

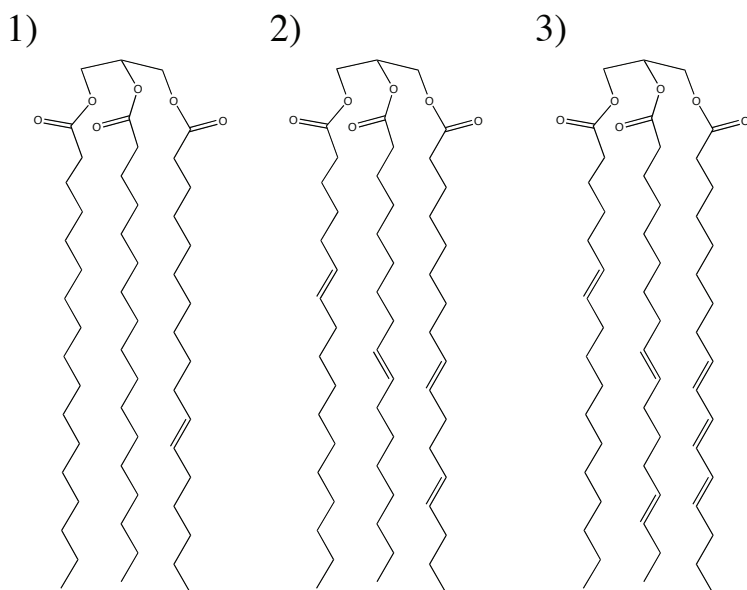
1. (2 points) What is the chemical formula for the molecule at right?

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

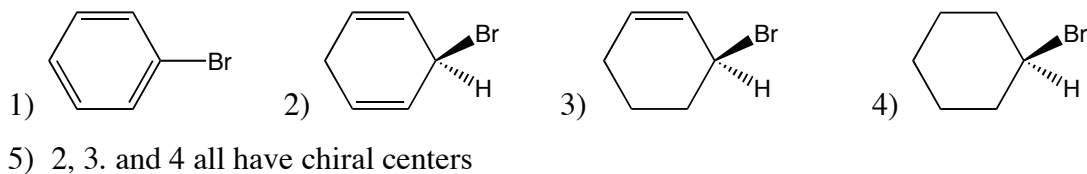
2. (2 points) What is the functional group in  $CH_3COCH_3$ ?

- 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 *least* likely to be a liquid at room temperature?

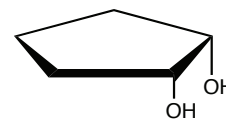


4. (2 points) Which molecule below has a chiral center?

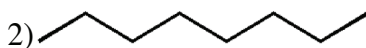
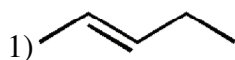


5. (2 points) The molecule at right is

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

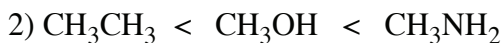
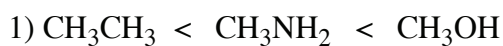


6. (2 points) Which molecule below is more reactive, in general?



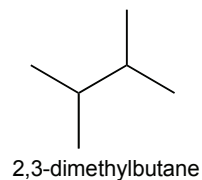
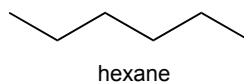
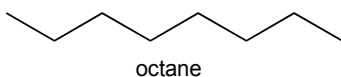
3) they have the same reactivity

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



5) They are all about the same

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



1) octane

2) hexane

3) 2,3-dimethylbutane

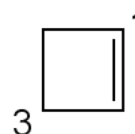
9. (2 points) In the molecule at right, the ideal bond angle around the 3-carbon is:

1)  $120^\circ$

2)  $109^\circ$

3)  $90^\circ$

4)  $180^\circ$

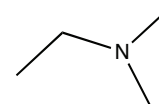


10. (2 points) In the molecule at right, the amine is classified as:

1) primary

2) secondary

3) tertiary

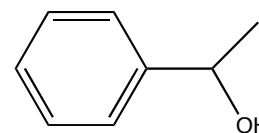


11. (2 points) In the molecule at right, the alcohol is classified as:

1) primary

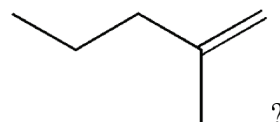
2) secondary

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

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

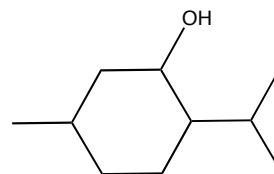


- 1)
- 2)
- 3)

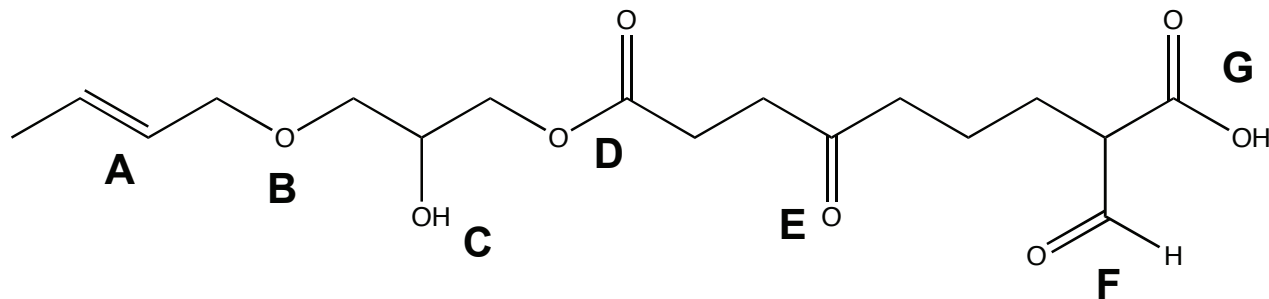
17. (2 points) A racemic mixture  
 1) rotates polarized light to the right    2) rotates polarized light to the left  
 3) does not rotate polarized light

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

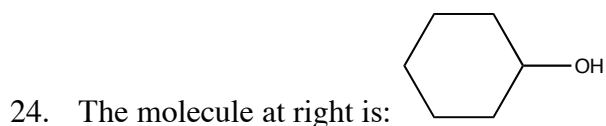
- 1) 0      2) 1      3) 2      4) 3      5) 10



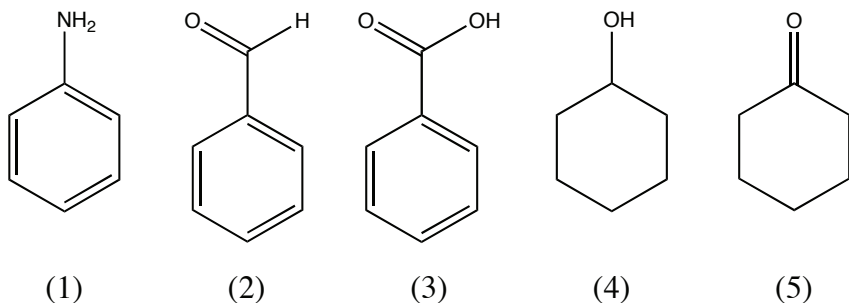
For questions 19 to 23, refer to the molecule below.



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

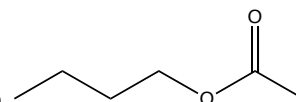


- 1) phenol                      2) aniline                      3) benzoic acid                      4) benzaldehyde                      5) cyclohexanol



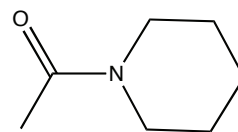
25. (2 points) Which molecule above in a reaction with  $K_2Cr_2O_7$  and  $H_2SO_4$  yields cyclohexanone?
26. (2 points) Which molecule above in a reaction with  $H_2$  and a transition metal catalyst yields cyclohexanol?

