___ = ___%

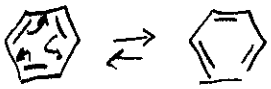
66

Name: _____

Organic Test #2 - SCH 4U

1. Why is the reactivity of aromatic ring compounds different than the reactivity of regular alkenes

- conjugated double bonds in the aromatic ring



- bonds flip position through an electronic resonance
- because the bonds are closer to 1 bond and a half and the electrons are delocalized
- they are not true alkene bonds
- do not react the same way
- resonance stabilization lowers reactivity

/4

2. Would you expect hexane to dissolve well in water or pentane? Explain the reasons for your choice.

hexane — non-polar → pentane — non-polar

- should be soluble
- LIKE DISSOLVES LIKE

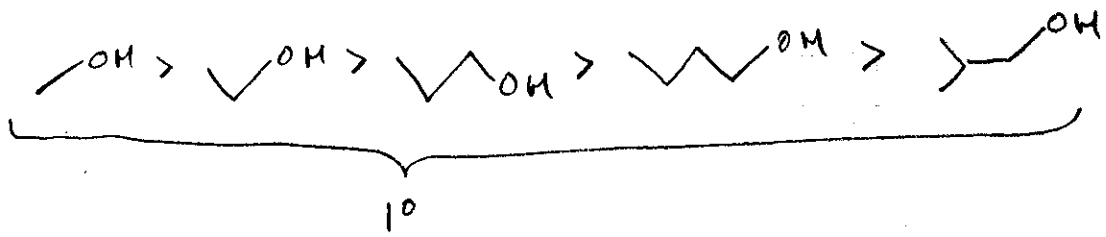
/4

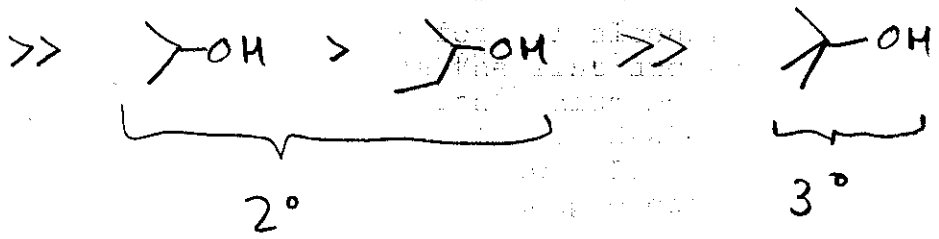
non-polar → $\delta^+ H - \ddot{O}: ^{\delta-}$ (very polar)

- should be immiscible liquids
- big difference in polarity

/8

3. Create an organizied list for all alcohols that contain four carbons or less. Organize the list according to how quickly each alcohol would react with sodium metal. Use > and >> signs to help organize your list. State the degree of each alcohol under ~~the reaction arrow~~. Finally indicate the reasons that you have used to help organize your list.

