Chem 250 Evening Exam 1

This exam is composed of **44** questions.

As discussed in the course syllabus, honesty and integrity are absolute essentials for this class. In fairness to others, dishonest behavior will be dealt with to the full extent of University regulations.

I hereby state that all answers on this exam are my own and that I have neither gained unfairly from others nor have I assisted others in obtaining an unfair advantage on this exam.

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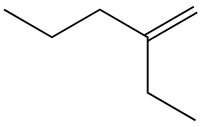
Signature

PERIODIC TABLE OF THE ELEMENTS

1A	2A	3B	4B	5B	6B	7B	8B	8B	8B	1B	2B	3A	4A	5A	6A	7A	8A
1 H 1.008																	2 He 4.003
3 Li 6.939	4 Be 9.012											5 B 10.81	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.18
11 Na 22.99	12 Mg 24.31											13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.07	17 Cl 35.45	18 Ar 39.95
19 K 39.10	20 Ca 40.08	21 Sc 44.96	22 Ti 47.90	23 V 50.94	24 Cr 52.00	25 Mn 54.94	26 Fe 55.85	27 Co 58.93	28 Ni 58.71	29 Cu 63.55	30 Zn 65.39	31 Ga 69.72	32 Ge 72.61	33 As 74.92	34 Se 78.96	35 Br 79.90	36 Kr 83.80
37 Rb 85.47	38 Sr 87.62	39 Y 88.91	40 Zr 91.22	41 Nb 92.91	42 Mo 95.94	43 Tc (99)	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3
55 Cs 132.9	56 Ba 137.3	57 La 138.9	72 Hf 178.5	73 Ta 181.0	74 W 183.8	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)
87 Fr (223)	88 Ra 226.0	89 Ac 227.0	104 Unq (261)	105 Unp (262)	106 Unh (263)	107 Uns (262)	108 Uno (265)	109 Une (266)									



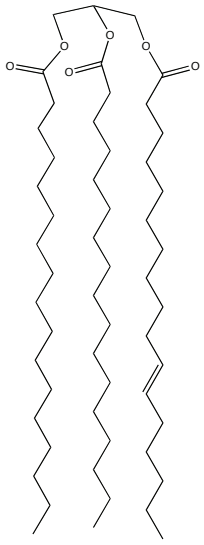
1. (2 points) What is the chemical formula for the molecule at right?

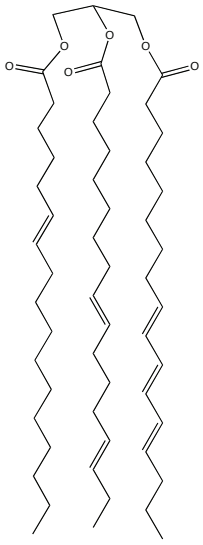
   1) C_6H_{10} 2) C_6H_{12} 3) C_6H_{14} 4) C_7H_{14} 5) C_7H_{16}

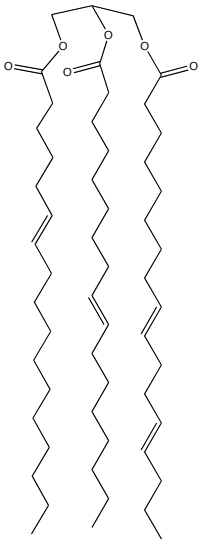
2. (2 points) What is the functional group in CH_3COH?

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

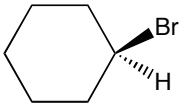
3. (2 points) Triglycerides are a common form a fat in our bodies. Which of the following triglycerides is ***most*** likely to be a liquid at room temperature?

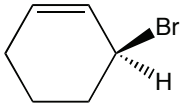
   1) 

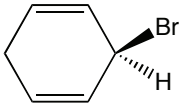
   2) 

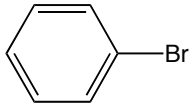
   3) 

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

   1) 

   2) 

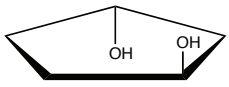
   3) 

   4) 

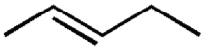
   5) 1, 2 and 3 all have chiral centers

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?

