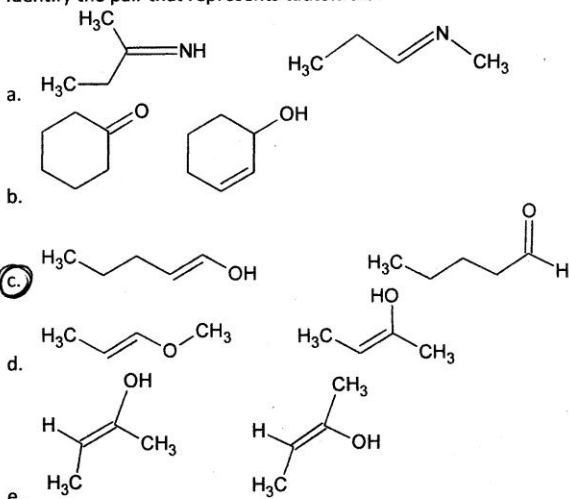


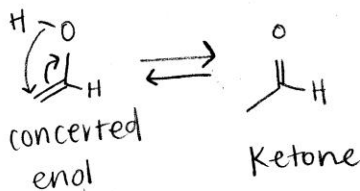
1. When a vinylic alcohol (enol) tautomerizes, a/an _____ is formed.

- a. Alkane
- b. Alkene
- c. Alkyne
- d. Ketone
- e. Vinylic cation

2. Identify the pair that represents tautomers.

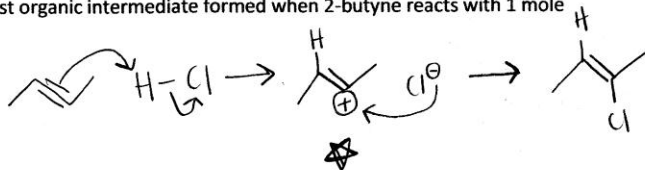


Keto-enol
tautomerization:



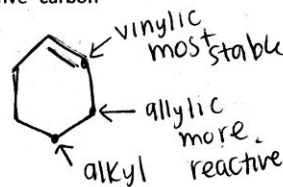
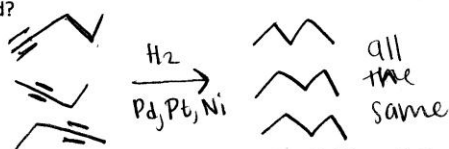
3. What is the best description of the first organic intermediate formed when 2-butyne reacts with 1 mole of HCl?

- a. Allylic cation
- b. Allylic anion
- c. Chloronium ion
- d. Vinyl anion
- e. Vinyl cation
- f. Alkyl cation



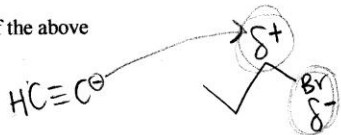
4. A mixture of 1-pentyne, 2-pentyne, and 3-pentyne was hydrogenated. How many different five-carbon alkanes were produced?

- a. One
- b. Two
- c. Three
- d. Four
- e. Five

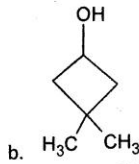
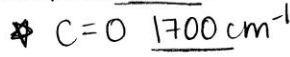
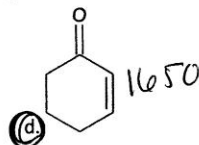
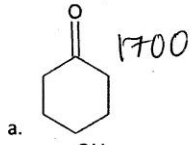


5. Which of the following best describes the C-Br bond of an alkyl bromide?

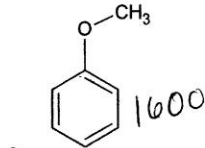
- a. Nonpolar, no dipole
- b. Polar, δ^+ at the carbon and δ^- at the bromine
- c. Polar, δ^- at the carbon and δ^+ at the bromine
- d. Ionic
- e. none of the above



6. Which of the following is NOT true with regards to halogenation using halogen and light?
- Bromination is more selective than chlorination. ✓
 - The reaction proceeds through radical intermediates. ✓
 - (c)** The process is useful for the preparation of alkyl halides.
 - The reaction requires initiation, propagation, and termination. ✓
7. Which compound would be expected to show an intense absorption at 1650 cm^{-1} ?



e. Both C and D



1650 $\text{C}=\text{C}$
1700 $\text{C}=\text{O}$

(conj.)