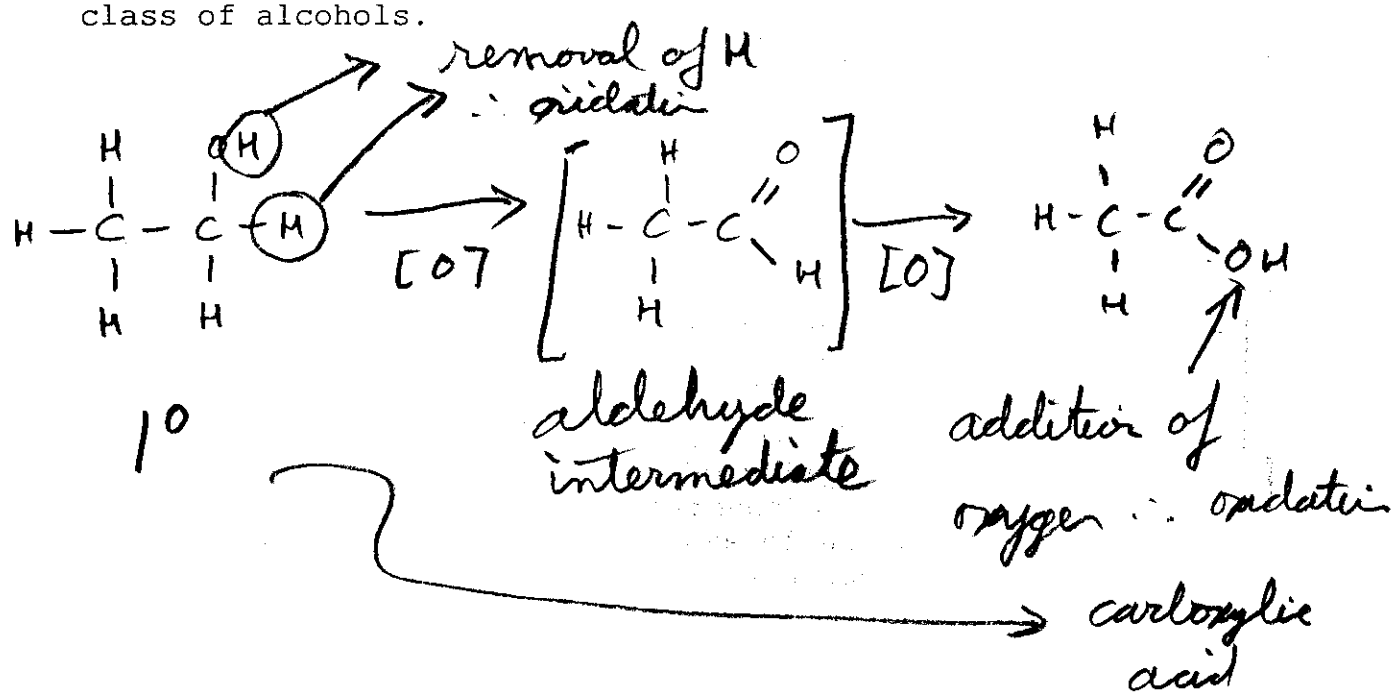


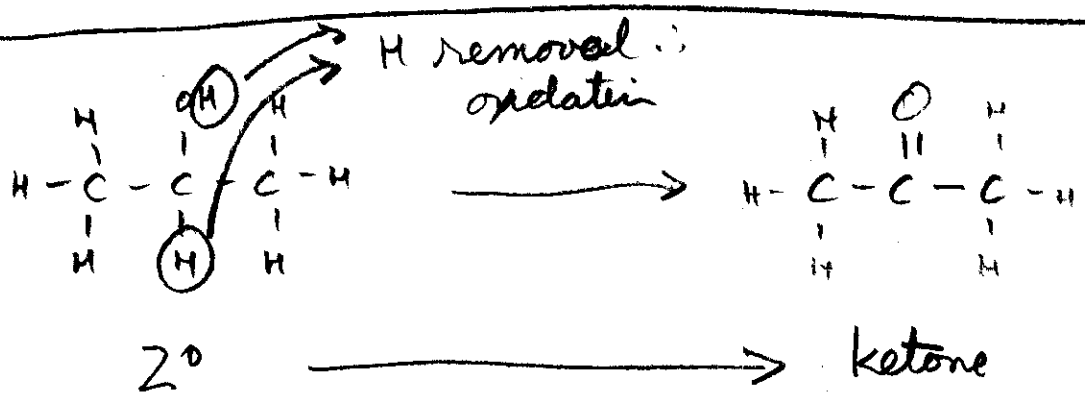


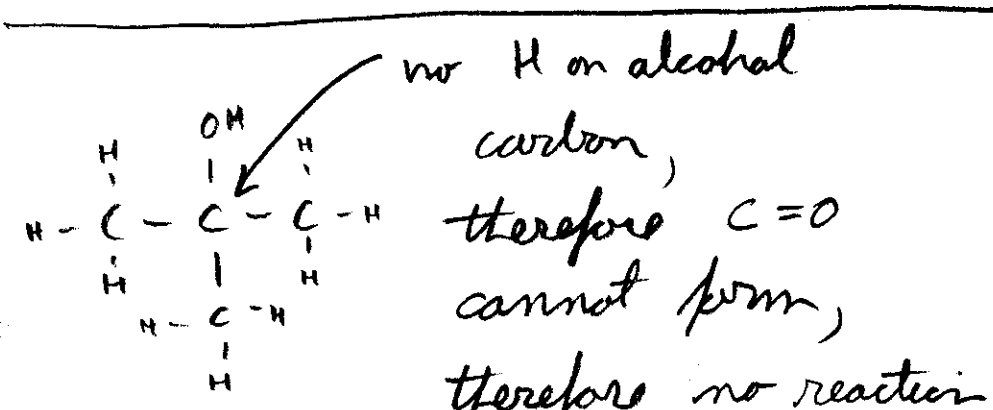
Steric Hindrance - non-reactive portion of a molecule blocks the reactive site