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



- 1) butanoic acid and ethene
- 2) butanol and methane
- 3) ethanoic acid and butanol
- 4) butanoic acid and ethanol
- 5) none of the above

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

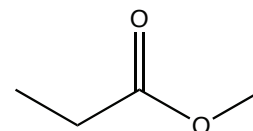


- 1) +
- 2) +
- 4) +
- 5) none of the above react to form that product

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

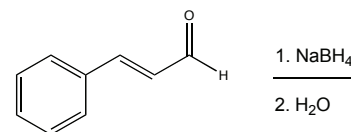
- 1)  $\text{R}-\text{CH}_3$        $\text{R}-\overset{\text{O}}{\parallel}{\text{C}}-\text{H}$        $\text{R}-\overset{\text{O}}{\parallel}{\text{C}}-\text{H}_2$        $\text{R}-\overset{\text{O}}{\parallel}{\text{C}}-\text{OH}$
- 2)  $\text{R}-\text{CH}_3$        $\text{R}-\overset{\text{O}}{\parallel}{\text{C}}-\text{H}_2$        $\text{R}-\overset{\text{O}}{\parallel}{\text{C}}-\text{H}$        $\text{R}-\overset{\text{O}}{\parallel}{\text{C}}-\text{OH}$
- 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 acid  
 3) Propanoic acid and methanol      4) Propanol and methanoic 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?

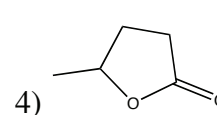
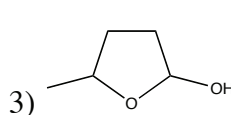
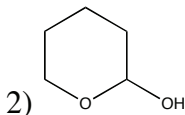
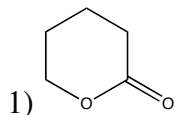
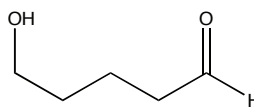
- 1) acetic acid      2) benzoic acid

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

1) acetic acid

2) trichloroacetic 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 androstenedione. What are the odds (assuming a random grabbing of bottles) that he has the correct stereoisomer?

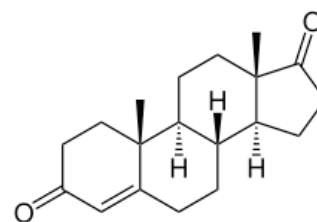
1) 1 in 8

2) 1 in 32

3) 1 in 64

4) 1 in 100

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



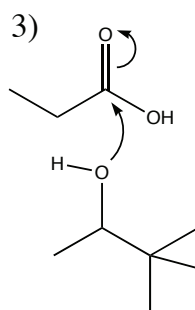
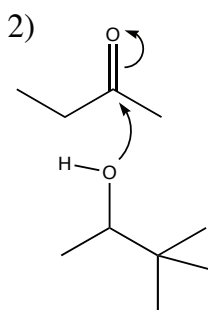
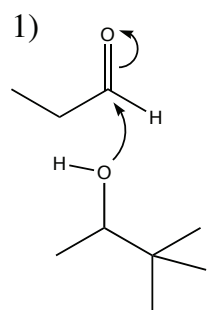
36. (2 points) Androstenedione (see above) is expected to have what kind of geometry?

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) a long, branched alkane

2) an aldehyde

3) a carboxylic acid

39. (2 points) Which is more polar?

1) an alcohol

2) a thiol

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

1) 86

2) 250

3) 111

4) 3.14159

5) 68.6 g



**Turn this page in, along with your OpScan Sheet (be sure your name is on both!)**

41. (5 points) Draw the structure for dimethylethylamine:
42. (5 points) Draw the structure for 5-chloro-3-pental:
43. (5 points) Draw the structure for pineapple flavor: ethyl butanoate
44. (5 points) Draw the structure for 2-ketodipentanoic acid

**Turn this page in, along with your OpScan Sheet (be sure your name is on both!)**