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Biochemistry

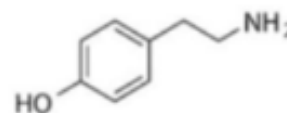
Past paper

Amino acids



1. The following structure represents a molecule that:

- A. Cannot be considered an amino acid
- B. Can produce Epinephrine
- C. Is produced by decarboxylation of Histidine
- D. Can produce Serotonin
- E. Is produced by hydroxylation of phenylalanine



2. (Glu) is the 3 –letter code of:

- A. glutamine
- B. glutamic acid
- C. cysteine
- D. none of the above

3. All of the following is polar, uncharged amino acid, except:

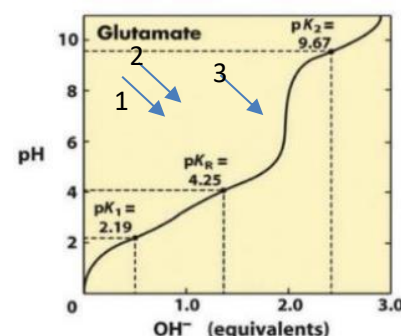
- A. Cys
- B. Tyr
- C. Asn
- D. Asp

4. one of the following is essential amino acid that the body can not synthesize :

- A. leucine
- B. valine
- C. serine
- D. A+B
- E. all of the above

5. The point that represents the zwitterion is ?

- A. 1
- B. 2
- C. 3
- D. 1&2



6. The amino acid that consists of a charged amino group in its side chain:

- A. His
- B. Lys
- C. Asp
- D. Gln
- E. Pro

7. What's different about Pro from any other amino acids?

- A. It's structure of a ring
- B. Contains 3 carbons in its chain
- C. It has a secondary amine
- D. Possess 3 double bonds
- E. All the above

Answers:	1) A	2) B	3) D	4) D	5) A	6) B	7) C
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8. Which group has the correct classification?
- {Ala, Val, Gli, Leu} nonpolar
 - {Ser, Asn, Arg} polar
 - {Gln, Trp, Met} uncharged
 - B+C
9. The amino acid arginine contains a guanidino R-group and has pKa values of 2.2, 9.0, and 12.5. A sample of arginine is titrated from pH=1.0 to pH=14.0 with NaOH. At pH=2.2
- all of the amino acid molecules will be in the fully protonated form
 - half of the amino acid molecules will be in the fully protonated form
 - all of the amino acid molecules will be in the zwitterion form
 - half of the amino acid molecules will be in the zwitterion form
10. Which property is shared by both arginine and aspartate as each is titrated with NaOH from pH=1.0 to pH=14.0?
- Both will require the same number of NaOH equivalents to complete the titration
 - Both will have the same number of equivalence points at the same pH values
 - Both will have the same net charge at pH=1.0
 - Both will have the same net charge at pH=14.0
11. The amino acids have a carboxyl group with a pK around _____ ,and an amino group with a pK near _____ .
- 1.1 and 12.1
 - 6.5 and 8.0
 - 3.3 and 10.5
 - 9.0 and 2.5
 - 2.0 and 9.5
12. The amino acid alanine has two pKa values 2.3 for the COOH group and 9.7 for the NH₃⁺ group .What is the pI for this compound??
- 6.0
 - 1.0
 - 12
 - 3.5
13. When the amino acid alanine (the R group is: CH₃) is added to a solution with a pH of 7.3 , alanine becomes:
- A cation
 - non-polar
 - a zwitterion
 - an isotope
14. The isoelectric point of an amino acid is defined as :
- The pH where the molecule carrier no net electric charge .
 - The pH where the carboxyl group is uncharged .
 - The pH where the amino group is uncharged .
 - The pH of maximum electrolytic mobility
 - $-\log_{10}(pK_i + pK_j)$

Answers:	8) D	9) B	10) A	11) E	12) A	13) C	14) A
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15. Which of the following amino acids has a net charge of +2 at low pH?

- A. Aspartic acid
- B. alanine and glutamic acid
- C. arginine and lysine
- D. leucine

16. Which has a net charge of -2 at high pH?

- A. Aspartic acid and glutamic acid
- B. alanine
- C. arginine and lysine
- D. leucine

17. For a solution of tyrosine molecules at pH = 10.2 :

- A. all the α -carboxyl groups will be uncharged
- B. all the α -amino groups will be uncharged
- C. all the phenolic R-groups will be uncharged
- D. all the ionizable groups will be uncharged

18. The amino acid tyrosine contains a phenolic R-group and has pKa values of 2.2, 9.0, and 10.2. A sample of tyrosine is titrated from pH = 1.0 to pH = 14.0 with NaOH. At which pH will all the amino acid molecules be in their fully protonated form?

- A. 1.0
- B. 2.2
- C. 5.6
- D. 9.0

19. At which pH will half the amino acid (without ionizable R groups) molecules have a +1 charge?

- A. 10.2
- B. 9.0
- C. 2.2
- D. 1.0

Answers:	15) C	16) A	17) B	18) A	19) C
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