

## Exam 3

## Part A

Name \_\_\_\_\_

Follow the directions and select the BEST answer for each section. Mark your answers on the scantron answer sheet carefully. Make sure you put your name on your scantron answer sheet- do so before you begin! Circle your name for 2 points extra credit. Clearly indicate which Scantron form is the **PRIMARY** and **SECONDARY** ones by writing **PRIMARY** and **SECONDARY** on the top-right hand corner of each Scantron.

There are 19 questions/problems for 100 pts. total.

A. Match or fill in the blank. Remember to choose the "BEST" answer!

2 pts. each

1. A catalyst \_\_\_\_\_ the activation energy of a chemical reaction.
  - A. increases
  - B. decreases\*
  - C. changes
  - D. removes
  - E. installs
2. A catalyst \_\_\_\_\_ the rate of a chemical reaction.
  - A. increases\*
  - B. decreases
  - C. changes
  - D. removes
  - E. installs
3. Hand warmers take advantage of an exothermic chemical reaction. Which concept applies when one is used?
  - A. Le Chatelier's principle of equilibrium maintenance\*
  - B. equilibrium
  - C. conservation of energy
  - D. conservation of mass
  - E. all of these\*
4. Which functional group must be present in the monomer for polymerization to occur?
  - A. aldehydes
  - B. alkanes
  - C. alkenes\*
  - D. amines
  - E. esters
5. How many isomers of pentane are there?
  - A. 1
  - B. 2
  - C. 3\*
  - D. 4
  - E. 5

6. Why are trans double bonds unfavorable in edible fats?
- they taste bad
  - they taste good
  - they allow the fat molecules to “cake” and form a solid\*
  - they force the molecules to spread apart and form a liquid
  - they are better for your health
7. Which is the generic name for a molecule containing repeating single units?
- Peptide
  - amino acid
  - carbohydrate
  - polymer\*
  - monomer
8. What kind of bond exists in all peptides?
- peptide/amide\*
  - amine/amide
  - sulfide/thiol
  - hydrogen
  - covalent
9. Which is not an example of a natural polymer?
- hair
  - wood
  - nylon\*
  - rubber
  - DNA

### Part B

Solve the following problems. Be sure to show all of your work if you want any credit- i.e.

**NO WORK = NO CREDIT!**

10. Fill in the missing information in the following table.

/10 pts.

line structure	# of carbons	name
□	1	methane
▬	2	ethane
▬ 	3	propane
▬   	4	butane
▬     	5	pentane
▬       	6	hexane
▬         	7	heptane
▬           	8	octane
▬             	9	nonane
▬               	10	decane

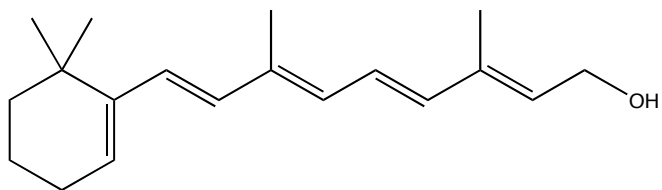
11. Draw the energy diagram for an exothermic reaction. Label all basic parts listed below. 4 pts.

See review notes

reactant energy  
product energy  
activation energy

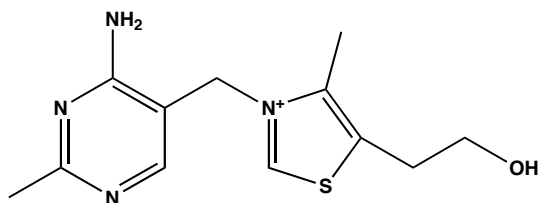
12. Identify **all heteroatomic** functional groups only in the following molecules. Make sure you clearly label every one and account for all of them!

