

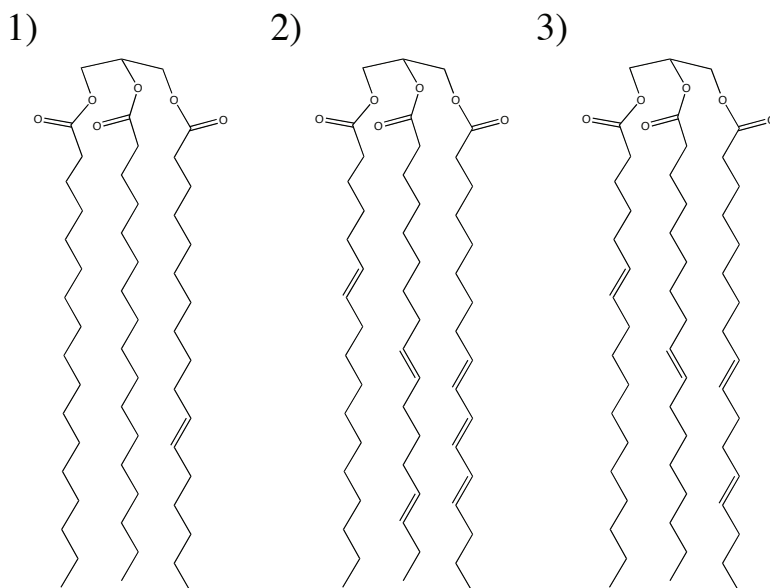
1. (2 points) What is the chemical formula for the molecule at right?

- 1)  $C_6H_8$       2)  $C_6H_{10}$       3)  $C_6H_{12}$       4)  $C_6H_{14}$       5)  $C_6H_{16}$

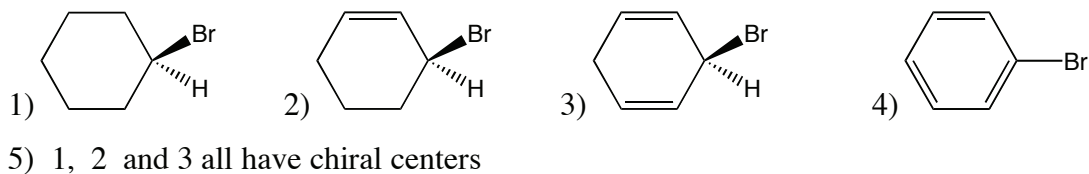
2. (2 points) What is the functional group in  $CH_3COOH$ ?

- 1) alcohol    2) ketone    3) aldehyde    4) carboxylic acid    5) ether

3. (2 points) Triglycerides are a common form a fat in our bodies. Which of the following triglycerides is **most** likely to be a liquid at room temperature?

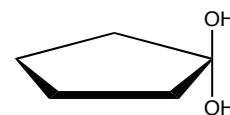


4. (2 points) Which molecule below has a chiral center?

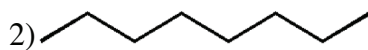
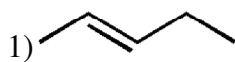


5. (2 points) The molecule at right is

- 1) a cis isomer      2) a trans isomer      3) not an isomer

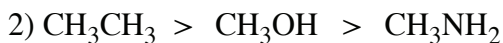
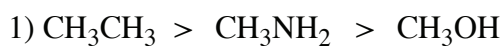


6. (2 points) Which molecule below is less reactive, in general?



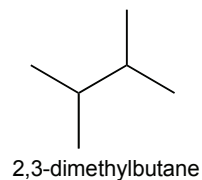
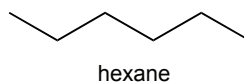
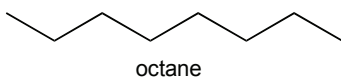
3) they have the same reactivity

7. (2 points) Rank boiling points, highest to lowest:



5) They are all about the same

8. (2 points) Which molecule below has the lowest boiling point?