- degree: the greater the degree of the reactive site the greater the steric hindrance, the slower the reaction
- side chain length: the longer the side chain, the greater the steric hindrance, the slower the reaction
- degree matter more than chain length

4. Explain how alcohols (1^0, 2^0, & 3^0) react when oxidized by an oxidizing agent such as potassium permanganate in water ($KMnO_4/H_2O$). Include clear reference using diagrams as to the hydrogen removal in each class of alcohol and be sure to clearly state the type of product you would expect for each class of alcohols.







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5. Which of the follow statements is true:

a) alcohols cannot be oxidized because they have already lost electrons

b) alcohols can be oxidized but only if they are third degree alcohols

c) in a oxidation in organic chemistry, oxygen is gained and/or hydrogen is lost

d) in order to oxidize alcohols, one must use a reducing agent such as $LiAlH_4$ in THF

e) oxidations seldom if ever accompany a corresponding reduction

6. For the property of steric hindrance:

a) one must consider both the length and the number of side chains adjacent to a reactive site

b) the greater the steric hindrance, the more active the reactive site on the molecule

c) is never of concern in organic biological systems

d) depends more on length of blocking groups than the number of blocking groups (related to degree of reactive site)

e) is identical for all first degree alcohols

7. Aromatic compounds:

a) are more reactive than corresponding alkenes

b) undergo electronic resonance only at high temperatures

c) were never mentioned in this course

d) are not a part of normal biological systems

e) allow for the delocalization of π electrons (the pair of electrons that produces the second bond in a double bond)

8. Sulphuric acid is used in many places in organic chemistry. Which of the following statements is true?

a) it function will depend on concentration and temperature

b) concentrated sulphuric acid at high temperature will **always** dehydrate an alcohol to form an alkene (there is a bonus mark for providing a counter example - use the margin)

c) cannot perform asymmetric additions on alkenes

d) is needed to reduce primary alcohols to ketones

e) is the acid of choice to put the flavour into french fries

9. An asymmetric addition will occur whenever the following conditions are met:

a) 2-butene is treated with HCl in water

b) 1-butene is treated with H_2 and Pt catalyst

c) 2-butanol is treated with concentrated H_2SO_4 at high temperature

d) 2-pentene is treated with H_2O and dilute catalytic quantities of H_2SO_4

e) 1-cyclohexene is treated with I_2 in water

10

10 For the following monomers, write:

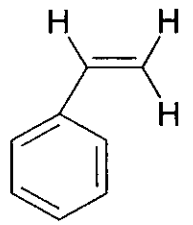
a) whether the monomer will undergo and addition of condensation polymerization

b) a polymer structure that is at least four monomer units long

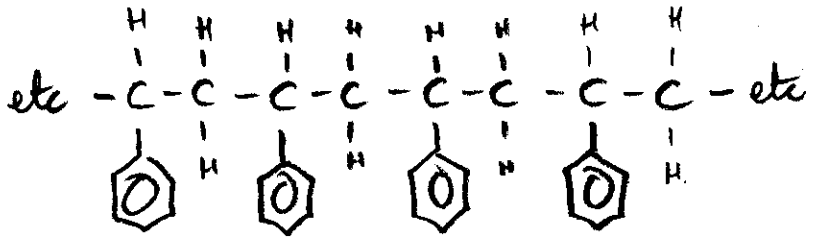
c) necessary reaction condition for addition reactions

d) stable by-product for condensation reactions

Type: addition



free radical initiator



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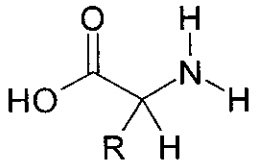
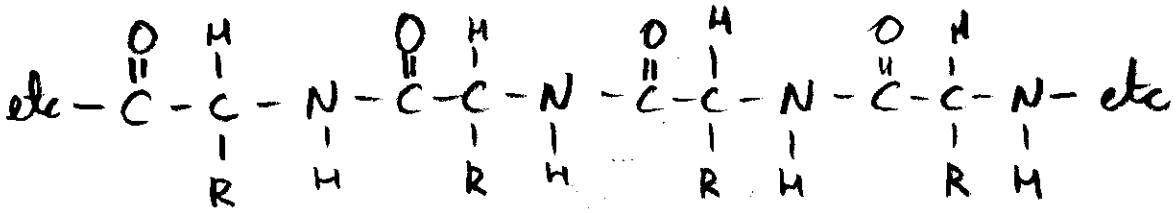
Type = condensation



