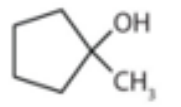
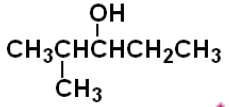
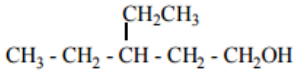
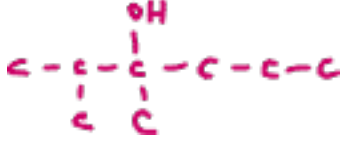

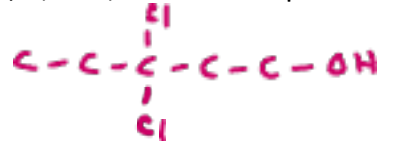
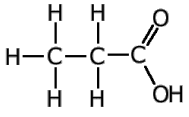
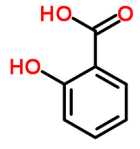
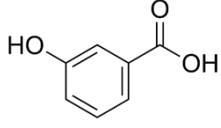
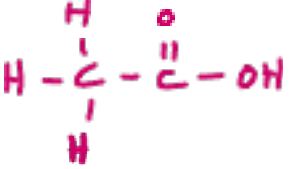
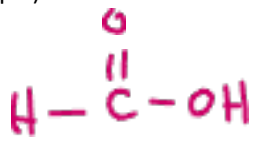
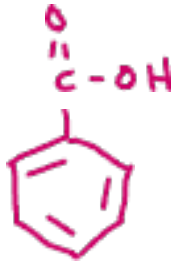


## Review: Alcohols, Carboxylic Acids, Esters, and Aspirin

**Part 1 - Alcohols: (15pts)** Name or draw each of these alcohols and categorize as primary (1°), secondary (2°), or tertiary (3°)

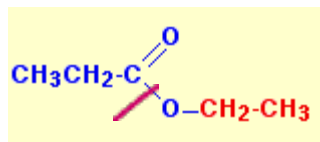
1. (2pts)		2. (2pts)		3. (2pts)	
1-methylcyclopentanol		2-methyl-3-pentanol		3-ethyl-1-pentanol	
1° 2° 3°		1° 2° 3°		1° 2° 3°	
4. (3pts)	2,3-dimethyl-3-hexanol	5. (3pts)	1-propanol	6. (3pts)	3,3-dichloro-1-pentanol
					
1° 2° 3°		1° 2° 3°		1° 2° 3°	

**Part 2 – Carboxylic Acids: (17pts)** Name or draw each of these carboxylic acids. Write the common or IUPAC names as requested.

7. (3pts)		8. (2pts)		9. (2pts)	
IUPAC: propanoic acid		IUPAC: 2-hydroxybenzoic acid		IUPAC: 3-hydroxybenzoic acid	
Common: propionic acid		Common: salicylic acid			
Location: bacteria in sweat glands		Location: willow bark			
10. (4pts) Acetic acid		11. (4pts) Methanoic acid		12. (2pts) Benzoic acid	
IUPAC: ethanoic acid		Common: formic acid			
Location: vinegar		Location: ant saliva			

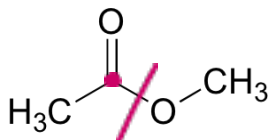
**Part 3 - Esters: (12pts) Name or draw each of the esters in the space provided.**

13. (2pts)



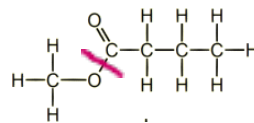
ethyl propanoate

14. (2pts)



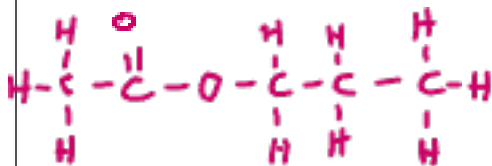
methyl ethanoate

15. (2pts)

