

Biochemistry Historical and Quantitative Milestones

Biochemistry · Practice Test · 20 Questions

1. In what year did James B. Sumner publish his definitive proof that the enzyme urease is a protein, thereby settling a long-standing debate?

- A) 1926
- B) 1932
- C) 1940
- D) 1918

2. The first crystal structure of a protein, myoglobin, was determined by John Kendrew and Max Perutz in which year?

- A) 1953
- B) 1958
- C) 1962
- D) 1948

3. How many carbon atoms are present in the core structure of a steroid nucleus (gonane)?

- A) 15
- B) 17
- C) 19
- D) 21

4. The complete human mitochondrial genome consists of approximately how many base pairs?

- A) 12,500
- B) 16,569
- C) 22,400
- D) 8,200

5. The term 'biochemistry' (Biochemie) was first coined by which German chemist in 1903?

- A) Carl Neuberg
- B) Eduard Buchner
- C) Hermann Emil Fischer
- D) Frederick Gowland Hopkins

6. What is the standard free energy change ($\Delta G'^{\circ}$) for the hydrolysis of phosphoenolpyruvate (PEP) in kJ/mol?

- A) -30.5
- B) -42.3
- C) -61.9
- D) -14.8

7. At a pH of 7.4, what is the approximate net charge of a molecule of the amino acid histidine (pKa of imidazole group is ~6.0)?

- A) -1
- B) 0
- C) +1
- D) +0.5

8. The 'Central Dogma' of molecular biology was first articulated by Francis Crick in what year?

- A) 1953
- B) 1957
- C) 1961
- D) 1965

9. How many turns are found in a standard B-DNA double helix that contains 105 base pairs?

- A) 10.5
- B) 9.5
- C) 11.0
- D) 10.0

10. Who was awarded the 1907 Nobel Prize in Chemistry for his discovery of cell-free fermentation?

- A) Eduard Buchner
- B) Arthur Harden
- C) Hans von Euler-Chelpin
- D) Otto Warburg

11. In the standard genetic code, how many of the 64 possible codons are classified as 'stop' codons?

- A) 2
- B) 3
- C) 4
- D) 1

12. The peptide hormone insulin consists of two chains connected by how many interchain disulfide bridges?

- A) 1
- B) 2
- C) 3
- D) 4

13. What is the approximate molecular weight (in kDa) of a single subunit of the E. coli RNA polymerase core enzyme (beta subunit)?

- A) 151 kDa
- B) 95 kDa
- C) 43 kDa
- D) 110 kDa

14. The Henderson-Hasselbalch equation was derived by Lawrence Joseph Henderson in 1908 and later modified by Karl Hasselbalch in what year?

- A) 1910
- B) 1912
- C) 1916
- D) 1920

15. How many ATP molecules are consumed in the priming phase of glycolysis per molecule of glucose?

- A) 1
- B) 2
- C) 3
- D) 4

16. Which vitamin is chemically known as pteroylmonoglutamic acid?

- A) B1
- B) B9
- C) B12
- D) C

17. The average molecular weight of an amino acid residue in a protein is considered to be approximately how many Daltons?

- A) 95
- B) 110
- C) 128
- D) 145

18. How many high-energy phosphate bonds are broken to activate an amino acid for protein synthesis via aminoacyl-tRNA synthetase?

- A) 1
- B) 2
- C) 3
- D) 4

19. Frederick Sanger determined the full amino acid sequence of bovine insulin in which year?

- A) 1945
- B) 1953
- C) 1958
- D) 1962

20. The Michaelis constant (K_m) is numerically equivalent to the substrate concentration at which the reaction velocity is what fraction of V_{max} ?

- A) $1/4$
- B) $1/2$
- C) $3/4$
- D) $1/3$