Assignment # 10
Organic 211
Fall 2020

Name:_____

1) Draw the structure of R-134a.

134 → 2 carbons, 4 hydrogens, 4 fluorines
90
224

a means 2nd
most equal distribution
∴ not 2F on each carbon

∴ CF_3-CH_2F

2) Draw the chemical structures of the components of R-410a

50% CH_2F_2 (R-32) and 50% CF_3CHF_2 (R-125)

3) Give the four parts to a reaction.

reactant $\xrightarrow[\text{solvent}]{\text{reagent}}$ product

4) Give the equation for Atom Economy.

$$\text{atom economy} = \frac{\text{mass of desired product}}{\text{total mass of all reactants}}$$

5) Give a reaction with high Atom Economy. Explain why it has high atom economy.

lots of possibilities

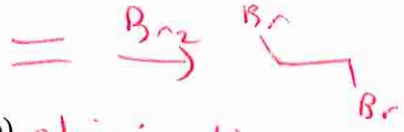
all atoms in starting materials are in product.

6) List the 12 principles of Green chemistry.

1) Prevent waste
2) Atom economy
3) Less Hazardous Synthesis
4) Design benign chemicals
5) Benign solvent and auxilianies
6) Design for energy efficiency
7) use of renewable feedstocks
8) reduce derivatives
9) catalysis (vs. stoichiometric)
10) Design for degradation
11) Real-time analysis for pollution prevention
12) Inherently benign chemistry for accident prevention

7) Give the four types of reactions.

a) addition

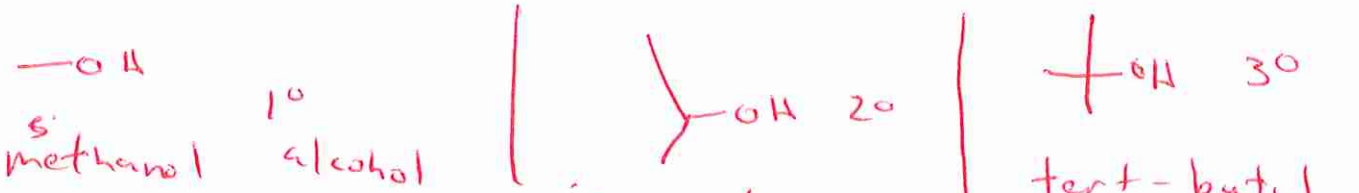


b) elimination

c) substitution

d) rearrangement

8) Give an example of a primary, secondary, and tertiary alcohol.



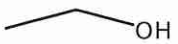
methanol — 1° alcohol

isopropyl alcohol or 2-propanol — 2°

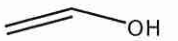
tert-butyl alcohol or 2-methyl-2-propanol — 3°

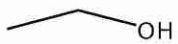
9) Name the alcohols in question # 8

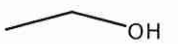
10) Give the products for the following reactions. Indicate if no reaction is possible.

a)  HCl → no reaction - HCl only reacts with 3° alcohols

b)  HCl → no reaction - HCl only reacts with sp^3 carbons

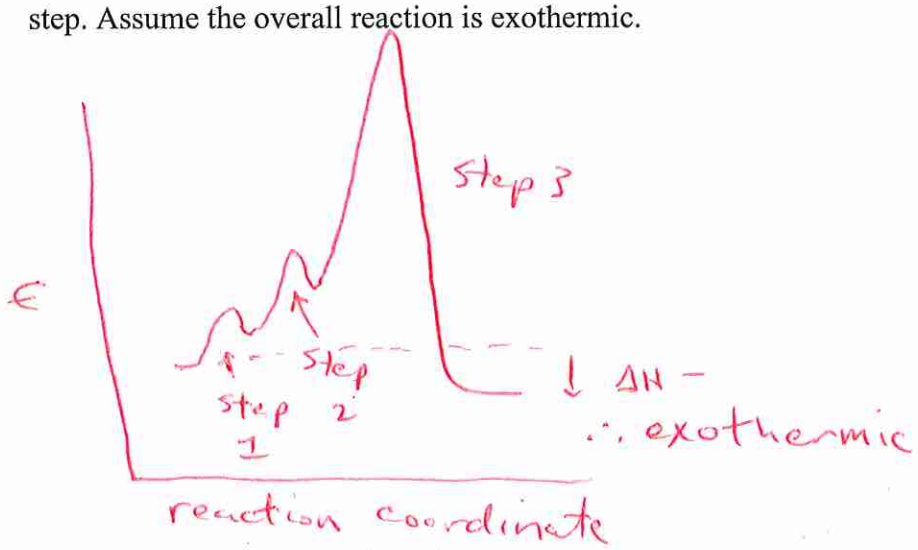
c)  HBr → no reaction - HBr only reacts with sp^3 carbons

d)  HBr → 

e)  HF → no reaction - HF not reactive enough for alcohols

11) What is a mechanism? a mechanism is an atomic view of how the ~~et~~ electrons change from reactant to the product. (push the electrons)

12) Draw a three step potential energy diagram with the third step being the rate determining step. Assume the overall reaction is exothermic.



13) a) Draw a primary carbocation.

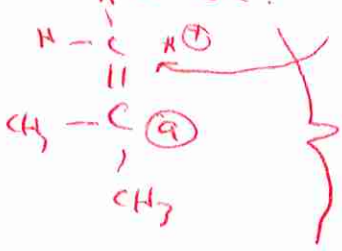
b) Draw a secondary carbocation.

c) Draw a tertiary carbocation.

14) Why is a tertiary carbocation the most stable?

hyperconjugation – more atoms to share positive charge makes it more stable.

for example



no bond due to electrons being sine to p orbital of carbon a,