

OLUSEGUN AGAGU UNIVERSITY OF SCIENCE AND TECHNOLOGY,  
OKITIPUPA  
SCHOOL OF SCIENCES



DEPARTMENT OF CHEMICAL SCIENCES, BIOCHEMISTRY PROGRAMME  
FIRST SEMESTER EXAMINATION 2022/2023 ACADEMIC SESSION

BCH 201: GENERAL BIOCHEMISTRY I UNIT: 3

Time allowed: 2½ Hours

**INSTRUCTION:** Answer all questions in section A and any four (4) in section B

**Section A: Answer all**

1. Standard free energy ( $\Delta G^\circ$ ) of hydrolysis of ATP to ADP + Pi is A. -49.3 kJ/mol B. -4.93 kJ/mol C. -30.5 kJ/mol D. -20.9 kJ/mol
2. Which of the following statement is correct about the free energy change,  $\Delta G$ ? A. Is directly proportional to the standard free energy change B. Is equal to zero at equilibrium C. Can only be calculated when the reactants and products are present at 1mol/1 concentrations D. Is equal to  $-RT \ln K_{eq}$
3. Under standard conditions, ..... A. The free energy change  $\Delta G$  is equal to 0 B. The standard free energy change  $\Delta G^\circ$ , is equal to 0 C. The free energy change,  $\Delta G$ , is equal to the standard free energy change,  $\Delta G^\circ$  D.  $K_{eq}$  is equal to 1
4. .... allows the exchange of energy and matter A. system B. closed system C. open system D. surroundings
5. At equilibrium, free energy difference is A. 1 B. +1 C. -1 D. 0
6. The following are trace elements found in the cell except... A. Copper B. Iodine C. Ferum D. Nitrogen
7. The cellular element required for the formation of strong bone and teeth is... A. Mg B. Ca C. Fe D. Na
8. DNA replication and transcription occurs in which of these cell organelles? A. Nucleus B. Mitochondria C. Endoplasmic reticulum D. Golgi apparatus
9. Which of these cell organelles are also called microbodies? A. Nucleus B. Mitochondria C. Peroxisomes D. Golgi apparatus
10. A method of cell fractionation where organelles of different buoyant densities are separated on a density gradient is called... A. isopycnic centrifugation B. thin-layer chromatography C. SDS-PAGE electrophoresis D. dialysis
11. Acids are defined as ..... A. proton acceptors B. proton donors C. neutron donors D. neutron protons
12. pH is defined as A.  $-\log[H^+]$  B.  $\log[H^+]$  C.  $-\log[OH^+]$  D.  $\log[OH^+]$
13. pH of a solution can be measured by A. pH meter B. litmus paper C. spectrophotometer D. a and b
14. Buffer systems consist of weak acid and ..... A. base B. conjugate base C. proton donor D. alkali
15. For a precise neutral solution at 25 °C, the concentration of hydrogen ions is A.  $1.0 \times 10^{-7} M$  B.  $1.0 \times 10^7 M$  C.  $1.0 \times 10^{-14} M$  D.  $1.0 \times 10^{-10} M$



**SECTION B (Essay): Answer question 1 and any other four (4) questions**

- 1a. State any 4 applications of biochemistry to plant 2.5 mks  
1b. List 3 organs used to study biochemical processes 2 mks  
1c. What was the contribution of Chargaff, Wilkins, Watson and Crick to the history of biochemistry  
1d. State 3 scope of biochemistry that you know  
1e. In the 20th century, what did Fredrick Hopkins and his associates developed? 5 mks  
2. List and state the functions of 5 cell organelles 10 mks  
3. a. Define the following (i) pH, (ii) Buffer  
b. Calculate the pH of solution with  $[H^+]$  of  $1 \times 10^{-5} M$  10 mks  
4. What is Biochemistry? Discuss 10 mks  
5. Given the following data, calculate  $\Delta G$  for this reaction and state whether it is spontaneous  
 $CH_3CH_2OH + H_2O \rightarrow CH_3COOH + H_2O$   
 $\Delta H = 495.2 kJ, \Delta S = -136 J/K, T = 298 K$  10 mks  
6. Describe the law of mass action with appropriate equation and formula 10 mks

pH is the degree of alkalinity and acidity of a substance  
It is the negative logarithm of hydrogen ion. i.e.  $-\log([H^+])$

(5)

$$pH = -\log([H^+])$$

$$pH = -\log(1 \times 10^{-5})$$

$$pH = -\log(-5)$$

$$pH = 5$$





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(OAUSTECH) OKITIPUPA  
SCHOOL OF SCIENCE  
DEPARTMENT OF CHEMICAL SCIENCES  
(Biochemistry Programme)  
FIRST SEMESTER EXAMINATIONS 2023/2024 SESSION