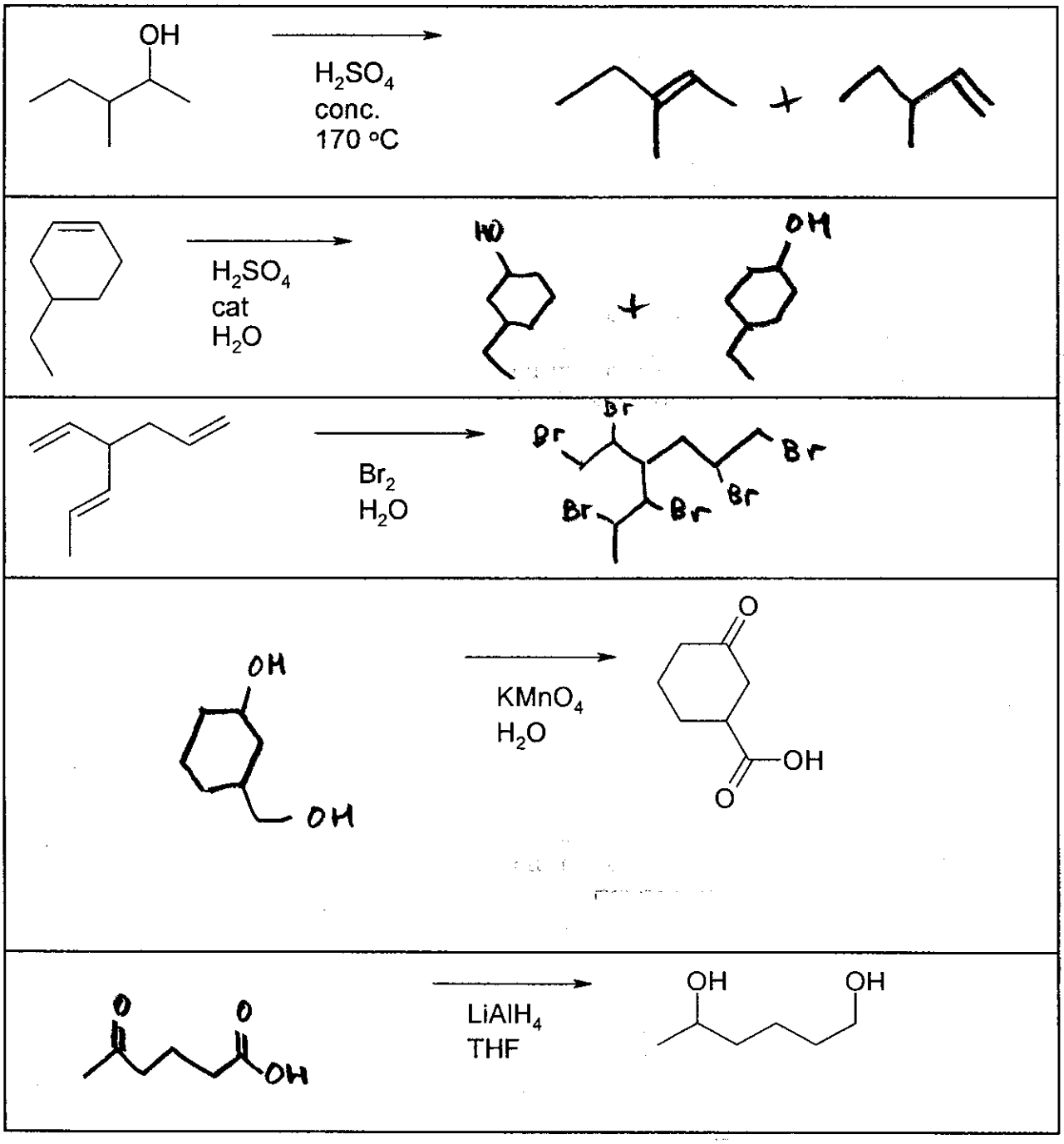


+ H_2O bi-product

/4

/8

11. Complete all reactions by providing reactants, products, and any necessary reaction conditions, whatever is required. Do not include aldehyde intermediates The marking scheme will help indicate if more than one reactant or product is possible. One mark per structure or reaction condition or per functional group change where more than one change occurs per molecule. Where more than one structure is possible, be sure to show all structures.



