

Key

Mock Exam for CH 107 Exam 3 (Chapters 18, 19. This is a similar format to the exam. Remember to pace yourself with the questions; you do not want to run out of time.

1. Which of the following is a secondary amine? C
- a. CH_3NCH_3 - no, the N needs 3 bonds + this has only 2
- b. $\text{CH}_3\text{CH}_2(\text{CO})\text{NHCH}_3$ - a 2° amide
- c. $\text{CH}_3\text{NHCH}_2\text{CH}_3$ ✓
- d. $\text{CH}_3(\text{CO})\text{N}(\text{CH}_3)_2$

2. The reaction between an amine and _____ forms an amide. C
- a. ketone
- b. Alcohol
- c. Carboxylic acid
- d. Aldehyde
- "amidation"
amine + carb. acid \rightarrow amide + H_2O
 $\text{NH}_3 + \text{R}-\overset{\text{O}}{\parallel}{\text{C}}\text{OH} \rightarrow \text{R}-\overset{\text{O}}{\parallel}{\text{C}}\text{NH}_2 + \text{H}_2\text{O}$

3. Name the following compound: b
- $\overset{5}{\text{CH}_3}\overset{4}{\text{CH}_2}\overset{3}{\text{CH}_2}\overset{2}{\text{CH}_2}\overset{1}{\text{CH}_2}(\overset{\text{O}}{\parallel}{\text{C}})\text{N}(\text{CH}_3)_2$
- a. Dimethyl pentyl amide
- b. N,N-dimethyl pentanamide
- c. N,N-dimethyl pentyl amide
- d. Dimethyl pentyl amine
- $\text{N,N-dimethyl-pentanamide}$

4. The amine ethyl propanamine is a _____ amine and will react with propanoic acid to form _____. a
- a. Secondary N-ethyl-N-propyl propanamide
- b. Secondary N,N-dipropyl ethanamide
- c. Tertiary Ethyl propyl propanamide
- d. Tertiary N-ethyl-N-propyl propanamide
-

5. _____ is an alkaloid that was the first antimalarial drug. d
- a. Pumiliotoxin alkaloid found in frog skin (heart muscles)
- b. Theobromine alkaloid - chocolate
- c. Acetaminophen amide - pain relief and fever reducer
- d. Quinine alkaloid - used by Peruvian Indians to fight fatigue + cold

6. A quaternary ammonium compound has a nitrogen bonded to _____ carbons and has a _____ charge. a
- a. Four positive
- b. Four negative
- c. Five positive
- d. Three negative
- $[\text{N}^+]$

7. A polyamide is made from a _____ and a _____. C
- a. Diacid diacid
- b. Diamine dialcohol
- c. Diacid diamine
- d. Diamine diamide
- (amide = acid + amine)
polyamide:

8. _____ will react with an amine to form an amine salt.

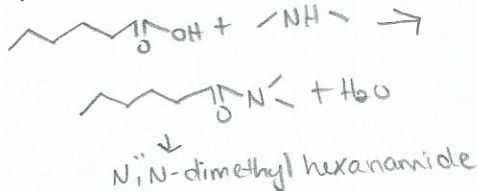
- a. HCl
- b. H₂O
- c. NH₄⁺
- d. Ammonia

amine + strong acid → amine salts

a

9. The reaction of hexanoic acid and dimethylamine will form

- a. 2,2-dimethylhexanamide
- b. N,N-dimethylhexanamine
- c. N-ethylhexanamide
- d. N,N-dimethylhexanamide



d

10. A _____ is a molecule with both positive and negative charges.

- a. Heterocyclic amine
- b. Zwitterion
- c. Free base
- d. Polyamide

b

11. Which of the following is NOT a nonpolar amino acid?

- a. Methionine nP
- b. Leucine nP
- c. Cysteine P
- d. Phenylalanine nP

c

12. Amino acids link together to form peptides and proteins. A protein has thousands of residues while a peptide has less than 50 residues.

- a. Protein peptide
- b. Protein protein
- c. Peptide protein
- d. Peptide peptide

a

13. The name of the bond that combines amino acids is _____.

- a. Amide bond
- b. Protein bond
- c. Peptide bond
- d. Hydrophobic bond

it is an amide bond, but more specifically in amino acids it is called peptide bond

c

14. Amino acids that are not synthesized in the body and must be obtained from the diet are called

- a. Incomplete
- b. Essential
- c. basic
- d. polar

b

15. Which of the following amino acid sidechains has a positive one charge?

- a. F
- b. D
- c. K +1 ✓
- d. W

check the chart! Given is the one letter name, so match it with the name, then match the name to the structure. The "R" sidechain determines the charge!