BCH 201: GENERAL BIOCHEMISTRY

Time allowed: 1 Hr

SECTION A: Answer all question

1. ----- discovered that enzymes are proteins in 1926)
2. The major objective of biochemistry is the complete understanding at the-----of all the chemical processes associated with living cells.
3. The evolution of biochemistry as a field of science dates back to ----- and-----.
4. Michael Chevreul (1786 – 1889) reported through ----- that fats are made of fatty acids and glycerol.
5. In 1868, ----- discovered nucleic acid and investigated its structure, function, properties and distribution.
6. Louis Pasteur identified the ----- and discovered aerobic and anaerobic organism.
7. Biochemistry studies the ----- that occurred in microorganism, plants, animals, insects and humans.
8. Fischer discovered peptide bond linking ----- together.
9. Biochemistry describes the origin, formation deficiency symptoms of what?
10. Quality of food, grains, milk, and water can be checked through -----.
11. Compounds that contain carbon and hydrogen and are associated with living organisms are called -----.
12. The organelle that contains the most percentage of eukaryotic cell's DNA and serves as the control centre of the cell is referred to as-----.
13. Endoplasmic reticulum is of ----- types.
14. ----- is the cell organelles also referred to as 'Microbodies'
15. The procedure for separating cell organelles of different buoyant densities is -----.
16. ----- is the cellular compound that serves as the primary source of energy -----.
17. ----- is the region between the inner and outer mitochondrial membranes.
18. ----- is the cell organelle which contains packet of enzymes.
19. The process of disrupting cells or tissues in a solution is called -----.
20. The cellular element required for the formation of strong bone and teeth is-----.
21. What is the pH of a solution with  $[H^+]$  of  $1.0 \times 10^{-7} M$  -----.
22. The high melting point, boiling point, and heat of vaporization of water is due to -----.
23. The ion product of water,  $K_w$ , is the basis for the -----.
24. A buffer system consists of a weak acid and its -----.
25. The HOOH bond angle is -----.
26. Solutions having a pH greater than 7-----.



27. The electrostatic attraction between the oxygen atom of one water molecule and the hydrogen of another is called
28. The position of equilibrium of any chemical reaction is given by its .....
29. When there are exactly equal concentrations of  $H^+$  and  $OH^-$ , as in pure water, the solution is said to be at
30. Buffers are aqueous systems that tend to resist ..... when small amounts of acid ( $H^+$ ) or base ( $OH^-$ ) are added. ✓
31. The total hydrogen ion concentration from all sources is experimentally measurable and is expressed as the.....
32. Solutions having a pH less than 7 is .....
33. As the ion product of water is constant, whenever  $[H^+]$  is greater than  $1 \times 10^{-7} M$ ,  $[OH^-]$  must become
34. Open system allows exchange of ..... and energy ✓
35. Matter cannot be created nor destroyed is ..... law of thermodynamic
36. The Mathematical relationship between  $K$  and  $DG^0$  can be written as-----
37. When the standard free energy of a reaction is positive at equilibrium, the formation of --- will be favored.
38. ----- is the actual free energy of the reaction at a given composition, and changes over the course of the reaction.
39. The thermodynamic relationship called Gulberg-Waage law is best written as -----
40. The process of using free energy released by the hydrolysis of "ATP" to drive a thermodynamically unfavourable reaction is known as -----

## SECTION B: Answer any 2 questions

1. With the aid of appropriate diagrams, explain the methods of cell fractionation. (10 Marks)
2. How can you explain biochemistry to your colleagues? (10 Marks)
3. Define Buffer (3 Marks)
- (b) Derive Henderson-Hasselbalch equation (7 Marks)



MCB/22/136

OLUSEGUN AGAGU UNIVERSITY OF SCIENCE AND TECHNOLOGY, (OAUSTECH) OKITIPUPA



SCHOOL OF SCIENCE  
DEPARTMENT OF BIOLOGICAL SCIENCES  
FIRST SEMESTER EXAMINATION, 2023/2024 SESSION

COURSE: BIO 205 (DEVELOPMENTAL CELL BIOLOGY)

UNIT: 2

TIME: 2 HRS

**Instruction:** Answer Two (2) questions in section A and B, at least one (1) question from each section and ALL questions in section C.

### SECTION A

- ✓ 1a. What is a cell? Who was the first to study unicellular microscopic organisms? ✓
- 1b. State the main components of prokaryotic and eukaryotic cell. ✓
- 1c. Tabulate the differences between prokaryotic and eukaryotic cells. List five (5). ✓
- 2a. Who was the first to use the term 'Nucleus' and which year?
- 2b. Draw a well labelled diagram of a nucleus, stating the components and a function of each.
- 2c. State the importance of nucleus.

### SECTION B

- ✓ 3a. At what points does cell check for errors in cell cycle? Enumerate the conditions checked for. ✓
- b. Define the following terms:
  - i. Independent assortment of gene. ✓
  - ii. Daughter cells ✓
  - iii. Homologous chromosomes. ✓
- 4a. Discuss the types of mitosis.
- b. Mention five significance of mitosis.

