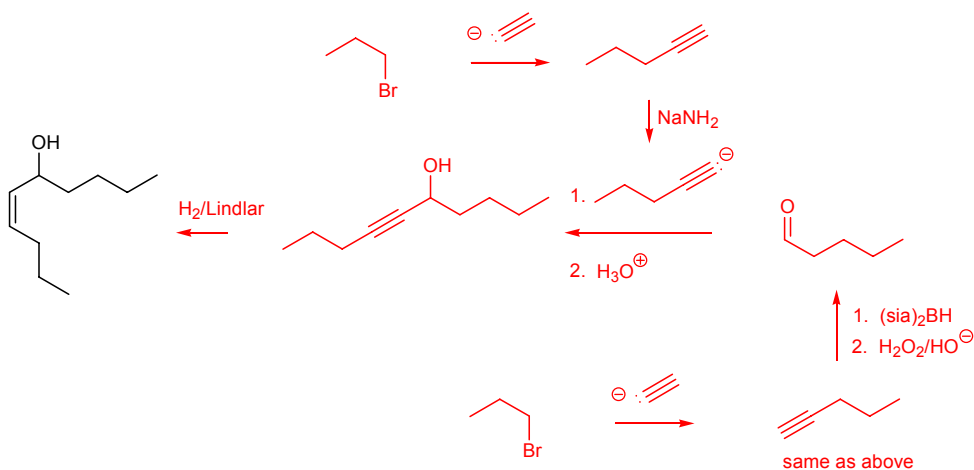
12. Choose the order that has the following alkyl bromides correctly arranged with respect to increasing reactivity in a S_N1 reaction.



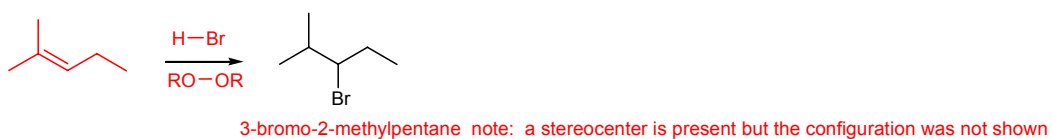
Source

Short Answer Questions. 40 points.

13. Propose a synthesis of the following compound from compounds containing four carbons or less. (10 points)



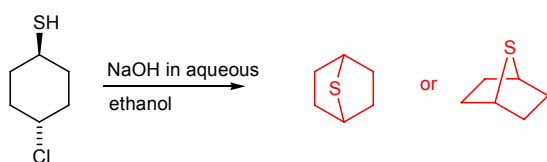
14. Consider the following reaction.



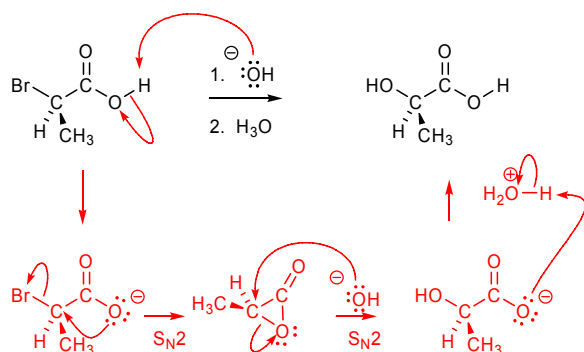
(a) Give an acceptable name for the product of the above reaction.

(b) Give the best reactant(s) and reagent(s) that could be used to perform the above transformation in one step using the reactions we have covered in CHE 321.

15. (a) Predict the product of the following reaction.

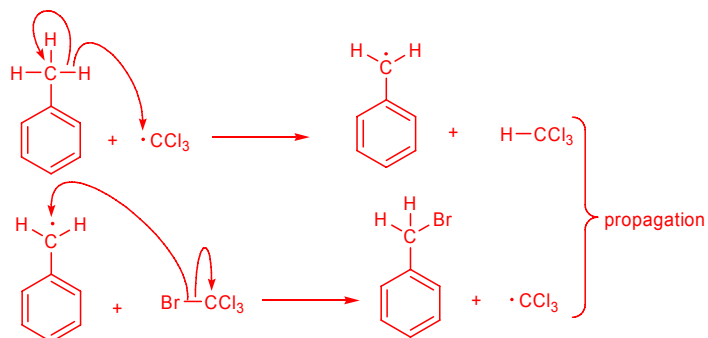
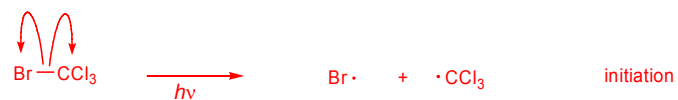
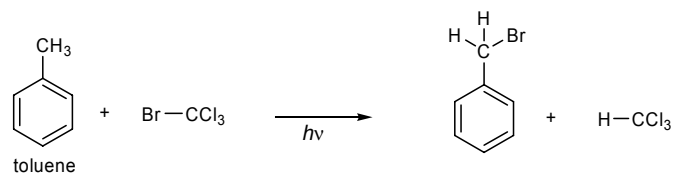


(b) Using the curved arrow formalism, give a reaction mechanism that explains why the following substitution reaction proceeds with retention of configuration.



Source

16. The following reaction of toluene with bromotrichloromethane proceeds via a radical chain mechanism.



(a) Give the initiating reaction.

(b) Give the two propagating reactions of this reaction mechanism.

(c) Give one of the several possible termination reactions.