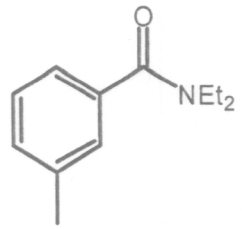
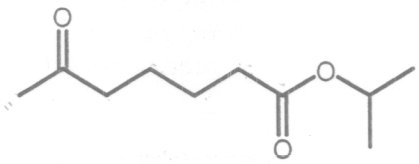
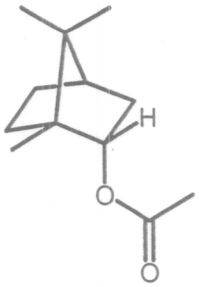
1. Provide IUPAC names for the following compounds. (30 points)

a. 

b. 

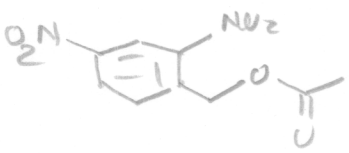
c. 

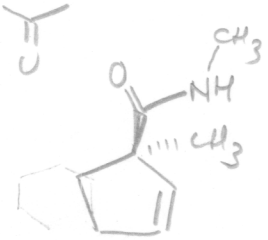
a. N,N-diethyl-3-methylbenzamide

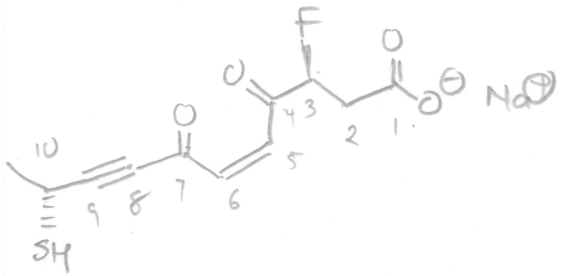
b. isopropyl 6-oxoheptanoate

c. endo (1,7,7-trimethyl bicyclo[2.2.1]hept-2-yl) acetate

2. Draw the structure of the following compounds (don't forget stereochemistry). (30 points)

d. 2,4-dintrophenylmethyl acetate 

e. (*R*)-*N*,1-dimethyl-2-cyclopentenecarboxamide 

f. sodium (*3S,5Z,10R*)-3-fluoro-4,7-dioxo-10-sulfanylundec-5-en-8-ynoate 

3. On the Internet, go to the KEGG website (http://www.genome.jp/kegg/) and find examples of the following reactions. Show the reaction and cite the reaction number (e.g.,R00619) and the give the enzyme name and number (e.g., thiamine diphosphokinase, 2.7.6.2). (20 points)