1)  2)  3) they have the same reactivity

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

1) CH_3CH_3 < CH_3NH_2 < CH_3OH

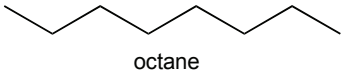
2) CH_3CH_3 < CH_3OH < CH_3NH_2

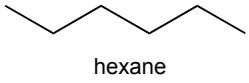
3) CH_3OH < CH_3NH_2 < CH_3CH_3

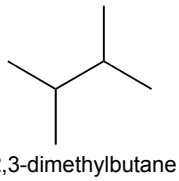
4) CH_3NH_2 < CH_3OH < CH_3CH_3

5) They are all about the same

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



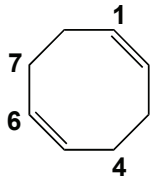




1) octane 2) hexane 3) 2,3-dimethylbutane

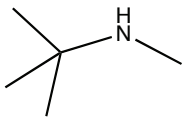
9. (2 points) In the molecule at right, the ideal bond angle around the 6-carbon is:

1) 120° 2) 109° 3) 90° 4) 180°



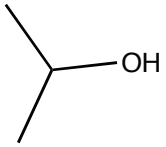
10. (2 points) In the molecule at right, the amine is classified as:

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) Aldehydes are reduced by H_2 and an appropriate catalyst to

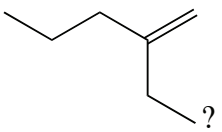
1) ketones 2) alcohols 3) carboxylic acids 4) the parent alkanes

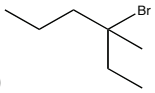
5) aldehydes are not readily reduced

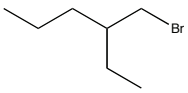
15. (2 points) Ketones are reduced by H_2 and an appropriate catalyst to

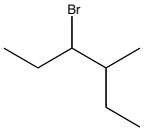
1) alchohols 2) ketones 3) carboxylic acids 4) the parent alkanes

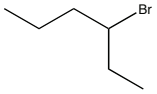
5) aldehydes are not readily reduced

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

1) 

2) 

3) 

4) 

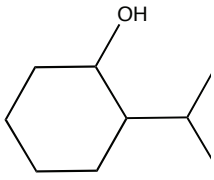
17. (2 points) A racemic mixture

1) rotates polarized light to the right 2) rotates polarized light to the left

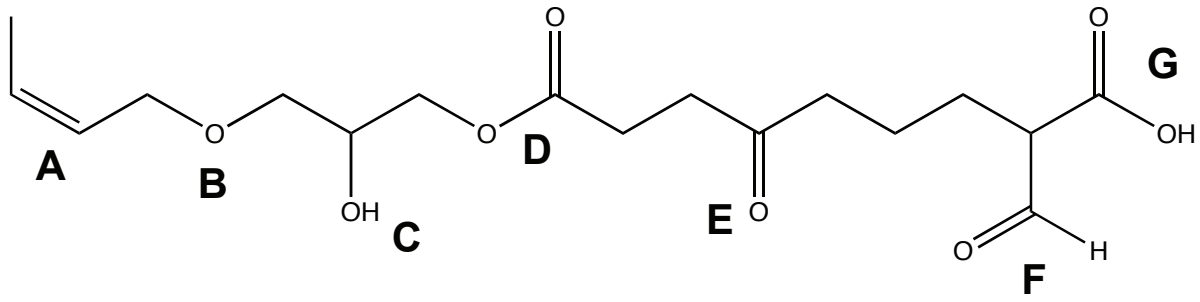
3) does not rotate polarized light

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.



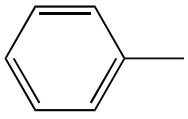
19. (2 points) Which of the above represents a ketone group?
    1) B 2) D 3) E 4) F 5) G

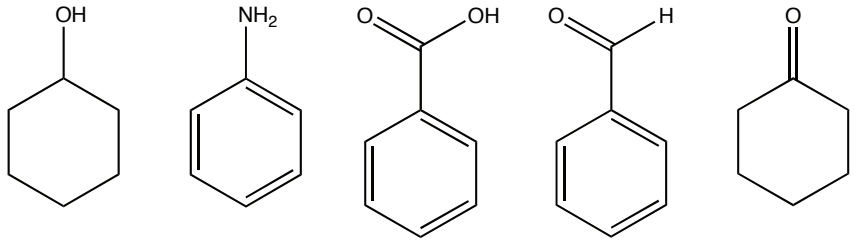
20. (2 points) Which group above is acidic?
    1) B 2) D 3) E 4) F 5) G

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

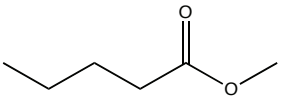
24. The molecule at right is: 
    1) toluene 2) aniline 3) benzoic acid 4) benzaldehyde 5) cyclohexamine



