

- Which of the following is **false** regarding the amino acid structure?
 - They have a tetrahedral structure
 - The pKa of the α -amino group is higher than the pKa of the α -carboxyl group
 - The α -amino group is protonated and positively charged at physiological pH
 - The α -carboxyl group is undissociated and negatively charged at physiological pH
- Which of the following amino acid is optically inactive/Achiral?
 - Ala
 - Gly
 - Thr
 - Val
- Which of the following amino acid contain Sulfur?
 - S
 - C
 - M
 - b+c
- Which of the following amino acid contain reactive Sulfur?
 - M
 - S
 - C
 - a+c
- Which of the following amino acid has negatively charged side chain at physiological pH?
 - Asn
 - Gln
 - Asp
 - a+b
- Which of the following is Imino acid?
 - Val
 - Met
 - Pro
 - His
- Which of the following amino acid contain polar amide in their side chain?
 - Asn
 - Glu
 - Asp
 - a+b
- Which of the following amino-acid can work as a physiological buffer?
 - Arginine
 - Tryptophan
 - Histidine
 - Aspartate
- The following is uncommon amino acid found in collagen?
 - proline
 - Hydroxyproline
 - lysine
 - b+c
- The following amino -acid important for clotting?
 - Hydroxyproline
 - Hydroxylysine
 - γ -aminobutyrate
 - γ -carboxyglutamale
- This amino acid is can work as oxidizing agents scavenger (antioxidant)?
 - Hydroxyproline
 - γ -carboxyglutamate
 - Ornithine
 - Selenocysteine

12. Which of the following amino acids doesn't contain aromatic side chain?

- a. Tyrosine b. Proline c. Phenylalanine d. Tryptophan

13. The precursor of catecholamines "dopamine, Epinephrine, and norepinephrine" is

- a. Tyrosine b. Proline c. Tryptophan d. Glutamate

14. Which of the following is **not true** regarding the following peptide?

Valine – Cysteine – Glutamate – Serine – Aspartate – Arginine – Cysteine

- a. It's able to make a disulfide bond
b. It can work as buffer at physiological pH
c. It has 2 negatively charged side chains at physiological pH
d. It can be phosphorylated

15. Which of the following is **not true** regarding the following peptide

Glycine – Isoleucine – Methionine – Tyrosine – Proline – Tryptophan – Valine – Alanine

- a. It has a sulfur-containing side chain
b. Absorb UV light
c. It's most likely to be located at the surface of cytosolic protein
d. Contain sulfo-ether side chain

16. Which of the following is **not true** regarding the following peptide?

Alanine – Threonine – Proline – Aspartate – Glutamine– Lysine – Glycine - Arginine

- a. It contain side chain with amide group
b. It contain side chain with cyclic secondary amine
c. It contains 2 positively charged side chains at physiological pH
d. It contains 2 negatively charged side chains at physiological pH
e. None of the above

17. Which of the following is **not true** regarding the following peptide?

Arginine – Serine – Tryptophan – Ornithine – Glutamine – Lysine – Leucine – Arginine

- a. It's concentration can be quantified by spectrophotometer
b. It can be formed in human body
c. It can be phosphorylated
d. This peptide would move to the cathode (negative electrode) in non SDS gel electrophoresis at pH 7

Use the following table if needed to answer the next Questions

Table 3.2			
pK _a Values of Common Amino Acids			
Acid	α-COOH	α-NH ₃ ⁺	RH or RH ⁺
Gly			
Ala			
Val			
Leu			
Ile			
Ser			
Thr			
Met			
Phe	2	9	
Trp			
Asn			
Gln			
Pro			
Asp			3.86*
Glu			4.25*
His			6.0*
Cys			8.33*
Tyr			10.07
Lys			10.53
Arg			12.48