a. conversion of an ester to a carboxylic acid

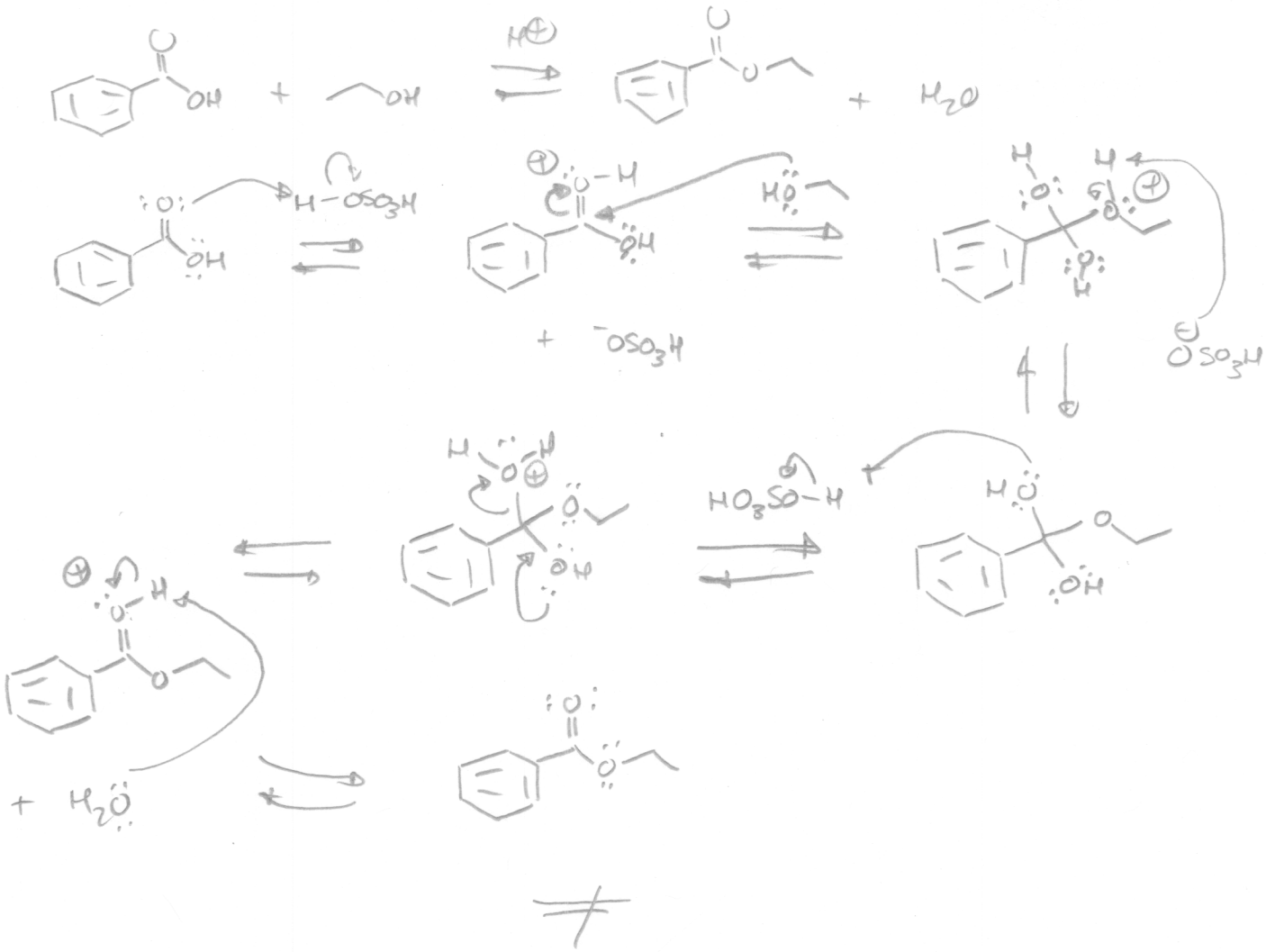
b. hydrolysis of an amide

c. oxidation of ethanol to give acetaldehyde - should involve

lots of possibilities

NADH → NAD⊕

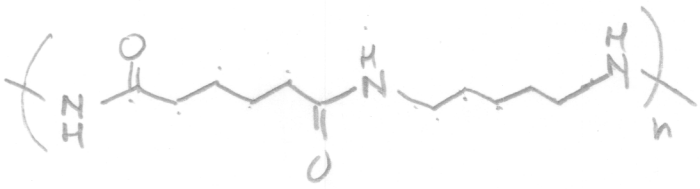
4. Show the *complete* mechanism of the Fischer esterification of benzoic acid with ethanol (using a catalytic amount of H_2SO_4). For each step of the reaction, indicate whether the step is a *proton transfer*, *nucleophilic attack*, or *loss of a leaving group*. Also, show which steps are fast and which ones are slow. (40 points)



