July 21, 2000
Summer II, 2000
Isom

# EXAM 2

**Physiological Chemistry II / CHEM 2450**

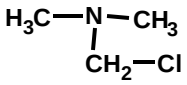
Name:_____

**Multiple Choice.** Put the letter corresponding to the correct answer in the space provided. (2 points)

____**1)** Which of the following solutions of 2-hydroxypropanoic acid would have an optical rotation of 0 ?

(a) 100% l- 2-hydroxypropanoic acid
(b) 100% d- 2-hydroxypropanoic acid
(c) 50% l- 2-hydroxypropanoic acid / 50% d- 2-hydroxypropanoic acid
(d) 50% l- 2-hydroxypropanoic acid / 50% d-3-hydroxypropanoic acid
(e) all of the above because 2-hydroxypropanoic is not chiral

____ **2)** The following compound is



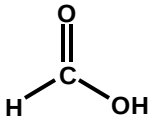
(a) a substituted amide (b) a primary amine (c) an unsubstituted amide
(d) a tertiary amine (e) none of the above

____**3)** Which of the following are true regarding an acid catalyzed hydrolysis of an ester reaction?

I. An ester must be a reactant
II. A carboxylate salt is a product
III. An alcohol is a product
IV. Water is a product

(a)All are true (b) II and III (c) I and III
(d) I, III and IV (e) None are true

____**4)** The compound below is commonly known as



(a) formic acid (b) acetic acid (c) acetaldehyde (d) formaldehyde
(e) none of the above

Name_____

____**5)** What is the correct order (lowest to highest) of the boiling point of these molecules ?

I. trimethyl amine (mw. 59 g/mol) II. ethyl methyl amine (mw. 59 g/mol)
III. propyl amine (mw. 59 g/mol)

(a) I < II < III (b) II < I < III (c) III < I < II (d) I < III < II
(e) cant determine from the information given

____ **6)** Which class of compounds are responsible for the odors of decaying flesh ?

(a) amides (b) carboxylic acids (c) amines (d) esters (e) None of the above

____ **7)** A pair of enantomers can have

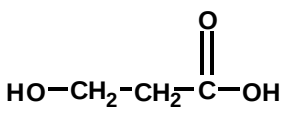
I. different physical properties II. different boiling points III. different molecular weights
IV. different optical rotation V. different physiological consequences

(a) I, II, III, IV and V (b) I, II and V (c) IV and V (d) III, IV and V
(e) none of the above

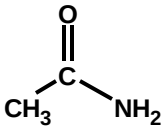
____**8)** The product of the reaction of N,N-diethylpropanamide with a reducing agent is

(a) propanoic acid + diethyl amine
(b) 1-propanol + propanoic acid
(c) propanoic acid + ethanol + ammonia
(d) diethyl propyl amine
(e) the reaction cannot take place

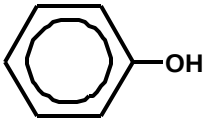
____**9)** Which of the following compounds is/are acidic ?



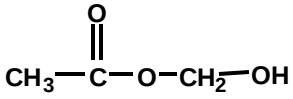

I.




II.




III.




IV.

(a) I, II, III and IV (b) I only (c) I and III (d) I and IV (e) I, II and III

____**10)** Which of the structures in # 9 above is stabilized by resonance?

(a) I, II, III and IV (b) I, II and IV (c) III only (d) I and IV
(e) None of the structures is stabilized by resonance.

Name_____

___ **11)** Which is the correct formula for sodium sterate (soap) ?

(a) $CH_3(CH_2)_{14}COOH$
(b) $CH_3(CH_2)_{15}COOH$
(c) $CH_3(CH2)_{14}COO^-\ Na^+$
(d) $CH_3(CH_2)_{15}COO^-\ Na^+$
(e) None of the above

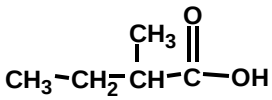
___**12)** Which of the following is responsible for the tanginess of swiss cheese?

(a) butyric acid (b) formic acid (c) propionic acid (d) acetic acid
(e) none of the above

___**13)** Which of the following would produce bubbles upon treatment with nitrous acid?

(a) butyl amine (b) acetamide (c) ethyl methyl amine
(d) N-isopropylpentamide (e) none of the above

___**14)** The methyl group is on which carbon (using **common** nomenclature) of the molecule below ?



(a) 2 (b) $\gamma$ (c) $\alpha$ (d) $\beta$ (e) none of the above

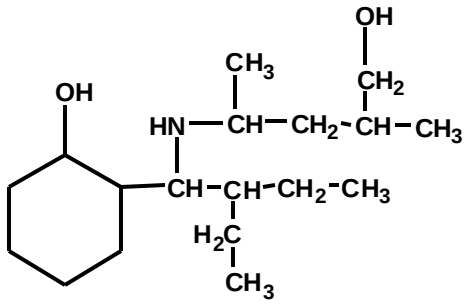
___**15)** The purpose of giving butyric acid to patients with sickle cell anemia is

(a) to activate the $\gamma$ - globin gene
(b) to deactivate the defective $\beta$ - globin gene
(c) to activate the unmutated $\beta$ - globin gene
(d) to deactivate the $\gamma$ - globin gene
(e) None of the above

Name _____

**16)** Clearly circle all of the chiral carbons in **2 of the 3** structures below. Then indicate whether the molecule is chiral in the space to the right of the molecule.
(10 points / 5 points each)

(a)