1600 $\text{C}=\text{C}$
1650 $\text{C}=\text{O}$

8. Which of the following can NOT be distinguished by IR spectroscopy?
- Primary, secondary, and tertiary amines
 - Bond hybridization
 - Bond strengths
 - (d)** The number of conjugated double bonds in a molecule

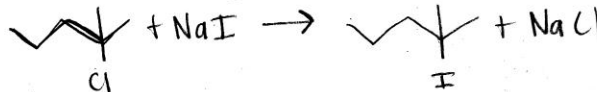
9. Which of the following halides has the longest and weakest bond?
- CH_3Br
 - CH_3F
 - CH_3Cl
 - (d)** CH_3I

F
Cl
Br
I

Smaller molecule = shorter & stronger
bigger molecule = longest & weakest

10. Consider the reaction of 2-chloro-2-methylpentane with NaI ($\text{S}_{\text{N}}1$). Assuming no other changes, how would it affect the rate if one simultaneously doubles the concentration of NaI ?

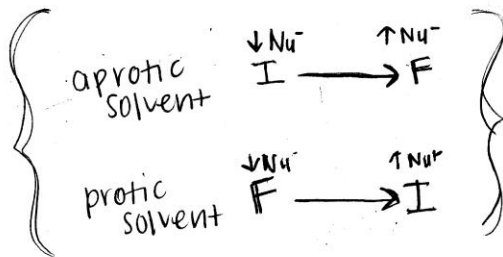
- (a)** No effect
- It would quadruple the rate
- It would triple the rate
- It would double the rate
- It would increase the rate five fold.



$\text{S}_{\text{N}}1$
 $\text{Rate} = k[\text{RX}]$

11. Which is the weakest nucleophile in polar protic solvents?

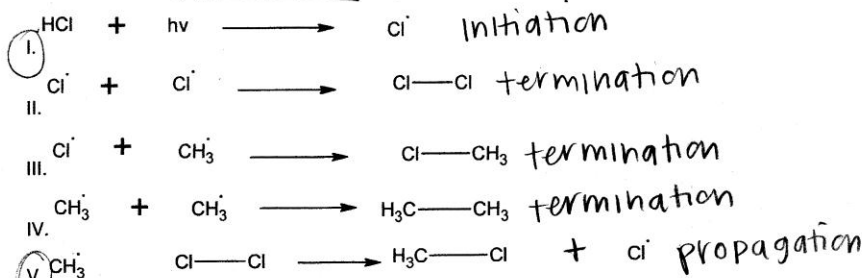
- (a)** F
- Cl
- Br
- I



12. Which of the following statements is true?

- a. Smaller wavenumbers and higher frequencies are associated with lower energy.
- b. Shorter wavelength and smaller wavenumbers are associated with lower energy.
- c. Longer wavelength and lower frequencies are associated with lower energy.**
- d. Larger wavelength and lower frequencies are associated with higher energy.
- e. Longer wavelength and higher frequencies are associated with lower energy.

13. Which of the following is NOT a termination step in a radical reaction?

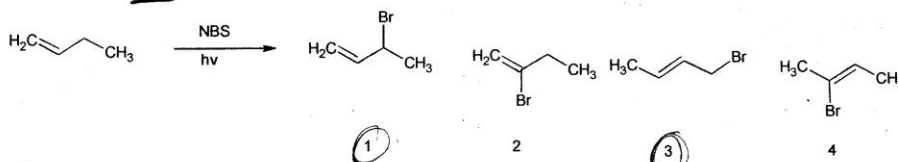


- a. II and III and IV
- b. I and V**
- c. III and IV
- d. II and V
- e. I and IV and V

14. Which of the following is an accurate statement of Hammond's postulate?

- a. The transition state of an exothermic reaction will resemble the products more than the starting materials.
- b. The transition state of an exothermic reaction will resemble the starting materials more than the product.**
- c. The transition state of an endothermic reaction will resemble the starting materials more than the product.
- d. The difference in energy between the starting materials and transition state controls the rate of a reaction.
- e. None of the above.

15. What are the major organic products obtained from the following reaction.



- ~~a. 1 and 3~~
- b. 3 and 4
- c. 1 and 2
- d. 2 and 4
- e. Only 1**

most easily
- add to allylic position

