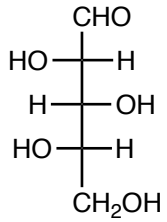
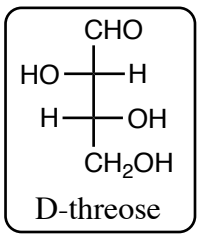
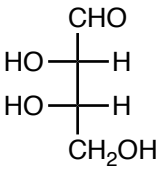
CHM 224 **NAME:**
Test 3
Chapters 24, 21, 26

1. Draw the Fischer projection for a naturally occurring epimer of the sugar below:

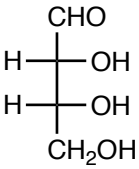


2. If D-threose is subjected to a round of Kiliani-Fischer synthesis, which of the compounds below might be expected as a product (may be more than one)?

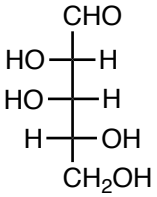




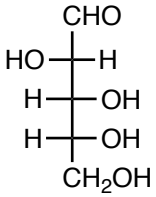
A



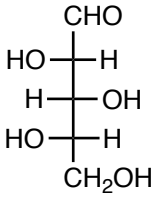
B



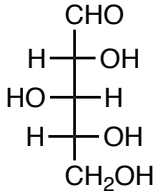
C



D



E

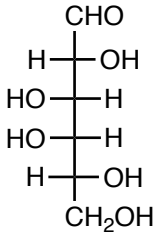


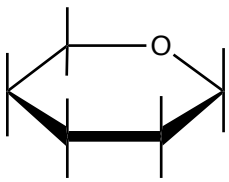
F

3. A carbohydrate with 8 carbons has how many oxygen atoms?

A. 4
B. 16
C. 8
D. 32

4. Draw the **β-anomer** for the pyranose ring formed from the sugar below using the template provided:





5. How many stereogenic carbons are found in a carbohydrate that is a ketoheptose?

6. A pyranose ring differs from a pyranoside ring because (may be more than one):

A. pyranose rings are reducing sugars and pyranoside rings are not
B. pyranoside rings undergo mutarotation and pyranose rings do not
C. pyranose rings always derive from aldoses and pyranoside always derive from ketoses
D. pyranose rings are always α-anomers while pyranoside rings are always β-anomers

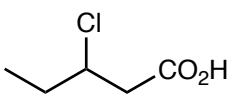
7. Answer the following questions:

A. the name of the linkage that connects two sugar molecules:

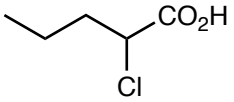
B. humans *cannot* metabolize complex carbohydrates containing this type of linkage:

C. chitin forms the exoskeleton of many types of:

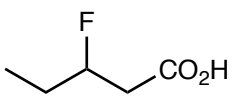
8. Which one of the following is the carboxylic acid with the **highest and lowest** pKa?



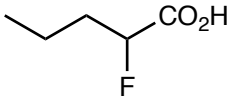
A



B



C

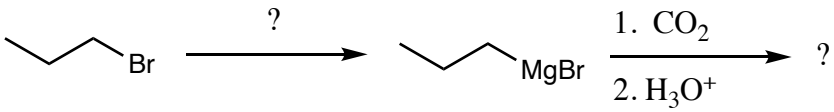


D

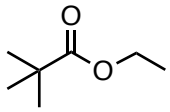
highest pKa:

lowest pKa:

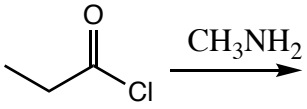
9. Complete the spaces indicated by an ? with either a reagent or a product:



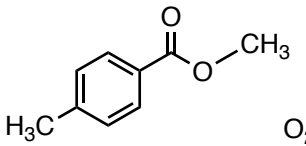
10. Provide the IUPAC name for the following compound:



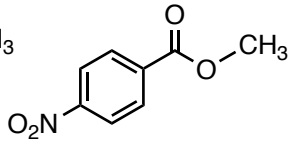
11. Draw the reaction mechanism and provide the product of the following reaction:



12. Which ester below would you expect to undergo hydrolysis with KOH/H_2O the fastest? Briefly explain.

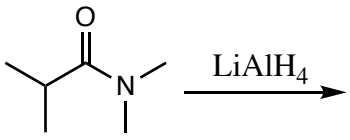


I

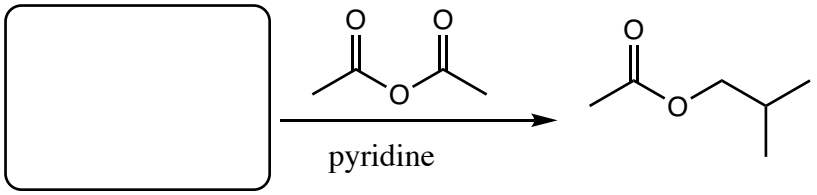


II

13. Provide the product from the following reaction:



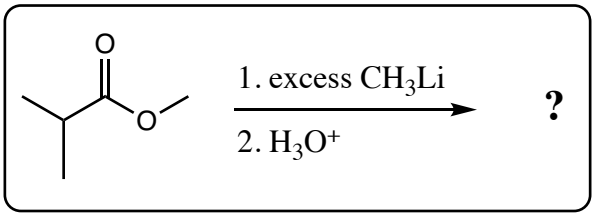
14. What starting material is required to complete the following reaction?

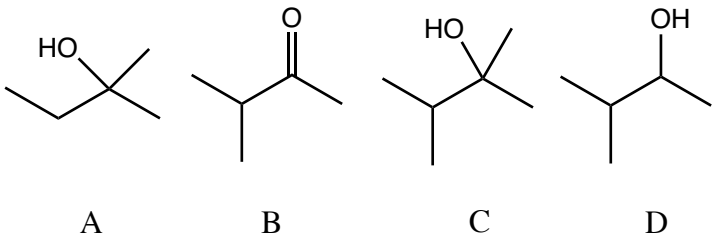


15. Which one of the following compounds will undergo hydrolysis fastest with KOH/H_2O/heat?
    a. butanoic anhydride
    b. methyl butanoate
    c. 2-chlorobutane
    d. N-methyl butanamide

16. Provide the structure of ethyl 2-methylpentanoate:

17. Which of the following is the expected product of the reaction below?





18. Which of the following is NOT a characteristic of a typical naturally-occurring oil (may be more than one answer)?
    A. It contains fatty acid chain lengths of 12-20 carbons
    B. It has a melting point above 25°C
    C. It has fatty acid chains that often have unsaturation
    D. The double bonds have trans stereochemistry

19. After studying for the organic exam for a whole hour (including a short break to update his Instagram), Jimmy says that cholesterol is mainly used in the human body as a source of energy for cells. Is Jimmy correct? If not, what is the primary function of cholesterol?

Jimmy

20. What are three ways by which the rate of reaction of oxygen with triglycerides in foods (leading to foods becoming rancid and/or stale) can be slowed?