

1. Definition: What is bioorganic chemistry, introduction, and history.
2. Please explain: What types of molecules do bioorganic chemists study? What is bioorganic chemistry used for?
3. Please describe: What does a bioorganic chemist do? What disciplines are related to bioorganic chemistry?
4. Please give definition for Amino acids, write the structure, and explain the naming methods and properties with sample.
5. Definition and explain: A wide array of functional groups of amino acids, classification, and short statement for each class.
6. Making illustration and compare the essential and non-essential amino acids, and basic set of 20 amino acids.
7. Illustration: Amino acid sequences, importance of knowing amino acid sequences.
8. Protein and its structures, Peptide bond, Primary structure, Daltons.
9. Word origin. Account for the origin of the term carbohydrate, explain detail with examples, show structures with Fischer and Haworth projections.
10. Differentiate between monosaccharides and polysaccharides in regard to structure and function.
11. Differentiate between proteoglycans and glycoproteins in regard to structure and function.
12. In what form are fatty acids found in the body.
13. How many major classes of biomolecules, please make short statement for each of them?
14. Fluidity matters. Triacylglycerols are used for fuel storage in both plants and animals. The triacylglycerols from plants are often liquid at room temperature, whereas those from animals are solid. Suggest some reasons for this difference.
15. Please write, Classification of flavonoid molecules.
16. What is the key difference between a flavone and isoflavone and neoflavone? please give an example
17. List the other recognized vitamins and classification .
18. Classification and biological role of lipids, the main natural higher fatty acids of saturated and unsaturated series, which are part of lipids. Iodine, acid number, number of saponification.
19. Describe the physiology of vitamins?
20. Please give definition: Secondary structure of protein,  $\alpha$  helix,  $\beta$  pleated sheet, turns and loops of polypeptide chains.
21. Please give definition: Tertiary structure of protein, principles, structural and functional units, and quaternary structure.
22. What are the key chemical properties of fatty acids?
23. What are the major lipids? Describe their biochemical functions
24. List the other recognized vitamins: Provide an example of a structure for each one? What are their important roles/ functions in the body?
25. Similar, but not the same. What are the structural differences between DNA and RNA?
26. Contrast. Distinguish between phosphoglycerides and triacylglycerols.
27. Compare. What structural features differentiate sphingolipids from phosphoglycerides?
28. Depict a lipid. Draw the structure of a triacylglycerol composed of equal amounts of palmitic acid, stearic acid, and oleic acid.
29. Please making short statements for following items: Free Fatty Acids, Triacylglycerols, Phospholipids,

## Glycolipids, Steroids.

30. There are how many common types of membrane lipids? make a short statement, write the structures.

1. Couples. Indicate whether each of the following pairs of sugars consists of anomers, epimers, or an aldose–ketose pair:

- (a) D-glyceraldehyde and dihydroxyacetone
- (b) D-glucose and D-mannose
- (c) D-glucose and D-fructose
- (d)  $\alpha$ -D-glucose and  $\beta$ -D-glucose
- (e) D-ribose and D-ribulose
- (f) D-galactose and D-glucose.

2. Mutarotation glucose \$ altrose

3. Mutarotation ramnoza \$ allose

4. Mutarotation arabinose \$ mannose

5. Mutarotation fructose \$ idose

6. Arabinose galactose \$ talose

7. Please, write down the following formula rutin and identification

8. Please, write down the following formula: 5,7,4' - trihydroxy 8-C- $\alpha$ -glycoside of flavone \$  
3,5,7,8,3',4'- hexahydroxyflavone

9. Please, write down the following formula: 5-oxy-7-methoxyflavone \$  
4'-hydroxy-7-O-glucopyranoside

10. Please, write down the following formula: 3-oxy-3',4'-dimethoxyflavone \$  
3-O- $\alpha$ -L-galactopyranoside of kaempferol