c

16. Gly¹-Met²-Asn³-Arg⁴-Lys⁵-Trp⁶ is a _____ that has _____ peptide bonds..

- a. Hexapeptide six
- b. Hexapeptide five
- c. Pentapeptide six
- d. Pentapeptide five

b

17. The bond between two cysteine molecules are called _____

- a. Disulfide bonds
- b. Peptide bonds
- c. Hydrogen bonds
- d. Nonpolar interactions

a

18. Hydrogen bonds are important in the _____ structure of proteins.

- a. Primary
- b. Secondary
- c. Tertiary
- d. Quaternary

b

19. Which of the following is NOT part of the tertiary structure of proteins?

- a. Peptide bonds
- b. Hydrophobic interactions ✓
- c. Hydrogen bonds ✓
- d. Hydrophilic interactions ✓

a

20. The tertiary is the overall protein structure while the secondary is the spatial arrangement of neighboring residues.

- a. Tertiary Secondary
- b. Tertiary Primary
- c. Quaternary primary
- d. Quaternary secondary

a

21. Globular proteins are _____ while fibrous proteins are _____.

- a. Structural functional
- b. Functional structural
- c. Not water soluble water soluble
- d. Disulfide bonds hydrogen bonds

b

22. In the peptide $\overset{N}{\text{Glu-Ala-Gln-Gly}}$, $\overset{C}{\text{_____}}$ is the C terminal residue and _____ is the N terminal residue.

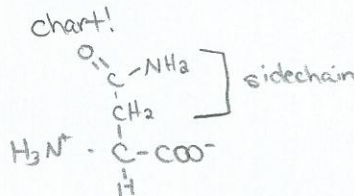
c

- a. Glycine Glycine
- b. Glutamic acid Glycine
- c. Glycine Glutamic acid
- d. Glutamine Glycine

23. What functional group is in the amino acid sidechain of asparagine?

b

- a. Amine
- b. Amide
- c. Thiol
- d. Carboxylic acid
- e. Alcohol



24. The type of interaction between the sidechains of valine and leucine is expected to be:

b

- a. Disulfide bond
- b. Hydrophobic interaction
- c. Peptide bond
- d. Hydrogen bond

both are nonpolar

25. The two peptide chains in insulin have what type of bond?

a

- a. Disulfide bond
- b. Hydrophobic interaction
- c. Peptide bond
- d. Hydrogen bond

26. Amines are considered to be _____.

b

- a. Acidic
- b. Basic - weak, so they form -OH in water
- c. Neither acidic or basic
- d. Both acidic and basic

27. Which of the following is not true about free bases?

d

- a. They are very volatile
- b. They are soluble in hydrophobic solutions
- c. They are uncharged amines
- d. They are soluble in hydrophilic solutions

* not charged and water insoluble

28. The bonds between strands in a β sheet are:

a

- a. Hydrogen bonds
- b. Disulfide bonds
- c. Peptide bonds
- d. None of the above

29. In what form are amine-containing drugs administered?

a

- a. Amine salt
- b. Free base
- c. Pumiliotoxin
- d. Polyamides

30. _____ are amines derived from plants, animals, and fungi.

a

- a. Alkaloids
- b. Pain relievers
- c. Free bases
- d. Acetaminophen

31. Amides are considered to be:

c

- a. Basic
- b. Acidic
- c. Neither acidic nor basic
- d. Both acidic and basic

32. Opioid peptides that are similar to opiate alkaloids in that they produce pain relief and feelings of euphoria are _____.