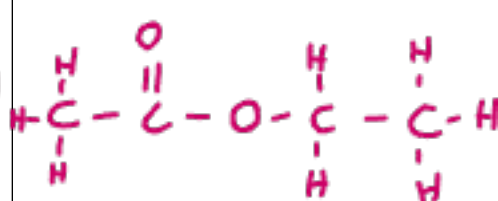


methyl butanoate

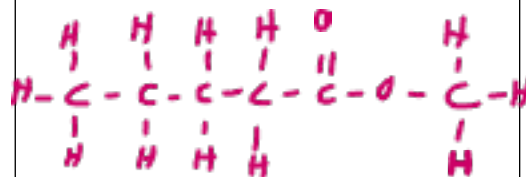
16. (2pts) Propyl ethanoate



17. (2pts) ethyl ethanoate



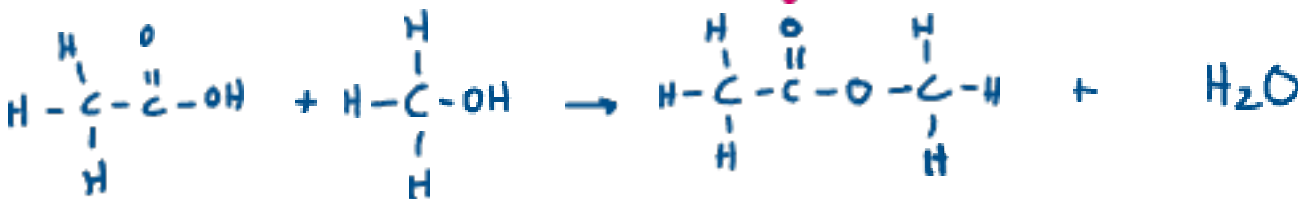
18. (2pts) Methyl pentanoate



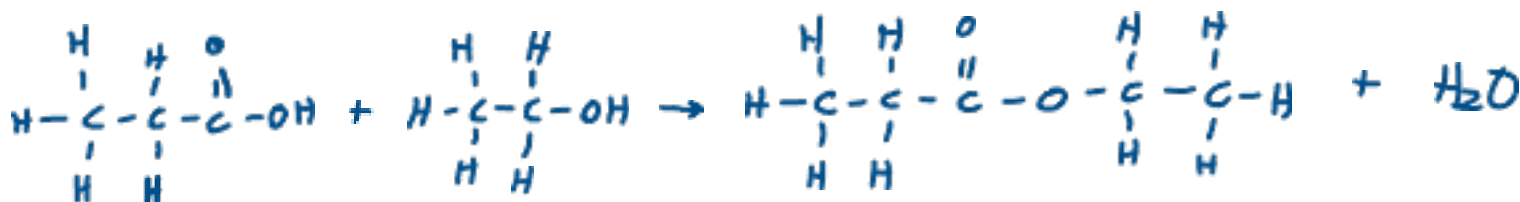
**Part 4: Formation of Esters Reactions**

19. (20pts) Please finish the word equation and then draw the structures for the reactions between each of the following:

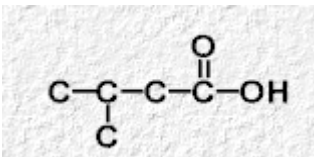
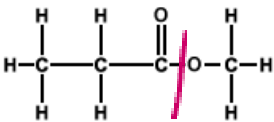

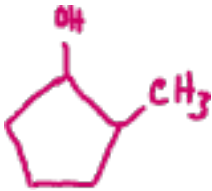
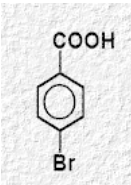
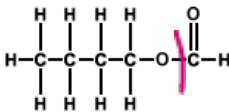
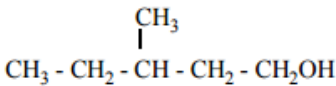
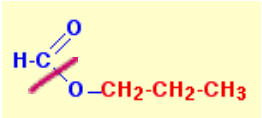
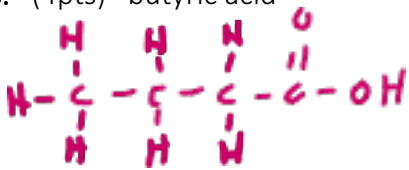
a. Ethanoic acid + methanol → methyl ethanoate + \_\_\_\_\_



b. Propanoic acid + ethanol → ethyl propanoate + \_\_\_\_\_



Part 4: Mixed Compounds (21pts) Finish each table.