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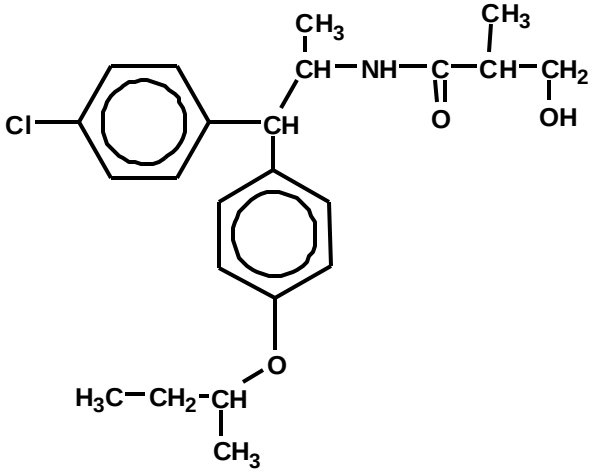
(b)

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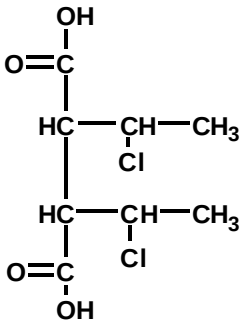
(c)

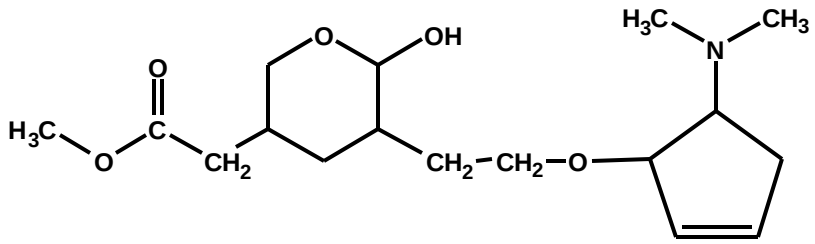



_____

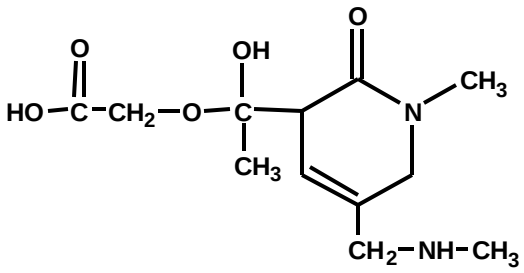
Name _____

**17) Clearly circle** and **label** all the functional groups in **1 of the 2** molecules below. (10 points)

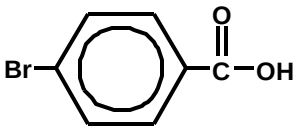
a)



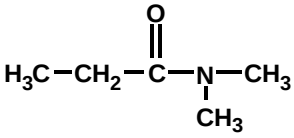

b)



**18)** Name **2 of the 3** following structures (10 points / 5 each) Name_____

(a) 

_____

b) 

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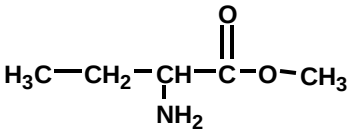
c) 

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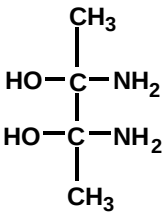
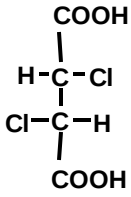
**19)** Draw the mirror image of both of the structures below. **Clearly label** the chiral carbon(s) if any and **circle** the correct answer to the questions. If the molecule is not chiral, **draw** the plane of symmetry of the molecule. (10 points)

(a) 

_____
mirror image

Is the molecule chiral? YES NO

Are the two structures enantomers? YES NO

(b) 

_____
mirror image

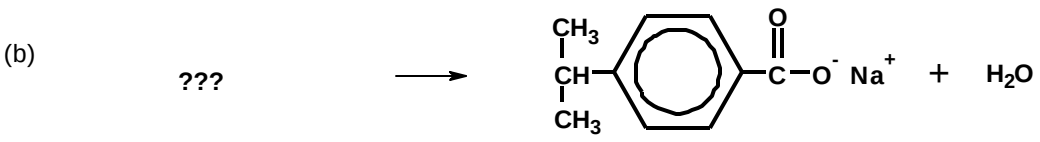
Is the molecule chiral? YES NO

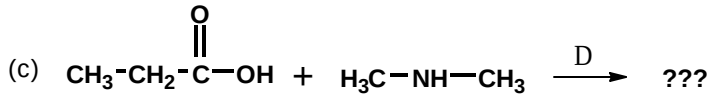
Are the two structures enantomers? YES NO

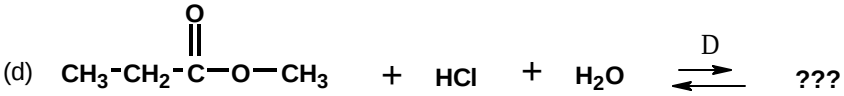
Name_____

**20)** Supply the missing information in **3 of the 4** reactions below. Make sure to **draw** and **name** all reactants and products. (21 points / 7 points each)

(a) Any example of an esterfication reaction

(b) 


(c) 


(d) 

**21)** Select **one** of the topics below and explain in **detail**, using words and pictures (9 points).

a) A carboxyl group differs from a carbonyl group in its tendency to undergo reactions (ie reactivity). Explain this and be sure to include a discussion of resonance in your answer .

b) Explain the trend in boiling point of molecules that have similar molecular weights but differ in the type (ie. OH or NH) of intermolecular hydrogen bonds possible. Be sure to include a few functional groups in your answer.

c) Explain the reason that treatment of sickle cell anemia that we discussed in class works. Be sure to include a description of the illness in your answer.

**Bonus (2 pts)** Enantomers can have different effects on our bodies even though the molecules differ only in the orientation of their atoms in space. List 2 examples.

A)

B)