11. Please, write down the following formula: 5,7,3',4'-tetrahydroxyxy-6-C- $\beta$ -glycoside flavone \$  
3,5,7,4'-tetrahydroxy-8-metoxyflavone

12. Please, write down the following formula: 4'-oxy-7-O- ramnopyranoside flavone \$  
5,4'-dihydroxy-3,6,7-trimethoxyflavone

13. Please, write down the following formula: 3,5,7,3',4'- pentahydroxyflavone \$  
4'-O- $\beta$ -D-galactopyranoside of kaempferol

14. Please, write down the following formula: 5,3- dihydroxy-4'-methoxy-7-O- $\alpha$ -glycoside flavone \$  
5,7,4'-trihydroxy-3,3',5'-trimetoxyflavone

15. Structure and name. Draw the structure of each of the following fatty acids and give the structure its common name:

(a) *n*-Dodecanate

(b) *cis*-9-Hexadecenoate

(c) *cis*, *cis*-9, 12-Octadecadienoate

16. Match each amino acid in the left-hand column with the appropriate side-chain type in the right-hand column (please show full name of amino acids with structures).

- |         |                         |
|---------|-------------------------|
| (a) Leu | (1) hydroxyl-containing |
| (b) Glu | (2) acidic              |
| (c) Lys | (3) basic               |
| (d) Ser | (4) sulfur-containing   |
| (e) Cys | (5) nonpolar aromatic   |
| (f) Trp | (6) nonpolar aliphatic  |

17. Solubility. In each of the following pairs of amino acids, identify which amino acid would be most soluble in water: (a) Ala, Leu; (b) Tyr, Phe; (c) Ser, Ala; (d) Trp, His. (please show full name of amino acids with structures)
18. A taste of honey. Fructose in its  $\beta$ -D-pyranose form accounts for the powerful sweetness of honey. The  $\beta$ -D-furanose form, although sweet, is not as sweet as the pyranose form. The furanose form is the more stable form. Draw the two forms and explain why it may not always be wise to cook with honey.
19. Qualitative and quantitative analysis of rutin by method of chromatography in laboratory, please write hydrolysis reaction of rutin.
20. Determine the carbohydrates, quantitative and qualitative analyses by method of chromatography in laboratory.
21. Please show the methods of determining the amino acids, quantitative and qualitative analyses of them in laboratory.
22. In the laboratory how to qualitative analysis compositions of antiinflammation extracts, and analysis of acetyl salicylic acid (aspirin).
23. Please, write down the following formula: 5,7-dihydroxy-3-methoxyflavone  $\beta$ -3-O- $\beta$ -D-galactopyranoside quercetin
24. Please, write down the following formula: 5,4'-dihydroxy-7-methoxyflavone  $\beta$ -3'-O- $\beta$ -D-glucopyranoside of luteolin
25. Please, write down the following formula: 7-hydroxy-3',4'-dimethoxyflavone  $\beta$ -3-O- $\alpha$ -L-arabiopyranoside of quercetin
26. Please, write down the following formula: 5,7,4'-trimethoxy flavone  $\beta$ -8-C- glucopyranoside of luteolin
27. Please, write down the following formula: 3,5,7,4'- tetrahydroxy flavone  $\beta$ -3-O- $\alpha$ -D-glucopyranoside of kaempferol
28. Please, write down the following formula: 5,7-dihydroxy-3,6,3'-4'-tetramethoxyflavone  $\beta$ -3-O- $\beta$ -D-glucopyranoside of myricetin
29. Please, write down the following formula: 5,7,4'- trihydroxy-3,3',5'-trimethoxyflavone  $\beta$ -3-O- $\alpha$ -D-glucopyranoside of isorhamnetin
30. Please, write down the following formula: 5,4'-dihydroxy-3,6,7-trimethoxyflavone  $\beta$ -3-O- $\beta$ -D-glucopyranosyl-(6 $\rightarrow$ 1)- $\alpha$ -L-rhamnopyranoside gvercetin