18. The charges of Gln groups at physiological pH are:

- COO⁻, NH₃⁺
- COO⁻, COO⁻, NH₃⁺
- COOH, COOH, NH₃⁺
- COOH, COO⁻, NH₃⁺
- COOH, COO⁻, NH₂

19. The charges of Asp at pH = 1 are?

- COO⁻, NH₃⁺
- COO⁻, COO⁻, NH₃⁺
- COOH, COOH, NH₃⁺
- COOH, COO⁻, NH₃⁺
- COOH, COO⁻, NH₂

20. What is the net charges of His at pH = 6?

- Zero
- +1
- 1
- +0.5
- 0.5

21. What is the net charges of Gly at pH = 5?

- a. Zero
- b. +1
- c. -1
- d. + 0.5
- e. - 0.5

22. Ala – Val – Lys; What is the net charges of this tripeptide at pH = 12?

- a. Zero
- b. - 1
- c. + 1
- d. + 2

23. HKL, what is the net charges of this tripeptide at pH = 7?

- a. Zero
- b. - 1
- c. + 1
- d. + 2

24. What is the pI of Ser – His – Glu?

- a. 5.12
- b. 3.2
- c. 7.5
- d. 6.6

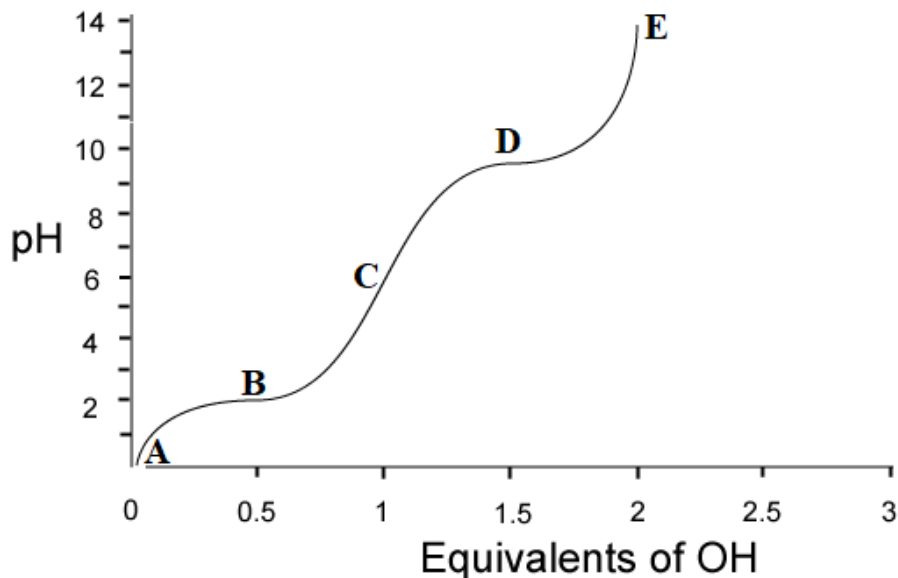
25. What is the pI of Gln – Lys – His – Asp – Arg?