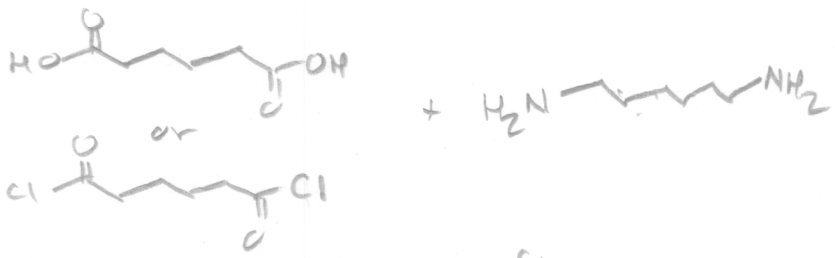
5. Many polymers contain repeating carboxylic acid derivatives. For the following four examples, show what the starting materials (monomers) are in each case and describe the most common uses for of each type of polymer. (40 points)

a. Nylon-6,6
b. Polyethylene terephthalate (PET)
c. Kevlar™
d. Lexan

a.



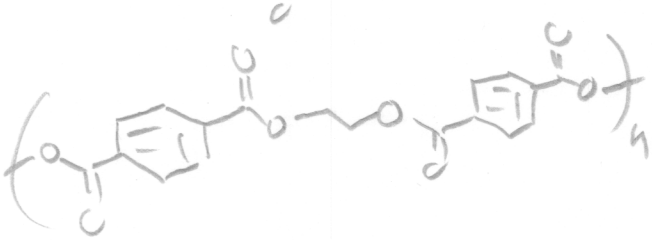
Starting materials



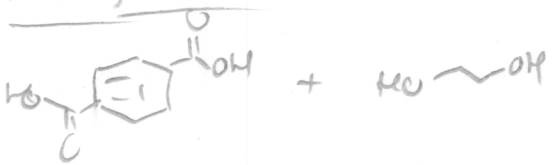
uses

rope, fishing line
fabrics

b.



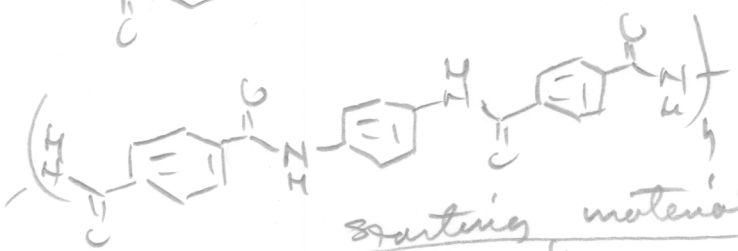
Starting materials



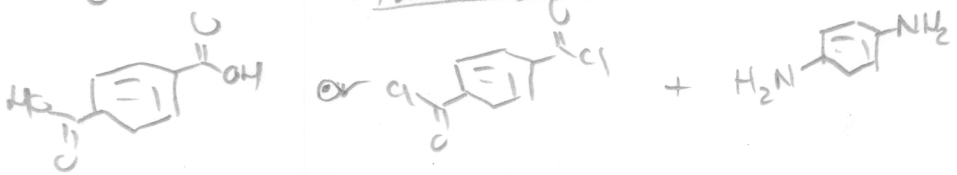
uses

mostly for hard plastics

c.



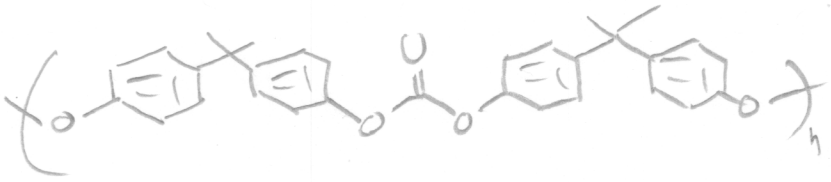
Starting materials



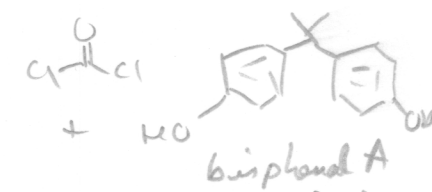
uses

body armor
tires

d.



From



bisphenol A (BPA)

uses hard plastic