A. vitamin A (retinol) /1



a. alcohol \_\_\_\_\_

B. vitamin B1 (thiamine) /4



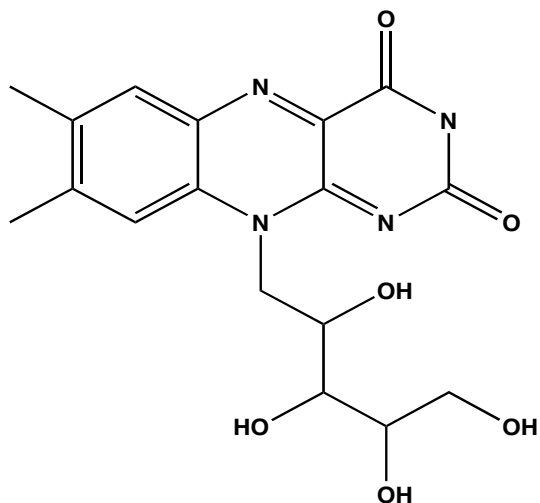
a. alcohol \_\_\_\_\_

b. sulfide \_\_\_\_\_

c. amine \_\_\_\_\_

d. imines \_\_\_\_\_

C. vitamin B2 (riboflavin) /4



a. amides \_\_\_\_\_

b. amine \_\_\_\_\_

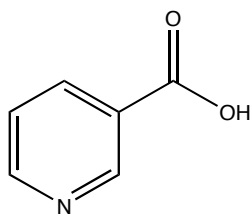
c. imine \_\_\_\_\_

d. alcohols \_\_\_\_\_

/13 pts. total

## D. vitamin B3 (niacin)

/2

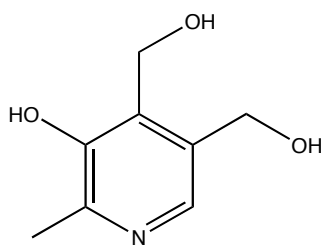


a. carboxylic acid \_\_\_\_\_

b. imine \_\_\_\_\_

## E. vitamin B6 (pyridoxine)

/2

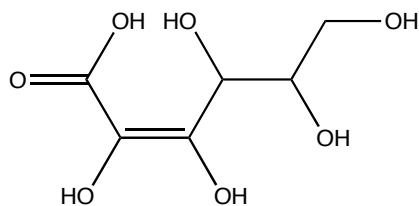


a. alcohols \_\_\_\_\_

b. imine \_\_\_\_\_

## F. vitamin C (ascorbic acid)

/2

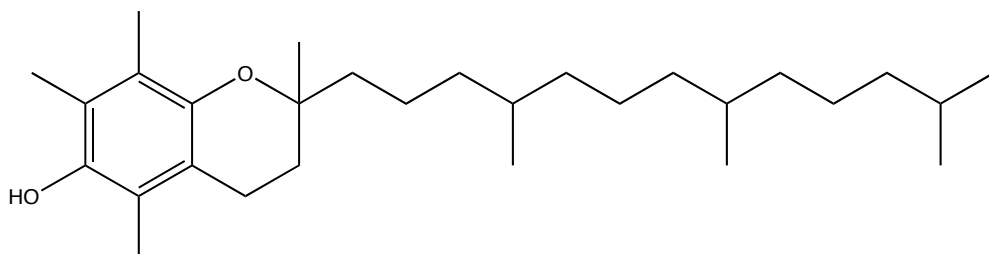


a. carboxylic acid \_\_\_\_\_

b. alcohols \_\_\_\_\_

G. vitamin E ( $\alpha$ -tocopherol)

/2

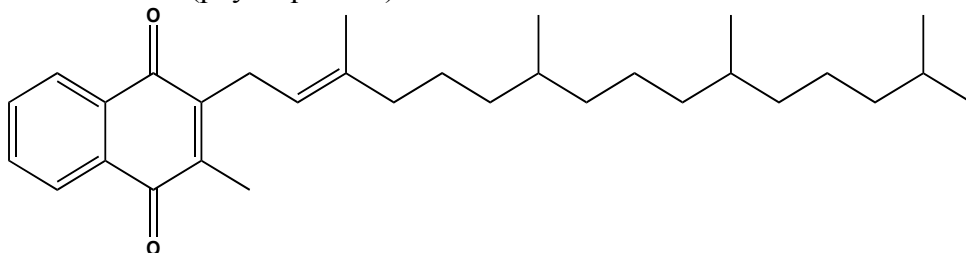


a. ether \_\_\_\_\_

b. alcohol \_\_\_\_\_

## H. vitamin K (phylloquinone)

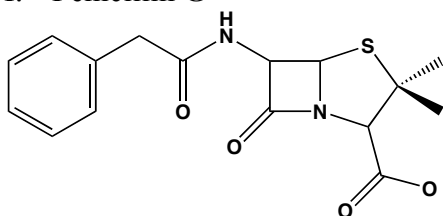
/1



a. ketones \_\_\_\_\_

## I. Penicillin G

/3



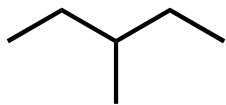
a. carboxylic acid \_\_\_\_\_

b. amides \_\_\_\_\_

c. sulfide \_\_\_\_\_

/12 pts. total

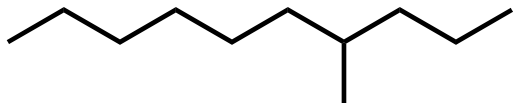
13. Name the following compounds

A. /2

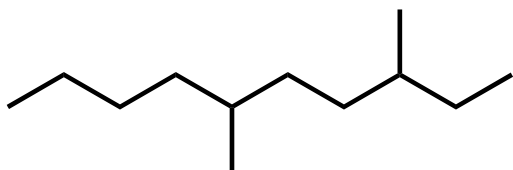
3-methylpentane\_\_\_\_\_

B. /2

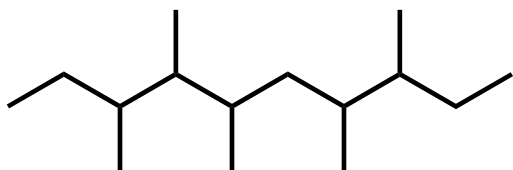
3,3-dimethylpentane\_\_\_\_\_

C. /2

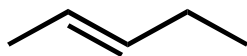
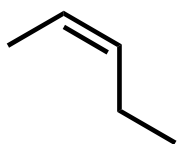
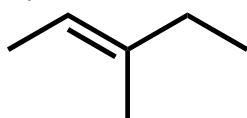
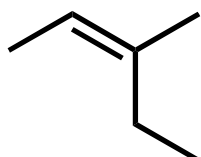
