Refer to the amino acids below to answer each of the following questions. There may be more than one answer for each question.

1. Which of the amino acid(s) listed above is(are) considered to be a neutral amino-acid?
   a) A  b) B  c) C  d) D  e) E

2. Which of the amino acid(s) listed above can participate in hydrogen bonding?
   a) A  b) B  c) C  d) D  e) E

3. Which of the amino acid(s) listed above can form disulfide bridges?
   a) A  b) B  c) C  d) D  e) E

4. Which of the amino acid(s) listed above is(are) considered to be a basic amino acid?
   a) A  b) B  c) C  d) D  e) E

5. Which of the following is considered a primary structure of a protein?
   a) Globular and Fibrous
   b) Arg-Ala-His-Ile
   c) Beta-pleated sheet and Alpha helix

6. Which of the following is considered a secondary structure of a protein?
   a) Globular and Fibrous
   b) Arg-Ala-His-Ile
   c) Beta-pleated sheet and Alpha helix

7. Which of the following is(are) important in forming a secondary or tertiary structure?
   a) Coordinate covalent bonds
   b) Hydrogen bonding
   c) Disulfide bridge
   d) Metallic bonds

8. Circle all that apply to hemoglobin.
   a) Forms a chelate with iron
   b) Is a globular protein
   c) Is considered a transport protein
   d) Is considered a protective protein.
A protein can be denatured by
a) heat
b) pH change
c) both a and b
d) none of the above

10. Circle each of the following which are true statements. If the statement is false, make it into a true statement by changing just one word.
   a) Enzymes are biological catalysts.
   b) Enzymes have the ending ose.
   c) Enzymes have amide functional groups as part of their structure.

11. Which part of soap is responsible for its ability to dissolve fats and oily dirt?
   a) The long hydrocarbon chain
   b) The carboxylate group
   c) The ionized oxygen
   d) The hydrophilic end
   e) Soaps cannot dissolve fats and oils.

12. Which suffix is commonly used to identify enzymes?
   a) ase
   b) ose
   c) ide
   d) ate
   e) ite

13. A polyunsaturated fatty acid contains more than one
   a) Double bond
   b) Carboxyl group
   c) Carbonyl group
   d) Long carbon chain
   e) Hydroxyl group

14. In the diagram of a cell membrane, the object labeled C is a

   a) cholesterol
   b) carbohydrate side chain
   c) mitochondrion
   d) protein
   e) phospholipids
18. Circle any section of the cell membrane below that would be polar.

18. Draw the structure of tyrosine. Label all chiral carbon centers in tyrosine with an asterisk (*).

\[
\begin{align*}
\text{HO-} & \quad \text{C} & \quad \text{C} & \quad \text{H} \\
\text{H} & \quad \text{C} & \quad \text{C} & \quad \text{NH}_2 \\
\text{H} & \quad \text{C} & \quad \text{C} & \quad \text{OH}
\end{align*}
\]

17. What is the pI of tyrosine? 5.66

18. Draw an alpha plot for tyrosine starting at a pH of 0 and going to a pH of 14.

19. Draw the structure of the predominant form of tyrosine at pH = 2.50.

\[
\begin{align*}
\text{HO-} & \quad \text{C} & \quad \text{H} & \quad \text{C} \\
\text{H} & \quad \text{C} & \quad \text{H} & \quad \text{NH}_3^+
\end{align*}
\]

20. Draw the structure of the predominant form of tyrosine at pH = 8.00.

\[
\begin{align*}
\text{HO-} & \quad \text{C} & \quad \text{H} & \quad \text{C} \\
\text{H} & \quad \text{C} & \quad \text{H} & \quad \text{NH}_3^+
\end{align*}
\]
MATCHING

A.)

B.)

C.) Glu-Lys-Phe-Gly-Arg-Met-Arg-Phe

D.) Val-Phe-Leu-Met-Tyr-Pro-Gly-Trp-Cys-Glu

E.) Vitamins

F.) Apoenzyme

G.)

H.)

J.)

L.)

M.) Asp-Tyr-Ile-His-Pro-Phe-Arg-Glu

Match the letter above for each of the following statements. There is only one correct answer for each.

21. N an octapeptide with a C-terminal glutamic acid.

22. K an amino acid in its zwitterionic form.


24. M a steroid that might have the name drphilosterol.
28. An electrophoresis experiment is carried out on a gel at a pH of 7.

- tyrosine
- glutamic acid
- histidine

The amino acids are all placed in the first rectangle (electrophoresis tank) as indicated below. Show the migration of each amino acid after the plate is charged as indicated in the second rectangle.

Refer to the data below to answer the following questions:
Angiotensin II shows the presence of eight different amino acids: Asp, Cys, Glu, Lys, Met, Phe, Trp, and Val. The following hydrolysis fragments were obtained.

Edman degradation yielded Glu + heptapeptide
Carboxypeptidase degradation yielded Cys + heptapeptide
Trypsin yielded a dipeptide of Glu, Lys (not in sequential order) + a hexapetide
Chymotrypsin yielded a tetrapeptide of Glu, Lys, Phe, and Val (not in sequential order) + a dipeptide of Met and Trp, and another dipeptide of Asp and Cys.

26. What is the N-terminal amino acid? Glu

27. What is the C-terminal amino acid? Cys

28. Suggest a plausible primary structure for this polypeptide?

Glu-Lys-Val-Phe-Met-Trp-Asp-Cys
29. Show the mechanism for the saponification of glyceroltrioleate.

30. Show the product for the partial hydrogenation of glyceroltriolote.

31. Show the positions of the isoprene units in the structure below.
32. Label each of the following compounds as carbohydrate, fatty acid, amino acid, peptide, protein, triglyceride, terpene, or phospholipid, or steroid.
CHM 236 Exam
Chpts 26-27
April 11, 2008

Refer to the amino acids below to answer each of the following questions. There may be more than one answer for each question.

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B

C

D

E

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20. Draw the structure of the predominant form of tyrosine at pH = 8.00
MATCHING

A.) \[ \text{Structure} \]

B.) \[ \text{Structure} \]

C.) Glu-Lys-Phe-Gly-Arg-Met-Arg-Phe

D.) Val-Phe-Leu-Met-Tyr-Pro-Gly-Trp-Cys-Glu

E.) Vitamins

F.) Apoenzyme

G.) \[ \text{Structure} \]

H.) \[ \text{Structure} \]

I.) \[ \text{Structure} \]

J.) \[ \text{Structure} \]

K.) \[ \text{Structure} \]

L.) \[ \text{Structure} \]

M.) \[ \text{Structure} \]

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   - tyrosine
   - glutamic acid
   - histidine

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   [-] Tyr
   [-] Glu
   [-] His

   [+] (-)

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