(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 

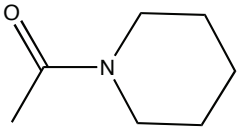
1) pentanoic acid and sodium hydroxide

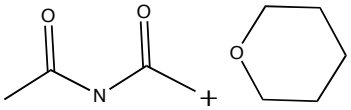
2) pentanoic acid and methanol

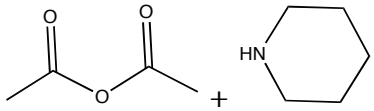
3) pentanol and methanoic acid

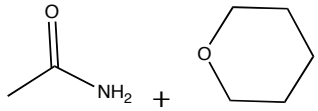
4) pentanol and methane

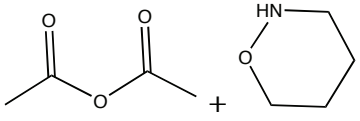
5) none of the above

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

1) 

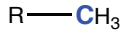
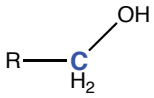
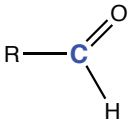
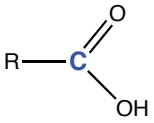
2) 

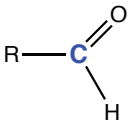
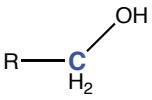
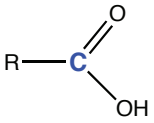
3) 

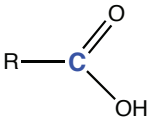
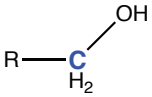
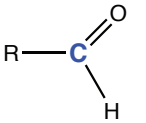
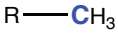
4) 

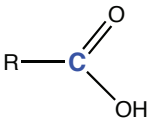
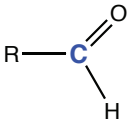
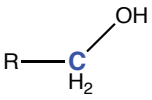
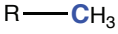
5) none of the above react to form that product

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

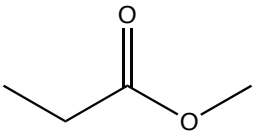
1)    

2)    

3)    

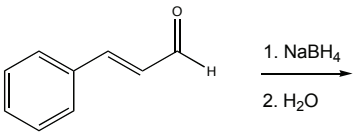
4)    

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



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

31. (2 points) The products of the reaction of cinnamaldehyde with $NaHB_4$ (see scheme at right) are:



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

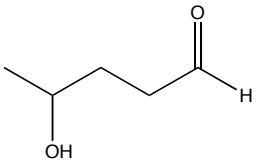
32. (2 points) Which do you think is more acidic: benzoic acid or acetic acid?

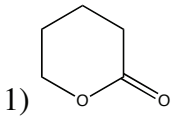
1) acetic acid
2) benzoic acid

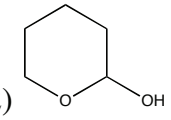
33. (2 points) Which do you think is more acidic: acetic acid or trichloroacetic acid?

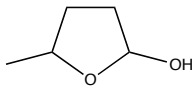
1) trichloroacetic acid 2) acetic acid

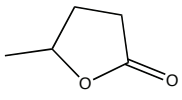
34. (2 points) The molecule at right can cyclize to form:



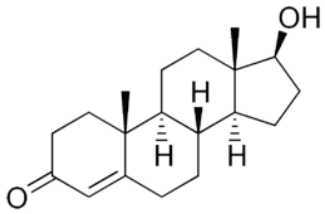
1) 

2) 

3) 

4) 

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?



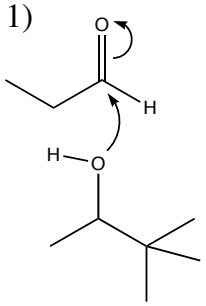
1) 1 in 8 2) 1 in 32 3) 1 in 64

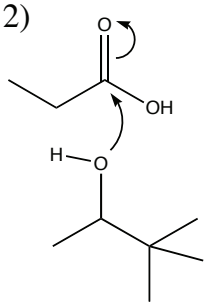
4) 1 in 100 5) I don't know, but he should retire

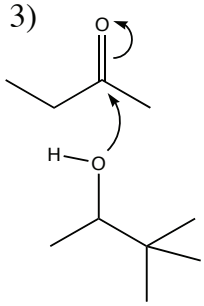
36. (2 points) Testosterone (see above) is expected to have what kind of geometry?

1) absolutely flat 2) almost flat 3) very distorted

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

1) 

2) 

3) 

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

1) a long, branched alkane 2) a carboxylic acid 3) an aldehyde

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) 2001 4) 250 5) 68.6 g

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41. (5 points) Draw the structure for diethylmethylamine:

42. (5 points) Draw the structure for 5-chloro-3-pentenal:

43. (5 points) Draw the structure for apple flavor: methyl 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!)