### SECTION C: Answer all questions.

- ✓ 1. The immunoglobulin are specialized proteins involved in defending the body from antigens (foreign bodies) and these immunoglobulin are also called Antibodies.
- ✓ 2. What is hormonal protein? ✓
- ✓ 3. Robert Hooke first discovered a cell in which year 1665.
- ✓ 4. The first man to witness a live cell under a microscope was Anthony Van Leeuwenhoek.
- ✓ 5. The first man to make a compound microscope was Zaccharias Janssen.
- ✓ 6. Adumbrate at least four classical interpretation of cell theory. ✓
- ✓ 7. Cell can be subdivided into Prokaryotic and Eukaryotic.
- ✓ 8. Highlight four factors that affect enzyme activities. pH, Temperature, inhibitors, enzyme conc.
- ✗ 9. List the major features of the International Union of Biochemistry (IUB) nomenclature system.



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DEPARTMENT OF BIOLOGICAL SCIENCES  
FIRST SEMESTER EXAMINATIONS, 2023/2024 ACADEMIC SESSION

BIO 211: Introductory Genetics and Evolution (3Units) Time Allowed: 2 ½ hours

INSTRUCTION: Answer all questions in section A and two (2) questions each from sections B and C.

Section A

- (1) Define the following terms: (a) Genotype (b) Phenotype (c) Homologous chromosomes (d) Locus (e) Alleles (f) Linked genes (g) Monocentric chromosome (h) Oogenesis (i) Karyokinesis (j) Meiosis
- (2) Differentiate between Autosomes and Sex chromosomes.
- (3) What is the number of chromosomes in the somatic cell of humans? State the number of autosomes and the sex chromosomes?
- (4) List three (3) patterns of sex determination and give two examples each of the patterns (2) examples each.
- (5) Which of the sex chromosomes is responsible for maleness in humans and birds?

Section B

- (1) (a) Draw and label a typical satellited acrocentric chromosome.
- (b) What is the other name for centromere and the normal division of the centromere?
- (c) What are heritable variations?
- (d) State the characteristics of heritable variations.
- (2) With appropriate diagrams, describe the process of mitosis in an organism with chromosome number of  $2n=4$
- (3) (a) Write out the differences between the products of mitosis and meiosis.
- (b) What are the significances of meiosis in sexually reproducing organisms?

Section C

- (1) In horse, short hair is controlled by a dominant allele (F) while long hair is controlled by its recessive allele (f). On the other hand, black hair is controlled by a dominant allele (B) while brown hair is controlled by a recessive allele (b). In a cross between  $FfBb \times FfBb$ : (a) Classify the offspring on the basis of parental and recombinant types of phenotype and give their genotypes, phenotypes, genotypic and phenotypic ratios.
- (2) (a) Blood type locus with two alleles, M or N, and three MM, MN, NN genotypes are possible. The data below was collected from a single human population. Calculate the genotypic and phenotypic frequencies.

genotypes	No. of individual	Genotypic frequencies	Allelic frequencies
MM	1787		
MN	3039		
NN	1303		

- (b). Write short notes on the following: (i) Hardy Weinberg equilibrium (ii) Punnett square (iii) Phenotypic ratio (iv) Genotypic ratio (v) Allele
- (3) (a) Mention five (5) reasons why Mendel used Pea plant in his experiment
- (b) A dominant allele W confers black fur for mice. A mouse that is homozygous recessive (ww) has white fur. David would like to know whether his pet black-furred mice is homozygous dominant (WW) or heterozygous (Ww). How can he determine his pet's genotype?
- (c) Define the following terms: (i) Backcross (ii) Recessive allele (iii) Testcross (iv) Pure line (v) Monohybrid cross



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OKITIPIPA



SCHOOL OF SCIENCE  
DEPARTMENT OF BIOLOGICAL SCIENCES  
SECOND SEMESTER EXAMINATION, 2022/2023 SESSION

ZOO 202/212 (CHORDATES) UNIT: 2 TIME: 2 HRS

Instruction: Answer any FOUR (4) questions in all and at least TWO (2) from each section

SECTION A

1a. Describe the patterns of reproduction in mammals. Give the common names of some mammals

belonging to each group.

b. What anatomical characteristics set primates apart from other mammals?

2a. Give FIVE (5) distinguishing features each of Ascidian tadpole larva and the adult tunicates.

b. List the THREE (3) classes of Urochordates, citing ONE example for each class.

3a. Explain with the aid of diagram the types of fish scales.

b. In a tabular form, highlight FIVE (5) differences between the two groups of Osteichthyes with

relevant examples.

SECTION B

4. Discuss FIVE characteristics of reptiles that distinguish them from amphibians.

5a. Citing an example for each, state FIVE Orders each for the Paleognathae and Neognathae.

b. Write a short note on paedomorphosis in amphibian.

6. Succinctly explain the subclass Elasmobranchii.