- a. 9.6
- b. 8.2
- c. 4.9
- d. 11.4

26. Which of the following is **false** If 10mmole of this tripeptide Ser – His – Asp is titrated?

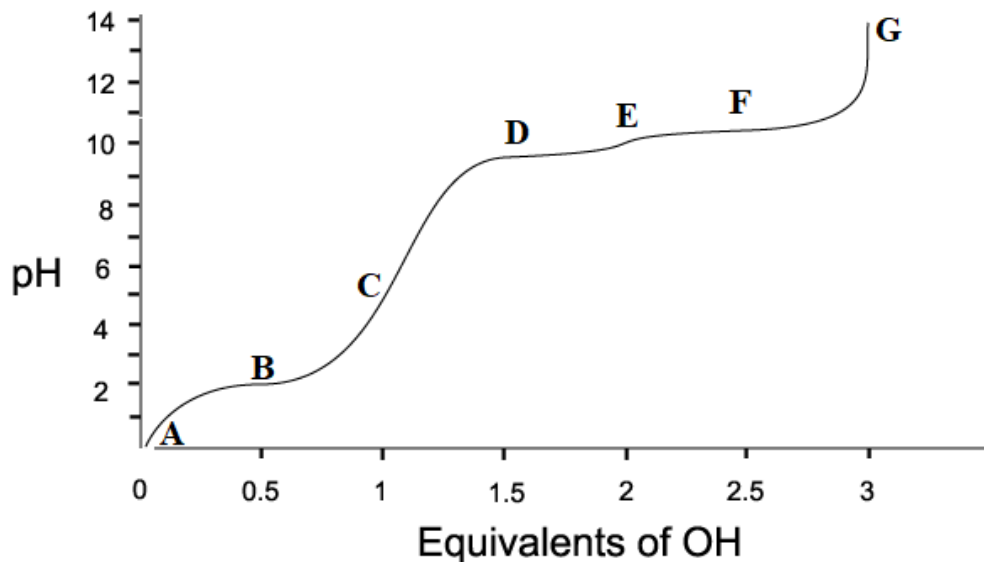
- a. It will produce 4 titration curves
- b. It requires 40 mmole of NaOH to complete the titration
- c. It requires 20 mmole of NaOH to reach the pI
- d. It will have - 2 charge at the end of titration
- e. It will have +1 charge at very low pH

Consider the following titration curve of an amino acid and answer Questions (27 – 32)



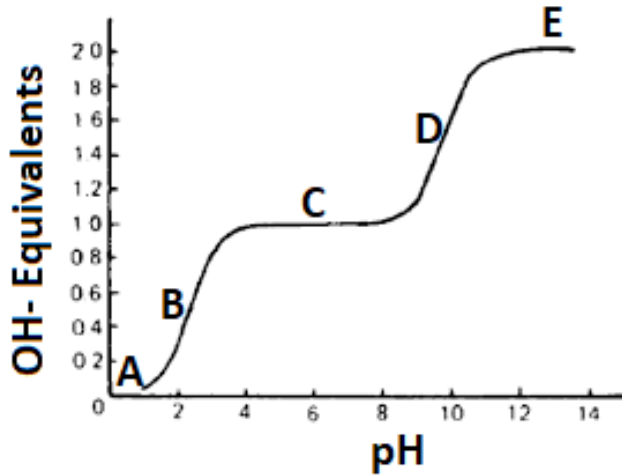
27. At Which point the amino acid will be fully protonated?
 - a. A
 - b. B
 - c. C
 - d. D
 - e. E
28. Which point on the graph represent the pKa of α -carboxyl group?
 - a. A
 - b. B
 - c. C
 - d. D
 - e. E
29. Which point on the graph represent the pKa of α -amine group?
 - a. A
 - b. B
 - c. C
 - d. D
 - e. E
30. Which point on the graph represent the pI of the amino acid?
 - a. A
 - b. B
 - c. C
 - d. D
 - e. E
31. If 10mmole of this amino acid is titrated, how many mmole of NaOH is required to reach point D?
 - a. 5
 - b. 10
 - c. 15
 - d. 20
 - e. 25
32. This amino acid can NOT be?
 - a. Serine
 - b. Histidine
 - c. Alanine
 - d. Leucine
 - e. Asparagine

Consider the titration curve shown of Lysine then answer Questions (33 – 41)



33. Which points on the graph represent the pKas?
34. Which point on the graph represent the pKa of α -amine group?
35. Which point on the graph represent the pI?
36. What is the net charges on lysine at point A?
37. What is the net charges on lysine at point C?
38. What is the net charges on lysine at point G?
39. How many Ionic forms Lysine can have during it's titration?
40. How many mmoles of NaOH is required for complete titration of 100mmole of Lysine?
41. The optical activity of Lysine can be determined from it's titration curve. True False

Consider the following titration curve of an amino acid then answer questions 42 and 43