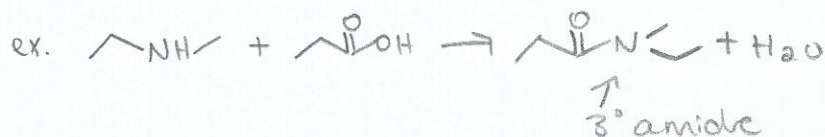
a

- a. Endorphins
- b. Sweeteners
- c. Kevlars
- d. Acetaminophens

33. In the reaction called amidation, a secondary amine will yield:

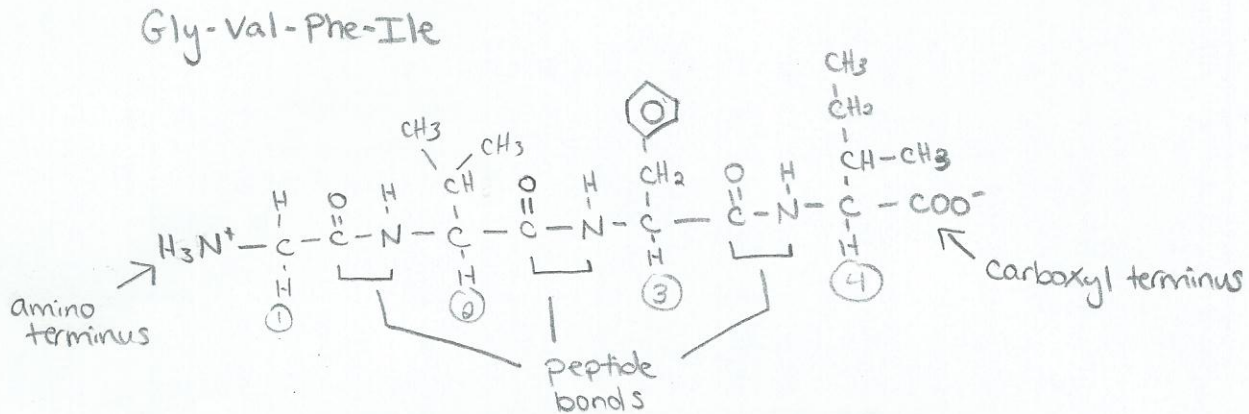
c

- a. A primary amide
- b. a secondary amide
- c. a tertiary amide
- d. no reaction

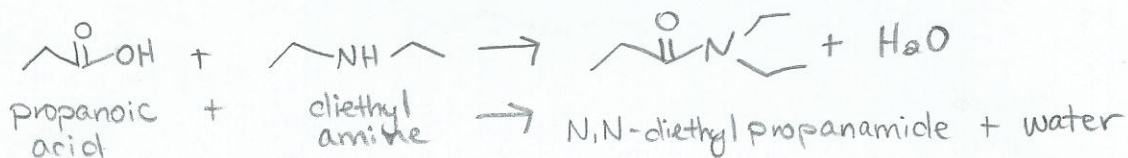


Short Answer: Answer any 4 of the following 6 questions. If you do all 6, he will only grade the first 4 (even if you got number 5 right and number 3 wrong, you will get 3/4 correct...so be careful!)

34. Draw a tetrapeptide with all nonpolar residues. Number the residues; give the three letter code, and indicate the peptide bonds, the amino terminus, and carboxyl terminus.



35. Write the complete reaction for the formation of a tertiary amide containing 7 carbons. Name all reactants and products.



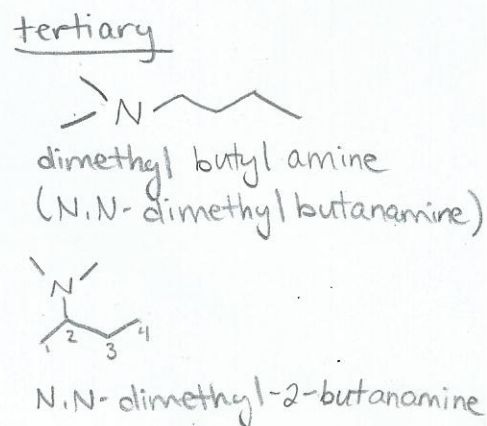
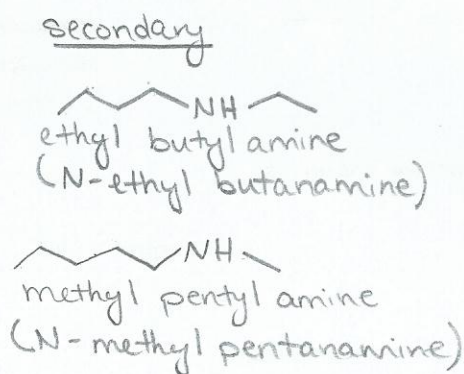
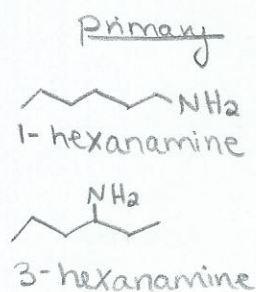
36. Compare and contrast globular and fibrous proteins (at least three items), and give an example of each type.

Fibrous proteins and globular proteins are both proteins that consist of residues. Fibrous proteins consist of only a few residues that repeat while globular proteins are made of most (and a lot) of residues. Fibrous are long chains while globular proteins can either be water soluble or water insoluble. Hair is an example of a fibrous protein while hemoglobin is an example of a globular protein. Fibrous are structural while globular are functional.

37. List three protein tertiary structure interactions. For one of these, name possible amino acids that can be involved.

1. hydrophobic interactions - (hydrophobic sidechain) proline, leucine
2. hydrogen bonds - (CO, NH, or OH) tyrosine, serine
3. salt bridge - (one acid and one base) aspartic acid with histidine

38. Draw and name two primary, two secondary, and two tertiary amines for $C_6H_{15}N$



39. Describe the toxication of acetaminophen.

Toxication - when something not harmful reacts with enzymes in the body and creates something very harmful. Acetaminophen is oxidized in the liver (where it loses 2 H's) and becomes NAPQI. The liver accumulates this and it causes irreversible liver damage.