<p>20. (2pts)</p>  <p>IUPAC: 3-methyl butanoic acid</p> <p>Common: 3-methyl-butyrilic acid</p>	<p>21. (2pts)</p>  <p>methyl propanoate</p>	<p>22. (2pts)</p>  <p>1,6-hexanediol</p>
<p>23. (3pts) 2-methyl-cyclopentanol</p>  <p>1° 2° 3°</p>	<p>24. (2pts)</p>  <p>IUPAC: 4-bromobenzoic acid</p> <p>Common: para-bromo benzoic acid</p>	<p>25. (2pts)</p>  <p>1-butyl methanoate</p>
<p>26. (2pts)</p>  <p>3-methyl-1-pentanol</p> <p>1° 2° 3°</p>	<p>27. (2pts)</p>  <p>propyl methanoate</p>	<p>28. (4pts) butyric acid</p>  <p>IUPAC: butanoic acid</p> <p>Location: rancid butter</p>

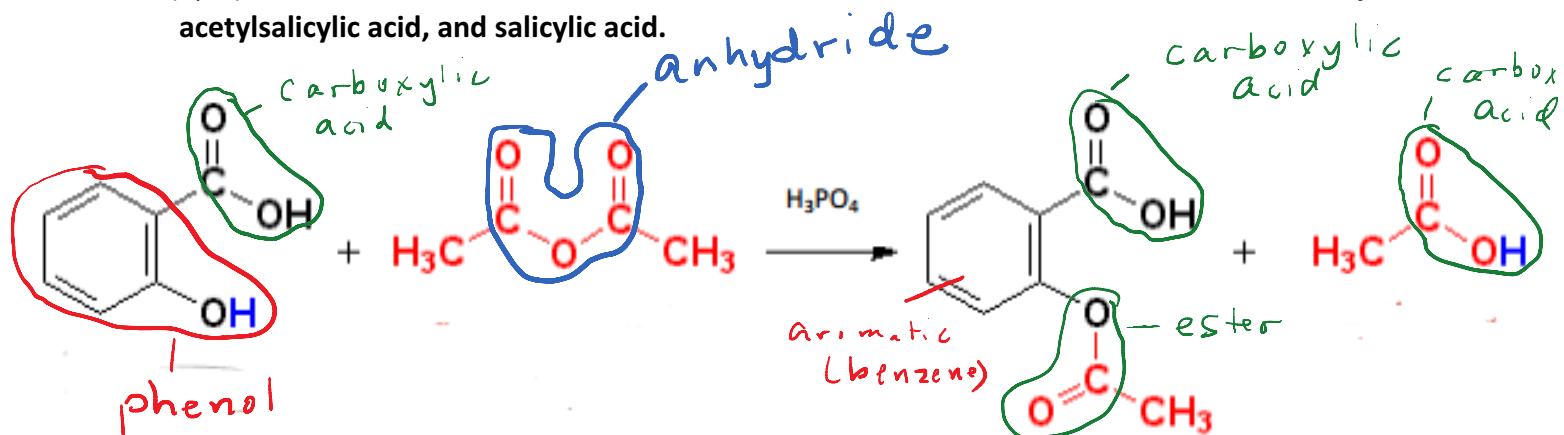
### Part 5: Description of the Synthesis of an Ester Lab (5 pts)

29. Please describe the process by which you made the pineapple fragrant ester, ethyl butanoate. Answer in the past tense with no personal pronouns. CORRECTLY IDENTIFY the carboxylic acid and alcohol needed to make ethyl butanoate. Be specific with the equipment used and the role of each substance. Draw a sketch if you think it might help with understanding.

A boiling water bath was prepared using a hot plate and a 400 mL beaker. The following was added to a test tube: 6 drops of ethanol, 2 drops of butanoic acid, and 5 drops of concentrated sulfuric acid. The test tube was heated in the boiling water bath for 3 minutes. After the test tube was removed, 5 mL of distilled water was added and the scent was wafted.

### Part 6: Aspirin

30. A. (5pts) Please circle and label each functional group on each substance in this reaction.
- B. (4pts) On the lines beneath each substance, label the name of each: acetic acid, acetic anhydride, acetylsalicylic acid, and salicylic acid.



Salicylic acid + acetic anhydride → acetylsalicylic acid + acetic acid.

31. (3pts) List three things aspirin is effective for.

- reducing fever
- pain relief
- reducing inflammation

32. (2pts) Define antipyretic and analgesic

fever  
reducer

pain reliever

33. (2pts) Explain where salicylic acid is found in nature and how it has been used in its natural form historically.