1) octane

2) hexane

3) 2,3-dimethylbutane

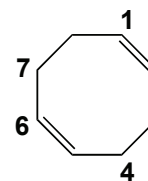
9. (2 points) In the molecule at right, the ideal bond angle around the 4-carbon is:

1)  $120^\circ$

2)  $109^\circ$

3)  $90^\circ$

4)  $180^\circ$

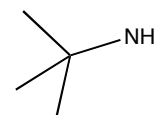


10. (2 points) In the molecule at right, the amine is classified as:

1) primary

2) secondary

3) tertiary

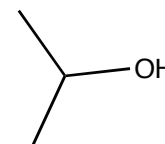


11. (2 points) In the molecule at right, the alcohol is classified as:

1) primary

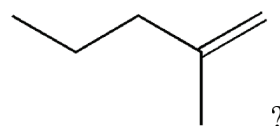
2) secondary

3) tertiary



12. (2 points) Aldehydes are readily oxidized (by oxygen in air) to  
 1) ketones      2) alcohols      3) carboxylic acids      4) the parent alkanes  
 5) aldehydes are not readily oxidized
13. (2 points) Ketones are readily oxidized (by oxygen in air) to  
 1) aldehydes      2) alcohols      3) carboxylic acids      4) the parent alkanes  
 5) ketones are not readily oxidized
14. (2 points) Ketones are reduced by  $H_2$  and an appropriate catalyst to  
 1) ketones      2) alcohols      3) carboxylic acids      4) the parent alkanes  
 5) ketones are not readily reduced
15. (2 points) Aldehydes are reduced by  $H_2$  and an appropriate catalyst to  
 1) ketones      2) alcohols      3) carboxylic acids      4) the parent alkanes  
 5) aldehydes are not readily reduced

16. (2 points) What is the product of the reaction of HBr with

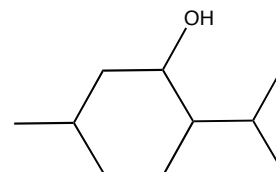


- 1)      2)      3)

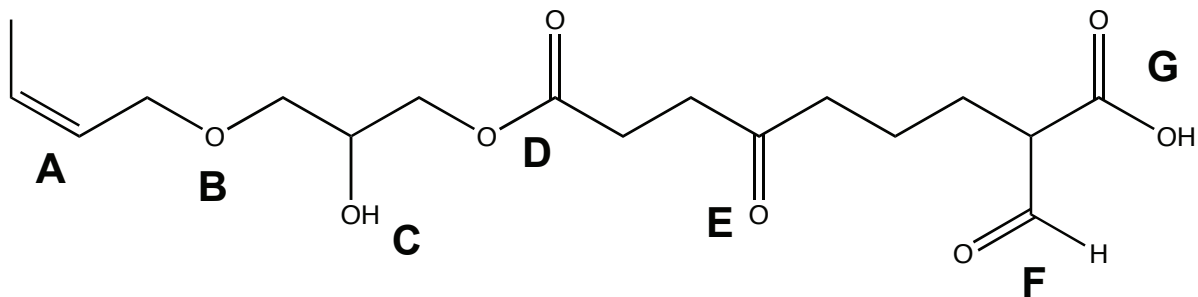
17. (2 points) A racemic mixture  
 1) rotates polarized light to the right    2) rotates polarized light to the left  
 3) does not rotate polarized light

18. How many chiral centers are in the molecule at right?

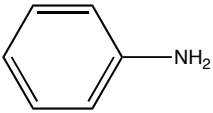
- 1) 0      2) 1      3) 2      4) 3      5) 10

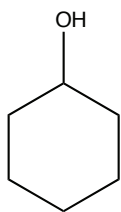


For questions 19 to 23, refer to the molecule below. Please mark your answers neatly.