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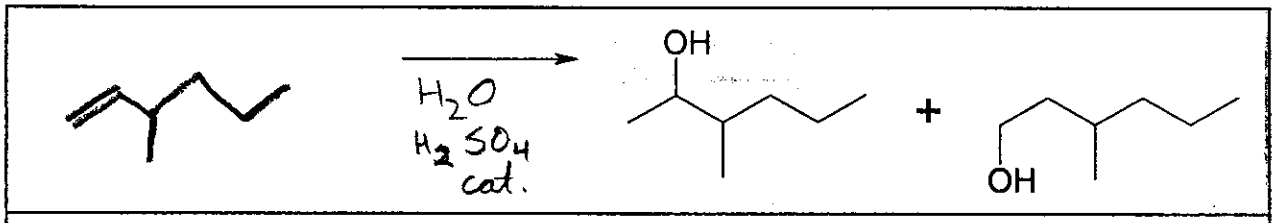
/11



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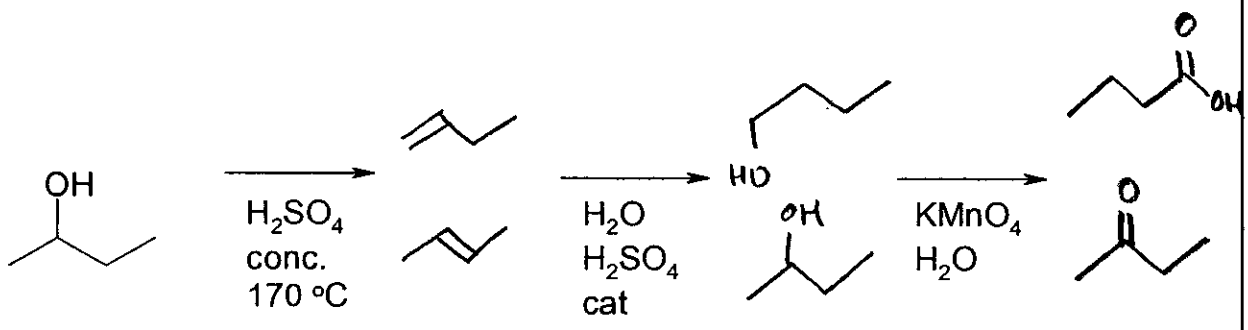

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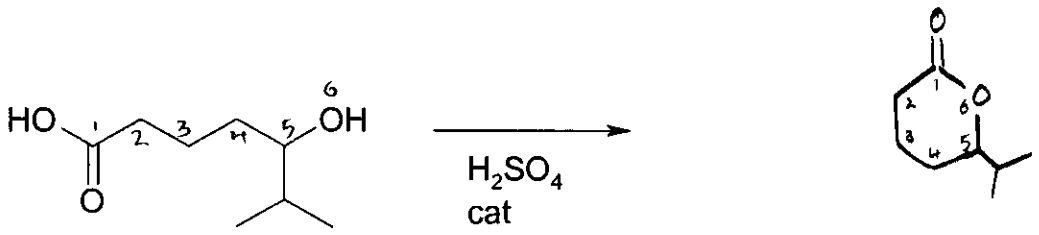

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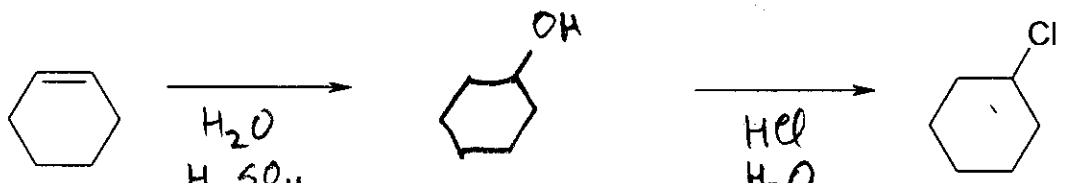

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hint- don't use HCl in H_2O - think of another way

/12