4-methyldecane\_\_\_\_\_

D. /2

3,6-dimethyldecane\_\_\_\_\_

E. /2

3,4,5,7,8-pentamethyldecane\_\_\_\_\_

F. /2*trans*-2-pentene\_\_\_\_\_G. /2*cis*-2-pentene\_\_\_\_\_H. /23-methyl-*trans*-2-pentene\_\_\_\_\_I. /23-methyl-*cis*-2-pentene\_\_\_\_\_

/18 pts. Total

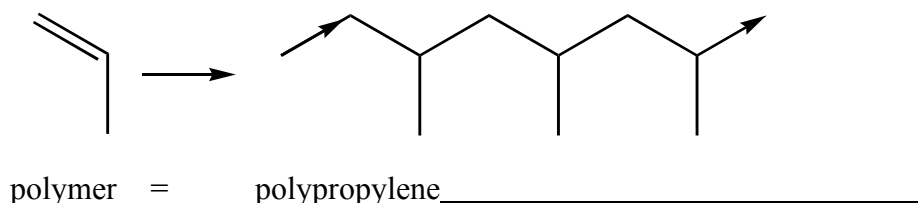
14. Draw a cartoon figure of a monomer. Then draw a figure of the polymer that forms from this monomer. /2

See review notes

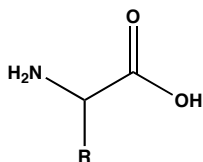
15. Draw a cartoon representation of a nucleotide (a monomeric unit of DNA). /3

See review notes

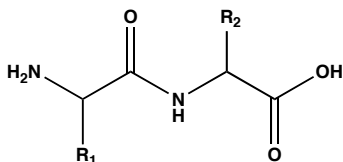
16. Identify (*i.e.* circle) the monomeric unit (propylene) in the polymer and name the polymer. /3



17. Draw the fundamental structural unit for all amino acids. /4



18. Draw an example of a dipeptide with an amide bond that joins two amino acids with R-groups  $R_1$  and  $R_2$ , respectively /4



19. Match (draw a line between) the names and their respective structural information contained in the four structural units of proteins. /4

- |  |  |
|--|--|
| a) Primary ( $1^\circ$ ) structure     | c helix or sheet structure                           |
| b) Secondary ( $2^\circ$ ) structure   | a amino acid sequence                                |
| c) Tertiary ( $3^\circ$ ) structure    | d protein folding due to intermolecular interactions |
| d) Quarternary ( $4^\circ$ ) structure | b protein folding due to intramolecular interactions |

/20 pts. Total

/10 pts pg 2

/13 pts pg 3

/12 pts pg 4

/18 pts pg 5

/20 pts pg 6

/73 pts Total