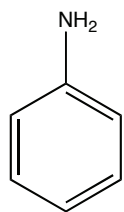


19. (2 points) Which of the above represents a ketone group?  
 1) B                      2) D                      3) E                      4) F                      5) G
20. (2 points) Which group above is acidic?  
 1) B                      2) D                      3) E                      4) F                      5) G
21. (2 points) Which of the above represents an ester group?  
 1) B                      2) D                      3) E                      4) F                      5) G
22. (2 points) Which of the above represents an aldehyde group?  
 1) B                      2) D                      3) E                      4) F                      5) G
23. (2 points) The functionality at A is:  
 1) cis                      2) trans                      3) neither

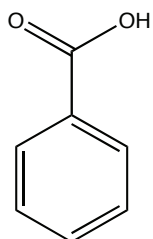
24. The molecule at right is: 
- 1) toluene              2) aniline              3) benzoic acid              4) benzaldehyde              5) cyclohexamine



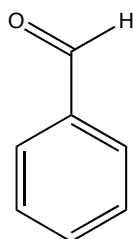
(1)



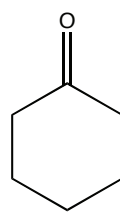
(2)



(3)



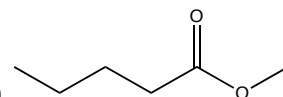
(4)



(5)

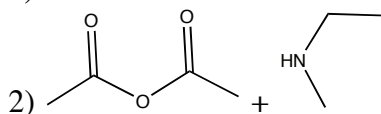
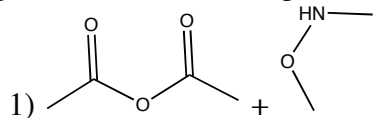
25. (2 points) Which molecule above in a reaction with  $K_2Cr_2O_7$  and  $H_2SO_4$  yields cyclohexanone?
26. (2 points) Which molecule above in a reaction with  $H_2$  and a transition metal catalyst yields cyclohexanol?

27. (2 points) Which two reagents react in the presence of  $H_2SO_4$  to form

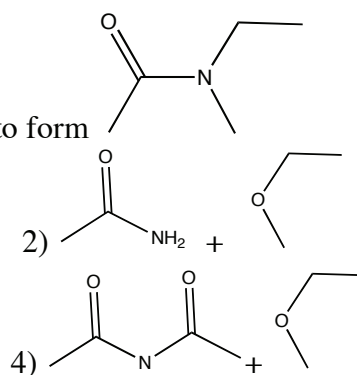


- 1) pentanol and methanoic acid
- 2) pentanol and methane
- 3) pentanoic acid and sodium hydroxide
- 4) pentanoic acid and methanol
- 5) none of the above

28. (2 points) Which two reagents react most readily to form



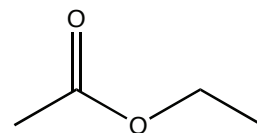
- 5) none of the above react to form that product



29. (2 points) Which listing portrays the carbons in decreasing oxidation state

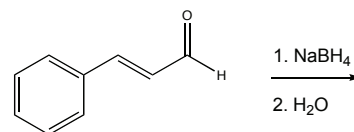
- 1)  $\text{R}-\text{CH}_3$        $\text{R}-\overset{\text{O}}{\parallel}{\text{C}}-\text{H}$        $\text{R}-\overset{\text{O}}{\parallel}{\text{C}}-\text{H}_2$        $\text{R}-\overset{\text{O}}{\parallel}{\text{C}}-\text{OH}$
- 2)  $\text{R}-\text{CH}_3$        $\text{R}-\overset{\text{O}}{\parallel}{\text{C}}-\text{H}_2$        $\text{R}-\overset{\text{O}}{\parallel}{\text{C}}-\text{H}$        $\text{R}-\overset{\text{O}}{\parallel}{\text{C}}-\text{OH}$
- 3)  $\text{R}-\overset{\text{O}}{\parallel}{\text{C}}-\text{OH}$        $\text{R}-\overset{\text{O}}{\parallel}{\text{C}}-\text{H}$        $\text{R}-\overset{\text{O}}{\parallel}{\text{C}}-\text{H}_2$        $\text{R}-\text{CH}_3$
- 4)  $\text{R}-\overset{\text{O}}{\parallel}{\text{C}}-\text{OH}$        $\text{R}-\overset{\text{O}}{\parallel}{\text{C}}-\text{H}_2$        $\text{R}-\overset{\text{O}}{\parallel}{\text{C}}-\text{H}$        $\text{R}-\text{CH}_3$