42. Which point represent the pKa of α -amine group?

- a. A
- b. B
- c. C
- d. D
- e. E

43. Which point represent the pI of this amino acid?

- a. A
- b. B
- c. C
- d. D
- e. E

44. The position of determine the optical activity of the amino acid?

- a. α -carboxyl
- b. α -amine
- c. side chain
- d. α -carbon

45. Which of the following is **not true** regarding the peptide bond?

- a. It forms through a dehydration reaction between the carboxyl group of one amino acid and the amino group of the adjacent amino acid
- b. It's shorter than any single covalent bond
- c. It restricts the rotation of the polypeptide backbone
- d. It has a cis configuration where the side chains are oriented opposite to each other

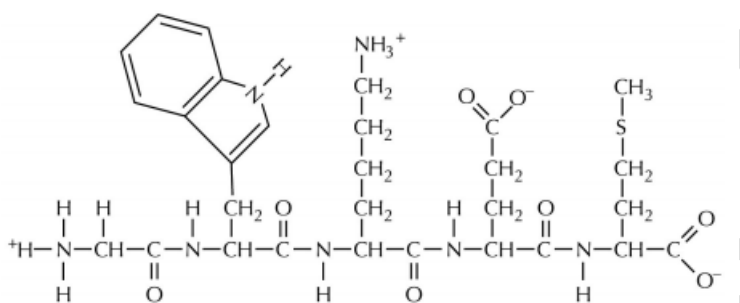
46. Which of the following is **incorrect** regarding the peptide bond?

- Can participate in a hydrogen bonds
- Has partial double bond character
- Is ionizable and carry charges
- Provide rigidity to the polypeptide backbone

47. Which of the following is **true** regarding this dipeptide Ala – Ser?

- The peptide bond is formed between the α -amine of Alanine and the α -carboxyl of Serine
- Alanine displays the free amino terminal
- It's identical to Ser – Ala
- It releases two water molecules upon formation
- It contains side chain with a carboxyl group

Refer to the following figure then answer Question (48 – 54)



48. How many peptide bonds are in this amino acid sequence?

- 0
- 1
- 4
- 5

49. In the peptide shown which residue has free α -carboxyl group?

- Gly
- Glu
- Cys
- Met

50. The correct sequence of amino acids in this peptide from N to C terminals is:

- GTLEM
- GTKEM
- GWKEM
- GWKDM

51. The net charge of this peptide at pH =7 is..... Given that (pka of alpha amine = 9, pka of alpha carboxyl = 2, pka of acidic side chains = 4, pka of basic side chains = 6,10, 12)
- +2
 - +1
 - Zero
 - 1
52. calculate the pH of a solution containing 50mmol of this peptide when 75 mmole of NaOH is added, given that (pka of alpha amine = 9, pka of alpha carboxyl = 2, pka of acidic side chains = 4, pka of basic side chains = 6,10, 12)
- 2
 - 4
 - 6
 - 9
53. The pH at which the peptide is neutral (no net charge) is given that (pka of alpha amine = 9, pka of alpha carboxyl = 2, pka of acidic side chains = 4, pka of basic side chains = 6,10, 12)
- 3
 - 6.5
 - 9.5
 - 7
54. How many ml of 0.15M NaOH solution required for titration of 15ml of 0.25M of this peptide solution?
- 25ml
 - 50ml
 - 75ml
 - 100ml
55. Regeneration of the active form of Glutathione Requires
- Selenium
 - NADH
 - Glutathione peroxidase
 - Glutathione Reductase
 - More than one answer
56. How many different tripeptide can be formed form His, Ala, Trp?
- 2
 - 4
 - 6
 - 9

Question	Answer	Question	Answer	Question	Answer
1	D	26	E	51	C
2	B	27	A	52	B
3	D	28	B	53	B
4	C	29	D	54	D
5	C	30	C	55	D
6	C	31	C	56	C
7	A	32	B		
8	C	33	B,D,F		
9	B	34	D		
10	D	35	E		
11	D	36	+2		
12	B	37	+1		
13	A	38	-1		
14	B	39	4		
15	C	40	300 mmol		
16	D	41	FALSE		
17	B	42	D		
18	A	43	C		
19	C	44	B		
20	D	45	D		
21	A	46	C		
22	B	47	B		
23	C	48	C		
24	A	49	D		
25	A	50	C		