It is found naturally in willow bark and teas were made historically with the willow bark for the medicinal properties.

34. (2pts) List unpleasant side effects of salicylic on the body

- irritates esophagus and stomach; may cause ulcers and hemorrhaging (bleeding).

35. (2pts) Describe your aspirin vs commercial aspirin titration results and explain why these results make sense.

Titration with our aspirin vs commercial aspirin showed ours to contain more aspirin per gram. Evidence of this was that our aspirin used more sodium hydroxide per gram before the end point was reached. This makes sense because commercial aspirin uses starch as a binder.

36. (3pts) Would salicylic acid or acetylsalicylic acid produce a positive test with iron (III) chloride? What is the evidence of a positive test with the iron (III) chloride? Explain why each would or would not produce a positive test.

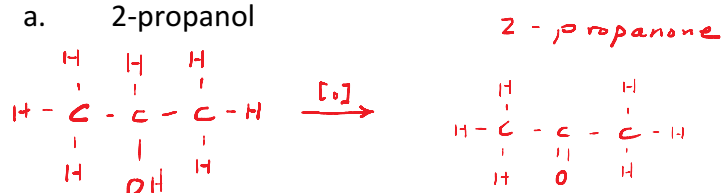
Salicylic acid would test positive (purple color) with iron(III) chloride. It tests positive because it has a phenol group, in which aspirin (acetylsalicylic acid) does not have a phenol group.

37. (4pts) Describe the role of acid-base body conditions on the breakdown of aspirin in the body (specifically the transition from the stomach to the small intestines)

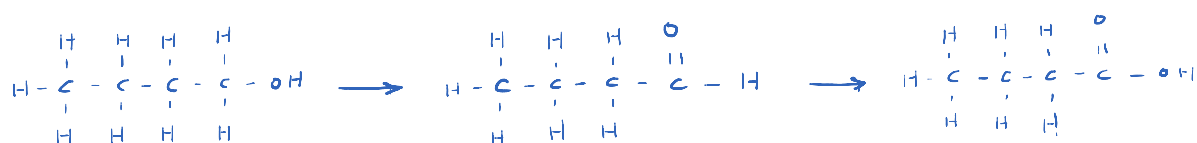
Aspirin remains largely unreacted in the acidic environment of the stomach. When it reaches the basic environment of the small intestines, it reacts with water to break down into salicylic acid and acetic acid. From here, the salicylic acid can enter the blood stream and begin working.

38. Name and write structures for the product(s) that result from the oxidation of these alcohols.

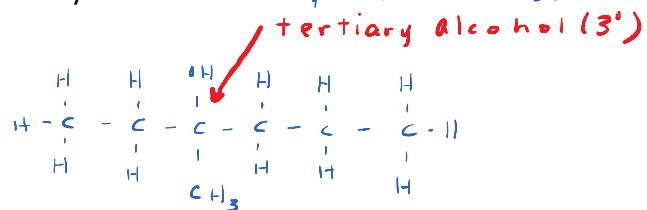
a. 2-propanol



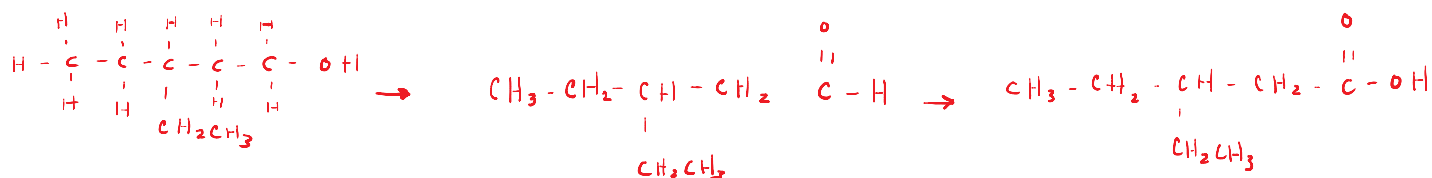
b. 1-butanol  $\rightarrow$  butanal  $\rightarrow$  butanoic acid



c. 3-methyl-3-hexanol  $\rightarrow$  NO Reaction



d. 3-ethyl-1-pentanol  $\rightarrow$  3-ethyl pentanal  $\rightarrow$  3-ethyl pentanoic acid



e. 3-heptanol  $\rightarrow$  3-heptanone