30. (2 points) Hydrolysis of the compound at right would yield



- 1) Ethanoic (acetic) acid and methanol      2) Ethanol and methanoic (formic) acid  
 3) Propanoic acid and methanol      4) Propanol and methanoic (formic) acid  
 5) This compound does not undergo hydrolysis

31. (2 points) The products of the reaction of cinnamaldehyde with  $\text{NaBH}_4$  (see scheme at right) are:



- 1) a carboxylic acid      2) a diol  
 3) sodium borate      4) an alcohol  
 5) no reaction will occur

32. (2 points) Which do you think is more acidic: benzoic acid or acetic acid?

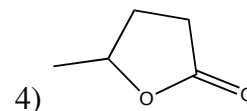
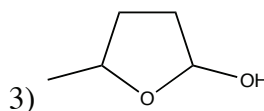
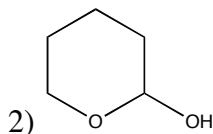
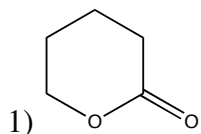
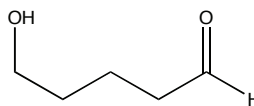
- 1) benzoic acid      2) acetic acid

33. (2 points) Which do you think is more acidic: acetic acid or trichloroacetic acid?

1) trichloroacetic acid

2) acetic acid

34. (2 points) The molecule at right can cyclize to form:



35. (2 points) Roger Clemens needs your help. Someone has given him only one of the possible stereoisomers of testosterone. What are the odds (assuming a random grabbing of bottles) that he has the correct stereoisomer?

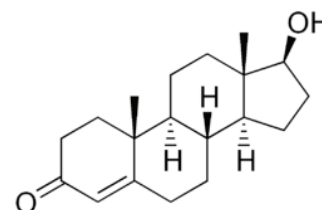
1) 1 in 8

2) 1 in 32

3) 1 in 64

4) 1 in 100

5) I don't know, but he should retire



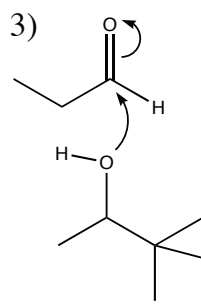
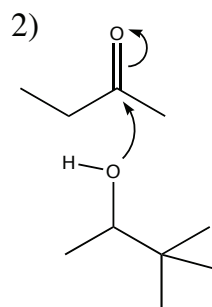
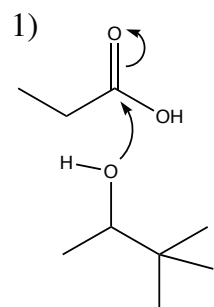
36. (2 points) Testosterone (see above) is expected to have what kind of geometry?

1) absolutely flat

2) almost flat

3) very distorted

37. (2 points) The following represent initial steps in a reaction. Which is most favorable?



38. (2 points) Which are you most likely to find as a flavoring added to your favorite candy?

1) an aldehyde

2) a long, branched alkane

3) a carboxylic acid

39. (2 points) Which is less polar?

1) an alcohol

2) a thiol

40. (2 points) What is the catalog number for this class?

1) 86

2) 111

3) 250

4) 2001

5) 68.6 g



